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Lights Off: Practice and Impact of
Closing Low-Performing Schools
2017

Volume I

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Volume I

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List of Acronyms & Definitions

CCD	Common Core of Data
CREDO	Center for Research on Education Outcomes
ELLs	English Language Learners
FERPA	Family Educational Rights and Privacy Act
NAEP	National Assessment of Educational Progress
NCES	National Center for Education Statistics
SIG	School Improvement Grants
TPS	Traditional Public School
VCR	Virtual Control Record
Growth	The year-to-year change in academic performance relative to one's peers. Growth can be positive or negative.

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Volume I

Executive Summary

Introduction

For decades, communities across the country have grappled with the problem of public K-12 schools that do not deliver high-quality education to the students they serve. After more than a decade of school-based accountability, policymakers have increasingly realized that there are limits to how much effort should be made to turn around a low-performing school. Many education leaders feel a strong sense of urgency that the life chances of the students enrolled in these schools are diminished with each year of continued operation and endorse closure of those schools.

The option of closing schools that persistently perform poorly has gained traction. There are two parallel systems that engage in school closure in the public K-12 education realm. For more than a decade, the charter school sector has become more insistent in closing schools that do not meet certain academic performance benchmarks. Closure is the ultimate consequence in the contractual bargain charter school operators strike with their authorizers: Do well and your charter will be renewed, but do poorly and your charter (potentially) will lose the chance to continue. Charter schools may be closed because of academic failure, though the actual risk is diminished where their overseers are timid about demanding it. The traditional public school (TPS) arena was historically resistant to closures, especially in regions where the threat of labor reprisals was credible. But given the persistent trends in low performance in many TPS and about 15 years of evidence that alternative strategies have not produced substantial improvement, the use of closure as a policy intervention has grown in TPS across the country.

Closures of low-performing schools are usually hotly contested events. Supporters claim that by closing schools, students will be removed from an unproductive environment and be better off under the wing of other educators. They also believe that closing low-quality schools holds out the chance

to transfer the building and facilities to other uses. Opponents are concerned that school closures will disrupt students' educational experiences, cause psychological stress and impair their outcomes.

Despite heated debates over the practice, empirical evidence about school closure is limited in scope and time and has produced mixed findings. The record is particularly weak about what school settings closure students move to and how they progress academically in the post-closure era. Lacking reliable information on school closures, policymakers, educators and parents risk the future learning of affected students.

Taking advantage of the multistate, longitudinal dataset of unprecedented scale that CREDO has built under FERPA (Family Educational Rights and Privacy Act)-compliant agreements with its state education agency partners, we systematically examined closure of low-performing public schools in both the charter and TPS sectors. Our investigation covered four broad areas. First, we built a national picture of school closures, for the first time providing a comparative accounting of the practice across sectors and across the country. Given the variation we observed, we examined whether equivalently performing schools faced comparable treatment across the country. From a focus on school outcomes, we shifted the focus to the schooling trajectory of students who were enrolled in closing schools in the final years of operation. Finally, and in many ways most importantly, we studied the impact of school closure on the academic progress of closure students. By addressing these questions, we hope to provide a solid foundation for informed evaluations of – and constructive discussions on – closure as a policy instrument to cope with academically low-performing schools.

Project Approach

We used the longitudinally linked data that CREDO had developed in partnership with 26 state education agencies to pursue our inquiry. We identified low-performing, full-time, regular (non-alternative) schools and closures in those 26 states from academic year 2006-07 to 2012-13, depending on the availability of data. A school was defined as low-performing if its average reading and math scores were both in the bottom 20 percent (i.e., the bottom four ventiles) in a state in a given year as well as the previous year.¹ Then we flagged the low-performing schools as closed based on the codes of the Common Core of Data (CCD) from the National Center for Education Statistics (NCES). A total of 1,522 low-performing schools, including 1,204 TPS and 318 charters, were closed in the 26 states during our study period.

Different analyses were conducted to address different questions. One group of questions aimed to provide for the first time an aggregate picture of the practice of closing low-performing schools across the country. We used descriptive analyses and tests of differences in statistics between groups to explore what the national landscape of closing low-performing schools looked like, whether similarly low-performing schools were treated equivalently, whether there was an early transfer of students in

¹ Each ventile covers 5 percent of the school population. The first ventile includes the lowest-performing 5 percent of schools in a state in terms of achievement. The 20th ventile includes the highest-performing 5 percent of schools in a state in terms of achievement.

the year before the official closure, and what sectors and school settings displaced students moved to after their schools had closed.

The second group of questions focused on the fates of students who were enrolled in the final years of operation in the low-performing schools that closed. We employed the Virtual Control Record (VCR) method developed by CREDO in our analysis of the academic impact of closure on individual students. Using the VCR approach, a “virtual twin” was constructed for each closure student by drawing on the available records of students with identical traits and identical or very similar baseline test scores but who were enrolled in continuing low-performing schools in the same sector (charter or TPS). If matched, this virtual twin would differ from the closure student only in that one student attended a closed school. We then estimated the impact of school closure by comparing the academic progress of closure students and their virtual twins (or peers) from the same sector. The VCR matching protocol has been assessed against other possible study designs and judged to be reliable and valuable by peer reviewers.

To study the academic performance across low-performing schools, we relied on scores students received on state standardized achievement tests. Achievement tests capture what a student knows at a point in time. These test results were fitted into a bell curve format that enabled us to see how students moved from year to year in terms of academic performance and how students’ scores compared to students in other states in the study.

Two successive test scores allow us to see how much progress a student makes over a one-year period; this is also known as a growth score. Growth scores have the advantage that they allow us to zero in on the contributions of schools separately from other things that affect point-in-time scores. The parsed effect of schools in turn gives us the chance to see how students’ academic progress changes as the conditions of their education transform. This is the analytic foundation for our examination of the academic impact of school closure.

To assist the reader in interpreting the meaning of the effect sizes in our impact analysis, we include an estimate of the number of days of learning required to achieve a particular effect size.

Major Findings

Our analyses revealed the following major findings:

Closures of low-performing schools were prevalent but not evenly distributed. Closures were on the rise in the study period. Geographically, closures appeared to be concentrated in a few key states, especially so in the TPS sector. Considering locale and grade span, closure was mostly an urban phenomenon focused largely on elementary schools, where students have a longer time to recover and communities tend to have more than one school in the system to receive affected students. High school closures were rarer, probably because of strong community affinity and scarcer alternatives.

Low-performing schools that were eventually closed exhibited clear signs of weakness in the years leading to closure compared to other low-performing schools. Closing schools had lower

academic performance and smaller student enrollment than low-performing schools that were permitted to remain open. In fact, there were steady declines in both academic achievement and growth in closing schools in the last three years before closure. Enrollment in those schools also dwindled in the last few years of operation.

Variations in closures of low-performing schools by sector were particularly salient. Although the number of charter closures was smaller than that of TPS closures, the percentage of low-performing schools getting closed was higher in the charter sector than in the TPS sector. This pattern was particularly pronounced in the first (from the bottom) state ventile of achievement. On average, the academic performance of closed charter schools was lower than that of closed TPS. However, the performance differences between the charter and TPS closures varied widely from state to state, suggesting that districts and charter authorizers operated in different legislative and regulatory environments. It was also clear that within states, decision-makers in the charter and TPS arenas exercised varying degrees of political will and drew on different approaches when they determined how to deal with low-performing schools.

Closures of low-performing schools were not blind to socioeconomic status or race/ethnicity of the students who were enrolled. In both the charter and TPS sectors, and particularly in the lowest ventile of achievement, low-performing schools with a larger share of black and Hispanic students were more likely to be closed than similarly performing schools with a smaller share of disadvantaged minority students. Moreover, the closure rates for higher-poverty low-performing TPS in the bottom two ventiles surpassed the rates for lower-poverty TPS of similarly low performance. These observed inequivalent tendencies raise the issue of equity in decision-making about school closures.

There was an obvious early departure of students before the official closure. In both sectors a higher percentage of students transferred from closing schools one year before the official closure than did students attending continuing low-performing schools in the same period. The rate of early transfers was higher for closing charters than for closing TPS. Early leavers from both charter and TPS closures had worse academic performance than students who remained until the official closure as well as students who transferred from not-closed low-performing schools in the same sector in the same year.

A little less than half of displaced closure students landed in better schools. This held for both sectors. A higher share of displaced charter students ended up in better school settings than did TPS closure students, compatible with the stronger capabilities of parents of charter school students in maneuvering school choices. The chance for superior placement among students who left in the year before school closure was somewhat higher, implying some advantage for early departure given limited seats available in better local schools. Some students who did not land well in the first one or two years after closure attended a better school in the next year. However, the dominant pattern was for the schools that students attended in the second and third years following closure to mirror the quality of their schools in the previous year. The pattern possibly reflected families' preference for stability over improved quality in their choice of schools or the realistic constraint of the options for

quality alternatives. These findings resonate with a widely held concern that there is a shortage of better options for students displaced by school closures. This concern is well-founded, as better schools are critically important for students' future academic progress.

The quality of the receiving school made a significant difference in post-closure student outcomes. Closure students who attended better schools tended to make greater academic gains than did their peers from not-closed low-performing schools in the same sector, while those ending up in worse or equivalent schools had weaker academic growth than their peers in comparable low-performing settings. This pattern was stronger for TPS closure students. The finding also held for a number of racial-ethnic groups and was particularly salient for black and Hispanic closure students. The effect was most pronounced for black and Hispanic students in poverty. However, the academic benefit of closure is systematically constrained, as the supply of superior alternatives for closure students is limited and there are systemic access challenges such as parent information and district placement practices.

Implications

Views on how to deal with academically failing schools diverge among policymakers, educators and parents. As the most radical measure, closure has received politically charged debate. The findings revealed in this study establish a foundation for evidence-based discussion about the implications of closing low-performing schools.

Closing chronically low-performing schools seems to be an inevitable option. The widespread failure of school improvement strategies makes the option of keeping chronically low-performing TPS schools in the hope of making progress over time unattractive and impractical. Previous research by CREDO has also demonstrated that a charter school that performs poorly at the beginning is very unlikely to improve later on (Peltason & Raymond, 2013; Woodworth & Raymond, 2013). Hence, closing persistently low-performing schools seems to be pushed to the front as an inevitable alternative. Our findings point out several intricacies, and call for caution, in implementing this bold policy measure.

Decision-makers need to assure equity in dealing with low-performing schools. Only a small fraction of low-performing schools have been closed, and our evidence suggests that closures of low-performing schools were biased by non-academic factors. In particular, closures were tilted toward the most disadvantaged schools such as the ones with higher concentrations of students in poverty and higher shares of black and Hispanic students, which raises the issue of equity in the practice of closures. Districts and charter authorizers face exposure in this regard. They will benefit from reviewing their policies and processes for closures. They should identify and refrain from explicit and unconscious biases in decision-making about closing low-performing schools.

Distinct patterns of closures in the charter and TPS sectors call for attention to accountability in both systems. School districts have been more tolerant of low-performing TPS, as evidenced by lower rates of closures of low-performing schools in sum and by category in the TPS sector than in the

charter sector. Although districts are likely to be confronted with greater pressure from various stakeholders when dealing with academically failing schools, the well-being of students should be their top concern. Responsible districts should never let chronically low-performing schools continuously erode student learning outcomes. In the charter sector, there should not be schools with very poor performance, particularly in the lowest state ventile, since the contract with authorizers obliges individual schools to meet certain academic goals. The existence of poorly performing charter schools raises the question of how accountability is implemented. Apparently, agreement with the terms on paper is not always sufficient. What matters more is the will on the part of charter authorizers to execute the terms and take action when things go wrong in schools.

Individual states will benefit from reviewing their closure criteria and processes and from learning from the experiences of successful states. The state is the locus for the formulation and supervision of many education policies and practices. Our data demonstrated that states varied extensively in the prevalence of closing low-performing schools, the academic criteria that were applied in the decision about closures, and the focus on ensuring student academic progress in post-closure periods. Individual states have yet to review the level of rigor in their making and implementation of policies and practices for coping with low-performing schools. They can also learn useful lessons from their counterparts that have successfully closed low-performing schools, relocated closure students to better schools and promoted improved academic performance of closure students after closure.

The quality of the receiving schools plays a significant role in the academic progress of closure students. However, superior alternatives are limited. Innovative measures are called for to yield positive outcomes for students. Closing low-performing schools alone does not automatically lead to better outcomes for students, but needs to be accompanied by effective follow-up measures to ensure better treatment of students. Our findings of the role that the quality of the receiving school played in the academic progress of closure students suggest it is crucial to assign affected students to higher-performing schools. However, we cannot pin all our hopes on currently higher-performing schools if there are many students to place. Not even half of the displaced students in our analysis were able to land in better schools. The chance for superior placement will grow slimmer if there are further increases in the practice of closure. Additional options need to be designed – starting new schools, for example. It is true that new schools are likely to be mixed in quality. But if poorly performing schools are closed and better schools are kept, there will be an accumulation of high-quality schools over time.

1. Introduction

Purpose of the Study

For decades, communities across the country have grappled with the problem of public K-12 schools that do not deliver high-quality education to the students they serve. After more than a decade of school-based accountability, policymakers increasingly realize that there are limits to how much effort should be made to turn around a low-performing school. For example, the U.S. Department of Education invested \$7 billion in implementing school intervention models in schools with poor performance through School Improvement Grants (SIG), one of the largest education grant programs funded by the federal government. Most of the money was spent on models that attempted to keep and improve failing schools. However, the final report for SIG evaluation reveals, “Overall, across all grades, we found that implementing any SIG-funded model had no significant impacts on math or reading test scores, high school graduation, or college enrollment” (Dragoset et al., 2017). The prospect of perpetuating investments in low-performing schools with little or no impact is unattractive politically and financially. Many education leaders feel a strong sense of urgency that the life chances of the students enrolled in these schools are diminished with each year of continued operation and endorse closure of these schools.

The option of closing schools that persistently perform poorly has gained traction. By closing schools, the theory goes, students will be removed from the unproductive environment and be better off under the wing of other educators. Closing low-quality schools also holds out the chance to transfer the building and facilities to other uses. The image that emerges is of a clean and straightforward process that seamlessly reassigns students and removes the low-performing schools with a surgeon’s precision. Unfortunately, that is not how it works.

This study examines closures of low-performing public schools and their impact on the academic fates of closure students. Our intent is to present to decision-makers and the general public unbiased, data-driven evidence for deeper discussion of closure as a policy instrument to cope with chronically failing schools. We found that closures of low-performing schools were on the rise and were handled differently in the charter and TPS sectors. We also found that a little less than half of students displaced by closures landed in better schools, while the quality of the receiving school made a significant difference in post-closure academic progress of closure students.

Context

Two parallel systems engage in school closure in the public K-12 education realm. For more than a decade, the charter school sector has become more insistent in closing schools that do not meet certain academic performance benchmarks. Closure is the ultimate consequence in the contractual bargain charter school operators strike with their authorizers: Do well and your charter will be renewed, but do poorly and your charter (potentially) will lose the chance to continue. Charter schools may be closed because of academic failure, though the actual risk is diminished where their overseers are timid about demanding it.

The traditional public school (TPS) arena was historically resistant to closures, especially in regions where the threat of labor reprisals was credible. But given the persistent trends in low performance in many TPS and about 15 years of evidence that alternative strategies have not produced substantial improvement, the use of closure as a policy intervention has grown in TPS across the country. The education leaders who have taken a strong stand on closing TPS for academic failure have had strong positional authority and deep political pockets. Former Education Secretary Arne Duncan accused education agencies and their leaders of being "unwilling to close failing schools and create better options" (Duncan, 2009). In New York City, former mayor Michael Bloomberg closed 140 schools for low academic performance (CBS News, 2013). A few state education agencies have created "recovery districts" to remove low-performing schools from local district control, close the schools and transfer the students to other campuses. But improvement has not occurred subsequently under direct operation in the recovery district.

From the outset of the practice, closure has rested on the presumption of superior alternatives, as exemplified by Secretary Duncan: "This may seem like surrender, but in some cases it's the only responsible thing to do. It instantly improves the learning conditions for those kids and brings a failing school to a swift and thorough conclusion" (Duncan, 2009). This view received support from many reform advocates (Hess & Gift, 2008; Smarick, 2010). Superintendents, state chiefs and charter school authorizers in favor of closures take a leap of faith that students who attend low-performing schools that are ultimately closed will be able to move to better schools and gain academic progress. Similarly, school closure is seen as a means of raising the average achievement level across a district by eliminating the low-performing schools in the belief that they will be replaced by higher-performing institutions.

Closures of low-performing schools are usually hotly contested events, though the flash points differ across stakeholders. Some education leaders opposing school closures believe students are the root causes of school poor performance. For example, Jimmy Gittings, a vice president for the American Federation of School Administrators, argued, "The foundation in the development of a child begins at home. We are not getting that foundation. That's why our schools aren't strong" (Tavernise, 2010).

Teachers and their unions protest the loss of positions, often blaming the district or charter operator for failure to provide sufficient remedial support to bring about improvements. Districts decry the loss of state and federal funding that accompanies closures and worry about how remaining schools can absorb the students from the closed ones.

Parents are ambivalent about the practice. They recognize the inconvenience and disruption of searching out new school options for their children. They fear that their children will find the transition difficult, further hindering their academic progress. Worse, some parents and students fear the reaction they might receive when students' deficiencies are realized at the next school they attend. Moreover, they have a legitimate concern in many cases about the quality of the alternatives they will be offered.

In addition to academic concerns, communities protest closures due to the loss of neighborhood schools, the end of a school's often-multigenerational history, empathy for those who will lose their jobs or lack of authentic engagement with the community around the closure policy and practice.

Current Literature on School Closures

Despite heated debates over the practice, much of what we know about school closure is fragmented and anecdotal. The vast majority of low-performing schools slated for closure are in communities that have the highest concentrations of ethnic minorities and poverty (Burdick-Will, Keels, & Schuble, 2013; Nathanson, Corcoran, & Baker-Smith, 2013). What school settings closure students move to and how they progress academically in the post-closure era are less clear.

Research on the fates of closure students is thin and geographically limited and has produced mixed findings. Carlson and Lavertu (2015) found that the majority of displaced students from closed urban schools in Ohio landed in higher-quality schools. The scenario in Chicago changed over time. Only 6 percent of students affected by closures between 2001 and 2006 ended up in top-performing Chicago public schools and placements for the remaining students did not improve their chances for success (de la Torre & Gwynne, 2009). In 2013, 93 percent of displaced students went to schools that were better than the closed ones thanks to Chicago Public Schools' (CPS) implementation of measures supporting the transition of the students (de la Torre et al., 2015).² In Denver, despite a transition plan, the school closures that occurred in 2007 showed the difficulty in ensuring that all of the affected students ended up in better schools (Steiner, 2009).

Results about the academic impact of school closures in the existing literature are also inconsistent. Positive effects were found in Ohio urban districts, in New York City high schools and in New Orleans (Bross, Harris, & Liu, 2016; Carlson & Lavertu, 2015; Kemple, 2016). Barrow, Park and Schanzenbach (2011) focused on students displaced by school closures for academic failure under the Chicago Renaissance 2010 policy and found that closure of 24 elementary schools had no impact on the performance of students. Bross, Harris, and Liu (2016) discovered negative effects for displaced high school students in Baton Rouge, Louisiana. Ozek, Hansen, & Gonzalez (2012) demonstrated that displaced students had declining performance in the final year before closing *and* the first year of transfer, but the effect dissipated in the second year. Several studies probed the role of the receiving school and revealed more positive learning outcomes for closure students who moved to higher-quality schools (Bross, Harris, & Liu, 2016; Carlson & Lavertu, 2015; de la Torre & Gwynne, 2009; Engberg, Gill, Zamorro, & Zimmer, 2012; Stroub & Richards, 2016).

Each of the above studies, however, is limited in scope and time. Lacking reliable information on school closures, policymakers, educators and parents risk the future learning of students affected by closure.

² "CPS assigned all displaced students to a '*welcoming school*' that was rated higher-performing than their closed schools. The district made investments in these welcoming schools and expanded the already existing Safe Passage program to include routes to these schools with adult monitors" (de la Torre et al., 2015, p.1).

Research Questions in the Study

Taking advantage of the multistate, longitudinal dataset that CREDO has built under FERPA (Family Educational Rights and Privacy Act)-compliant agreements with its state education agency partners, this study systematically examined closure of low-performing public schools in both the charter and TPS sectors. The areas of investigation included the national landscape of school closures, equivalence in the treatment of similarly performing schools, schooling trajectory of students who are enrolled in closing schools and the impact of closure on the academic progress of closure students. This report is guided by the following four sets of questions:

1. What does the landscape of closing low-performing schools look like nationally? Are the schools that eventually get closed for academic failure lower-performing than those that are allowed to remain open? Do charter schools get closed at higher or lower levels of achievement than TPS?
2. Are the fates of similarly low-performing schools treated equivalently across the country and within states? If among the worst schools only a subset is closed, are there discernible school attributes that distinguish the schools that are closed?
3. What happens to the students enrolled in low-performing schools? Is there obvious early departure of students in the year before the closure? Do the students who leave before the schools close look different from those who stay until closure? Are students attending closing schools able to find superior placements? Do school placements differ depending on the timing of the student departure?
4. How does the academic progress of students from closed schools compare to that of peers from low-performing schools that remain open? Does the impact vary by state, lapsed time since closure, number of closures experienced, student subgroup and the quality of the receiving school?

By addressing these questions, we hope to provide a solid foundation for informed evaluations of – and constructive discussions on – closure as a policy instrument to cope with academically low-performing schools. As will be shown in ensuing chapters, incidences and consequences of closures differ across sectors, states and other categories. The patterns offer helpful insights into the differences in closure mechanisms and practices to address the academic needs of affected students, which have a bearing on future policies and practices related to school closures across the country.

Outline of the Report

This report is composed of two volumes. Volume I focuses on the low-performing schools that closed. Chapter 2 gives a brief description of the data and analytic approaches, including how closed low-performing schools were identified, which states and years were covered in the study, and what analyses were conducted to address different questions. Chapter 3 depicts the national landscape of closures of low-performing schools. It finds a rise in school closures over time, higher closure rates in the charter sector than in TPS, varying likelihoods of closure across states, and concentrations of closures in elementary schools and in urban areas. Schools that were eventually closed show weaker academic performance and lower student enrollment in the years leading to closure than low-

performing schools that remained open. Chapter 4 evaluates the equivalence of treatment of similarly low-performing schools. Higher-minority schools were more slated for closure than lower-minority counterparts in both the charter and TPS sectors. Higher-poverty TPS were also more prone to be closed than lower-poverty TPS of similar performance.

In Volume II, we explore what happened to students who attended closing low-performing schools. We start with a quick roadmap for Volume II. Then Chapter 5 examines the pre- and post-closure transfers of students who were enrolled in closing schools. An obvious early departure of students in the year before school closures emerged. Slightly less than half of the students who were directly affected by closure were placed into a better school than the closed one in the year following closure. The schools which the majority of displaced students attended in the second and third years after closure were of the same quality as the schools they went to in the previous year. Chapter 6 looks into the impact of closure on student academic progress and reveals the remarkable role of the quality of the receiving school. Closure students with superior school placement made greater academic gains than their peers from continuing low-performing schools in the same sector, while those ending up in inferior or similar-performing schools had weaker growth than their counterparts from comparable low-performing settings. Chapter 7 concludes the whole report, highlighting major findings and discussing their implications for closure-related policies and practices.

2. Methods and Data

Identifying Closed Low-Performing Schools

We focused on full-time, regular (not alternative) public schools when we searched for schools that have been closed due to low academic performance. Alternative schools were excluded based on the assumption that the motivations and practices for their closure are different and merit a separate study. Thus, only regular schools consisting of full-time students constituted the pool from which we gleaned low-performing closures.

Closed low-performing schools were identified in several steps. First, we estimated the performance of each school in a year by averaging the test scores of the students in the school for reading and for math, using longitudinal student test data. Then the schools in the same state and in the same year were ranked by their performance. A school was defined as low-performing if its average reading and math scores were both in the bottom 20 percent (i.e., the bottom four ventiles) in a state in a given year as well as the previous year.³ After that, we combed the Common Core of Data (CCD) from the

³ Each ventile covered 5 percent of the school population. The first ventile included the lowest-performing 5 percent of schools in a state in terms of achievement. The 20th ventile included the highest-performing 5 percent of schools in a state in terms of achievement.

National Center for Education Statistics (NCES), flagging the low-performing schools that were coded as closed by NCES and recording the last year of operation for the closed school.

Data Structure

Table 1 lists the 26 states and the years from which we identify low-performing schools and closures.⁴ We split New York state into two units – New York City and upper New York State – as education policies, practices and outcomes differ considerably in the two regions. This division runs through our analysis and the rest of the report. A total of 1,522 closed low-performing schools were identified within our data window. In some analyses we trace school and student trajectories at least one year before or after closure. In those cases we use data for the year before the first year and the year after the last year as indicated in Table 1.

⁴ For Missouri, only Kansas City and St. Louis were included in the study due to the availability of data. High school test scores for Michigan for 2005 were not available. Since we identified low-performing schools and closures based on school performance in a given year and the previous year, closed low-performing high schools in Michigan in 2006, if there were any, were not covered in the study.

Table 1: States and Years with Low-Performing Schools under Study

State	Number of Years in Study	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13
Arizona	7	X	X	X	X	X	X	X
Arkansas	7	X	X	X	X	X	X	X
California	6	X	X	X	X	X	X	
Colorado	7	X	X	X	X	X	X	X
District of Columbia	7	X	X	X	X	X	X	X
Florida	7	X	X	X	X	X	X	X
Georgia	7	X	X	X	X	X	X	X
Illinois	4				X	X	X	X
Louisiana	7	X	X	X	X	X	X	X
Massachusetts	7	X	X	X	X	X	X	X
Michigan	6	X	X	X	X	X	X	
Minnesota	7	X	X	X	X	X	X	X
Missouri	7	X	X	X	X	X	X	X
Nevada	7	X	X	X	X	X	X	X
New Jersey	6		X	X	X	X	X	X
New Mexico	7	X	X	X	X	X	X	X
New York City	7	X	X	X	X	X	X	X
New York State	7	X	X	X	X	X	X	X
North Carolina	2						X	X
Ohio	7	X	X	X	X	X	X	X
Oregon	7	X	X	X	X	X	X	X
Pennsylvania	6		X	X	X	X	X	X
Rhode Island	6	X	X	X	X	X	X	
Tennessee	7	X	X	X	X	X	X	X
Texas	6		X	X	X	X	X	X
Utah	7	X	X	X	X	X	X	X
Wisconsin	6	X	X	X	X	X	X	

Note: For Missouri, only Kansas City and St. Louis were included in the study. Closed low-performing high schools in Michigan in 2006, if there were any, were not included.

Analytic Approaches

Different analyses were conducted to address different questions. One group of questions aimed to provide for the first time an aggregate picture of the practice of closing low-performing schools across the country. We used descriptive analyses and tests of differences in statistics between groups to explore what the national landscape of closing low-performing schools looked like, whether similarly low-performing schools were treated equivalently, whether there was an early transfer of students in the year before the official closure, and what sectors and school settings displaced students moved to after their schools had closed.



[Click here for an infographic about the Virtual Control Record method.](#)

The second group of questions focused on the fates of students who were enrolled in the final years of operation in the low-performing schools that closed. We employed the Virtual Control Record (VCR) method developed by CREDO (Davis & Raymond, 2012) in our analysis of the academic impact of closure on individual students. Using the VCR approach, a “virtual twin” was constructed for each closure student by drawing on the available records of students with identical traits and identical or very similar baseline test scores but who were enrolled in continuing low-

performing schools in the same sector (charter or TPS). If matched, this virtual twin would differ from the closure student only in that one student attended a closed school. We then estimated the impact of school closure by comparing the academic progress of closure students and their virtual twins (also referred to as “peers” interchangeably in the rest of the report) from the same sector. Further technical details of selecting VCRs are presented in Appendix B in Volume II. The VCR matching protocol has been assessed against other possible study designs and judged to be reliable and valuable by peer reviewers (Fortson, Verbitsky-Savitz, Kopa, & Gleason, 2012).

Presentation of Results

To study academic performance across low-performing schools, we relied on scores students received on state standardized achievement tests. Achievement tests capture what a student knows at a point in time. These test results were fitted into a bell curve format that enabled us to see how students moved from year to year in terms of academic performance and how students’ scores compared to students in other states in the study.

Two successive test scores allow us to see how much progress a student makes over a one-year period; this is also known as a growth score. Growth scores have the advantage that they allow us to zero in on the contributions of schools separately from other things that affect point-in-time scores. The parsed effect of schools in turn gives us the chance to see how students’ academic progress changes as the conditions of their education transform. This is the analytic foundation for our examination of the academic impact of school closure.

To assist the reader in interpreting the meaning of the effect sizes in our impact analysis, we include an estimate of the number of days of learning required to achieve a particular effect size. This estimate was calculated by Dr. Eric Hanushek and Dr. Margaret Raymond based on the latest National Assessment of Educational Progress (NAEP) test scores. Using a standard 180-day school year, each one standard deviation (s.d.) change in effect size is equivalent to 570 days of learning.

3. Landscape of Closure of Low-Performing Schools

Earlier work on school closures has been highly localized in scope. One of the benefits of CREDO's data-sharing partnerships with many state education agencies is the unprecedented ability to provide a wide-angle view of the practice of school closures across the 26 states included in this study. At the same time, we wish to provide important comparisons of the practice in the charter school arena and in traditional school districts. The patterns show that states differed in their use of school closure in important ways. In addition, the conditions of charter school policy imposed a different discipline upon charter schools than their district counterparts, which also surfaced distinct patterns of closures.

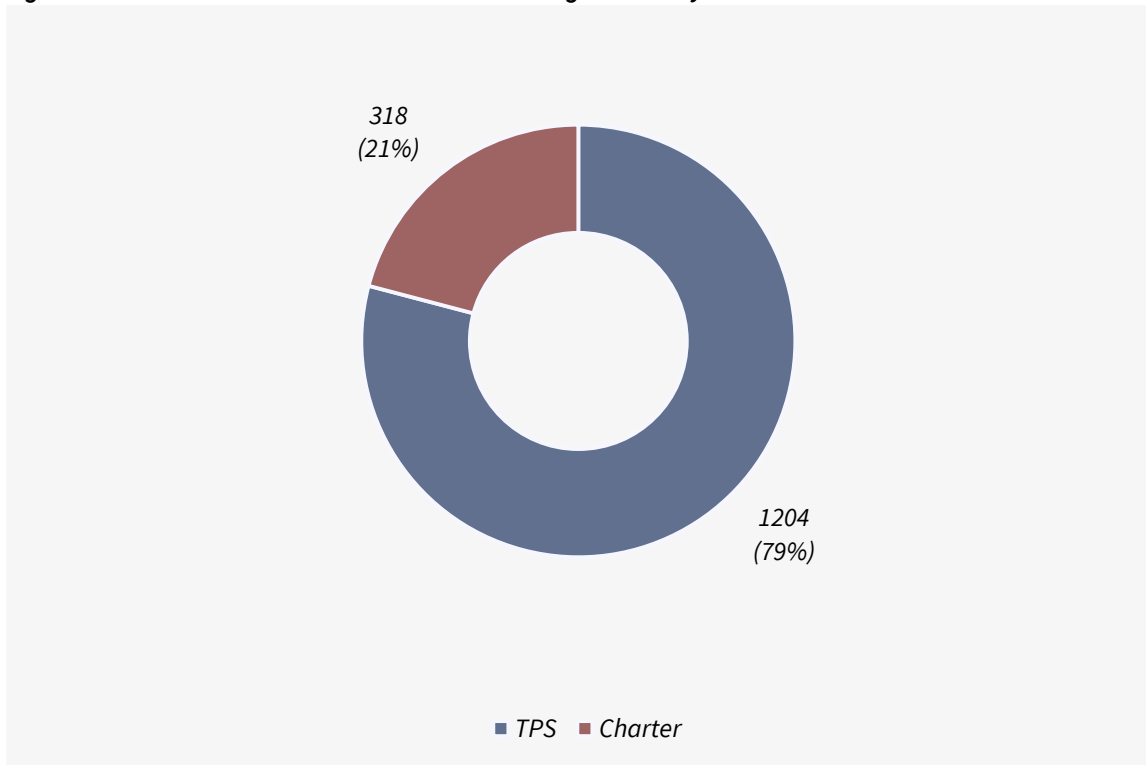
To paint a full picture of school closures in our participating states requires several passes at the data. We describe the distribution and the likelihood of closures of low-performing schools in the aggregate. We follow with results by sector (i.e., charter schools or district schools) and then further refine by state, year, grade span and locale. Then we describe the trends in academic performance and student enrollment of closed charter and TPS schools over time.

We regarded a school as low-performing if both its reading and math achievement scores were in the bottom 20 percent (i.e., bottom four ventiles) in its home state in a two-year period. They were coded as low-performing at the end of the second year.

Distributions of Closed Low-Performing Schools

A total of 1,522 low-performing schools were closed in the 26 states in the study period. Among them, 318 were charter schools and 1,204 were traditional public schools (TPS) as seen in Figure 1.

Figure 1: Distribution of Closures of Low-Performing Schools by Sector



The number of closures of low-performing schools differs across years as displayed in Figure 2 and shows an overall rising trend over the study period.⁵ The dip in 2009 was possibly due to the recession, which might raise concerns about teacher and staff layoffs induced by closures in a difficult economy.

⁵ California, Michigan, Rhode Island and Wisconsin were not included for 2012. If the same numbers of low-performing schools were closed in these four states in 2012 as in 2011, the number of charter closures for our 26 states in 2012 would be 64 and the number of TPS closures would be 236, leading to a total of 300 closures in 2012.

Figure 2: Distribution of Closures of Low-Performing Schools by Sector and Year

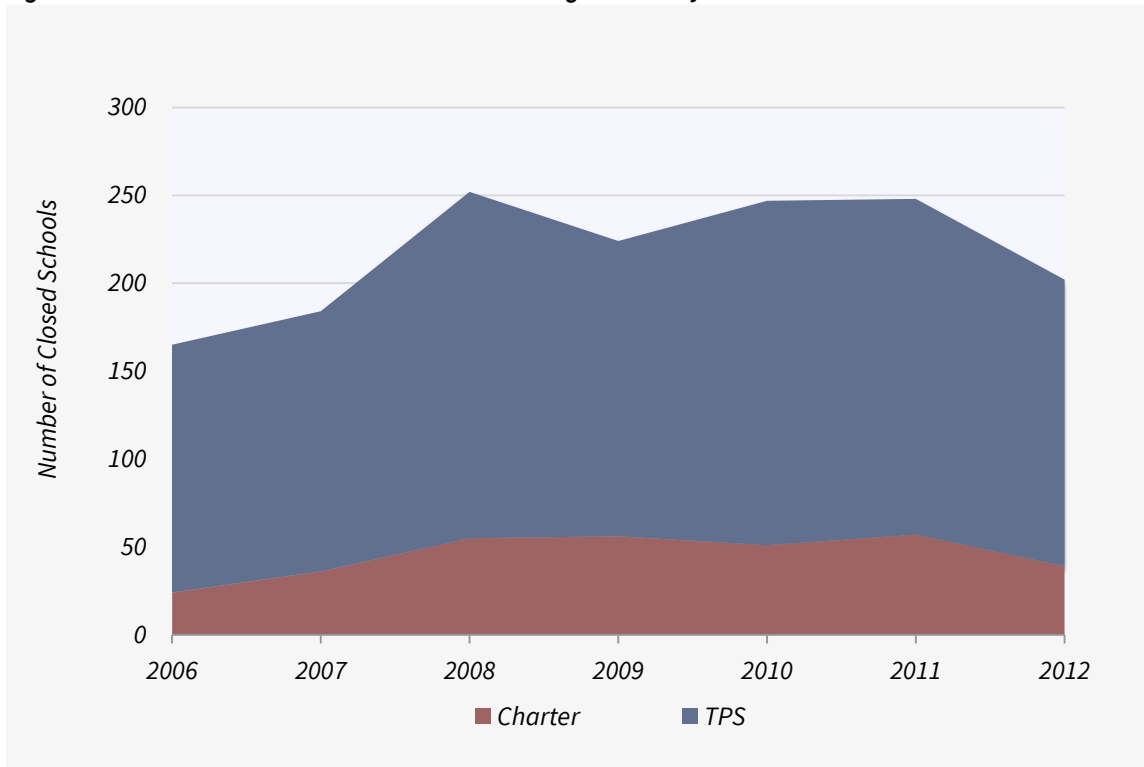


Table 2 presents the distribution of closed low-performing schools across states. The percentages distribution is shaded in red for charter closures and in blue for TPS closures. Darker hues reflect states that had larger fractions of the closures. The number of closures ranged from zero in Nevada, New York City, Rhode Island and Utah to 53 in Ohio in the charter arena and from one in Nevada to 183 in Michigan in the TPS sector. It needs to be noted as well that Detroit alone had 14 charter closures and 82 TPS closures during the years under study, which contributed to a large number of closures in Michigan.

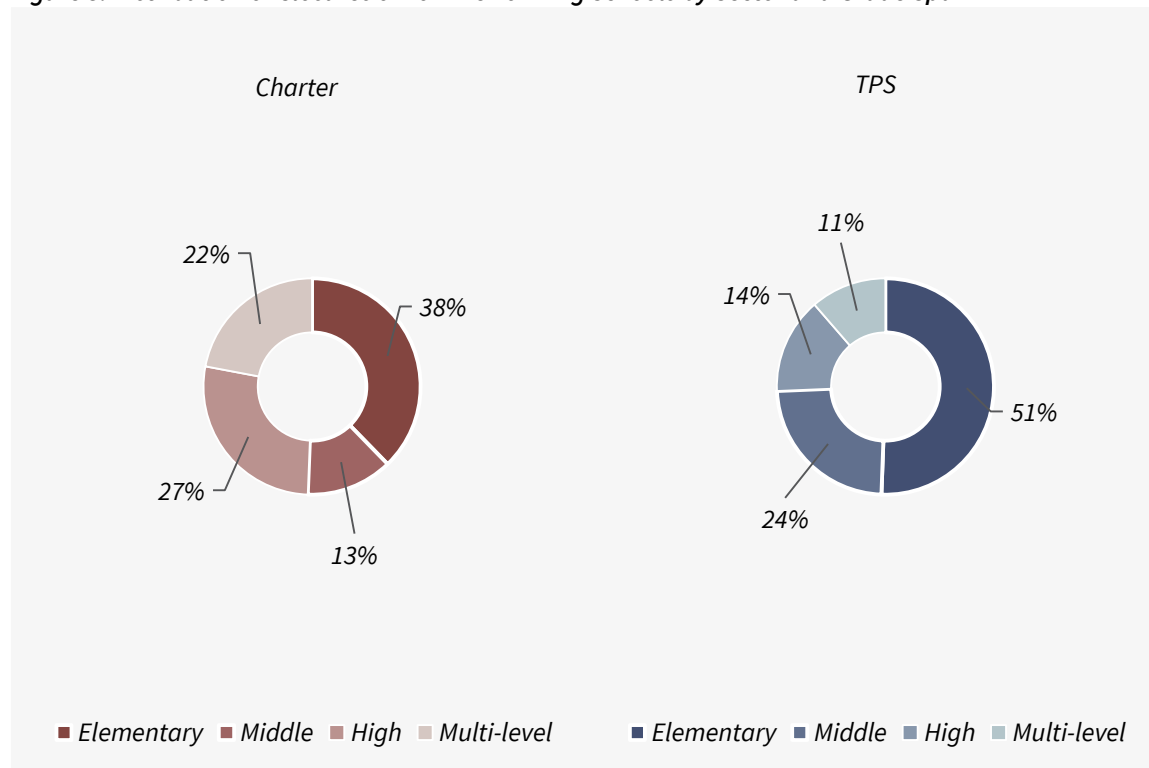
Table 2: Distribution of Closures of Low-Performing Schools by Sector and State

State	Number of Years under study	Number of Charter Closures	% Distribution of Charter Closures by State	Number of TPS Closures	% Distribution of TPS Closures by State
Arizona	7	33	10.4%	14	1.2%
Arkansas	7	5	1.6%	34	2.8%
California	6	44	13.8%	90	7.5%
Colorado	6	11	3.5%	47	3.9%
District of Columbia	7	3	0.9%	9	0.7%
Florida	7	34	10.7%	24	2.0%
Georgia	7	7	2.2%	59	4.9%
Illinois	4	1	0.3%	66	5.5%
Louisiana	7	1	0.3%	58	4.8%
Massachusetts	7	3	0.9%	55	4.6%
Michigan	6	30	9.4%	183	15.2%
Minnesota	7	18	5.7%	62	5.1%
Missouri	7	8	2.5%	7	0.6%
Nevada	7	0	0.0%	1	0.1%
New Jersey	7	6	1.9%	33	2.7%
New Mexico	7	3	0.9%	3	0.2%
New York City	7	0	0.0%	31	2.6%
New York State	7	5	1.6%	37	3.1%
North Carolina	2	3	0.9%	5	0.4%
Ohio	7	53	16.7%	112	9.3%
Oregon	7	5	1.6%	18	1.5%
Pennsylvania	6	3	0.9%	91	7.6%
Rhode Island	7	0	0.0%	9	0.7%
Tennessee	7	2	0.6%	24	2.0%
Texas	6	8	2.5%	74	6.1%
Utah	7	0	0.0%	15	1.2%
Wisconsin	6	32	10.1%	43	3.6%

Note: For Missouri, only Kansas City and St. Louis were studied.

A look at the breakdown by grade span in Figure 3 indicates that elementary schools accounted for the largest number of low-performing closures in both charter and TPS sectors. About 38 percent of charter closures were elementary schools, followed by high schools that make up 27 percent.⁶ The percentages of closed charter middle and multi-level (serving students from more than one grade span) schools were smaller. In the TPS sector, 51 percent of closures were elementary schools, followed by middle, high, and multi-level schools, which constituted 24, 14 and 11 percent respectively.

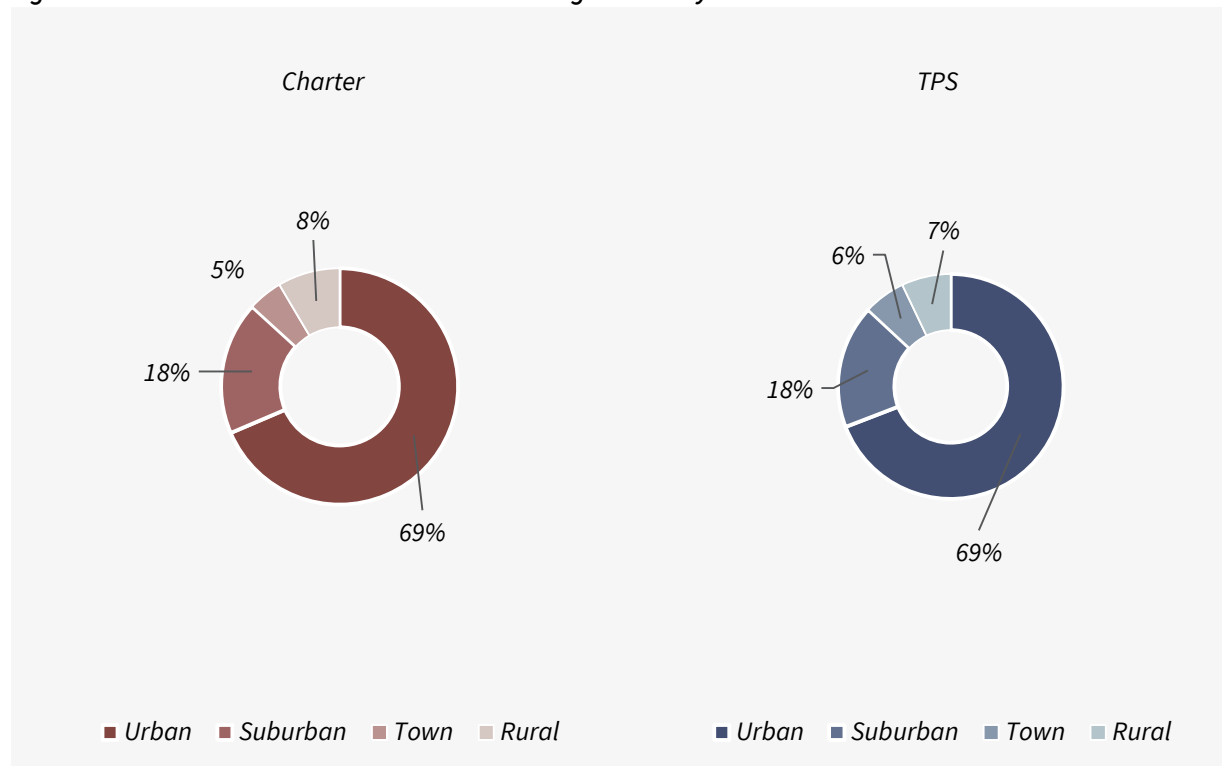
Figure 3: Distribution of Closures of Low-Performing Schools by Sector and Grade Span



⁶ While we used NCES level designations for this study, we counted any school with the lowest grade of grade 9 or higher to be a high school. NCES classifies schools as high schools only if they serve 12th grade students.

Much media attention has focused on school closures in major cities. Our data illustrated the concentration of closures in urban areas. Nonetheless, there were closures in other locales as well. Figure 4 shows that in both charter and TPS sectors, around 70 percent of closed schools were located in urban areas and nearly 20 percent of closures were suburban. The percentages of closures in towns and in rural areas were in the single digits. It is interesting that these distributions were nearly identical.

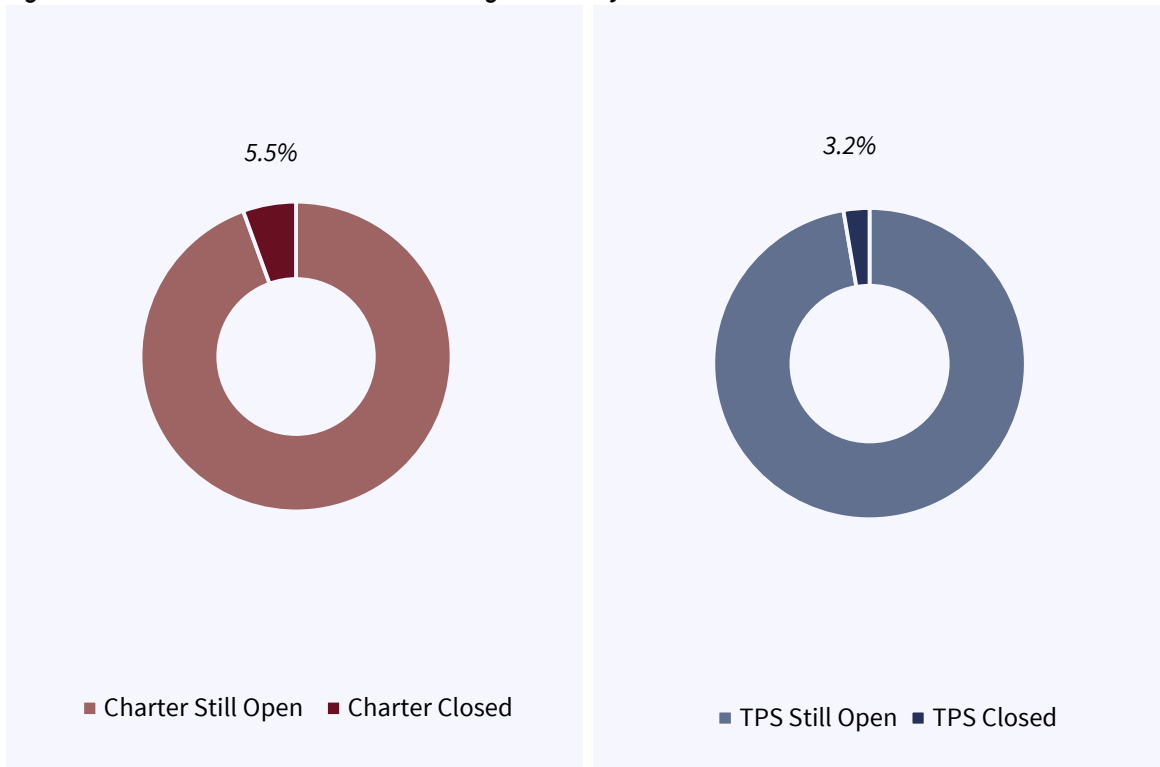
Figure 4: Distribution of Closures of Low-Performing Schools by Sector and Locale



Rate of Closures of Low-Performing Schools

Only a small fraction of low-performing schools were closed, while most were permitted to remain open. As shown in Figure 5, only 5.5 percent of low-performing charter schools were closed. The rate for low-performing TPS schools was even lower, standing at 3.2 percent.

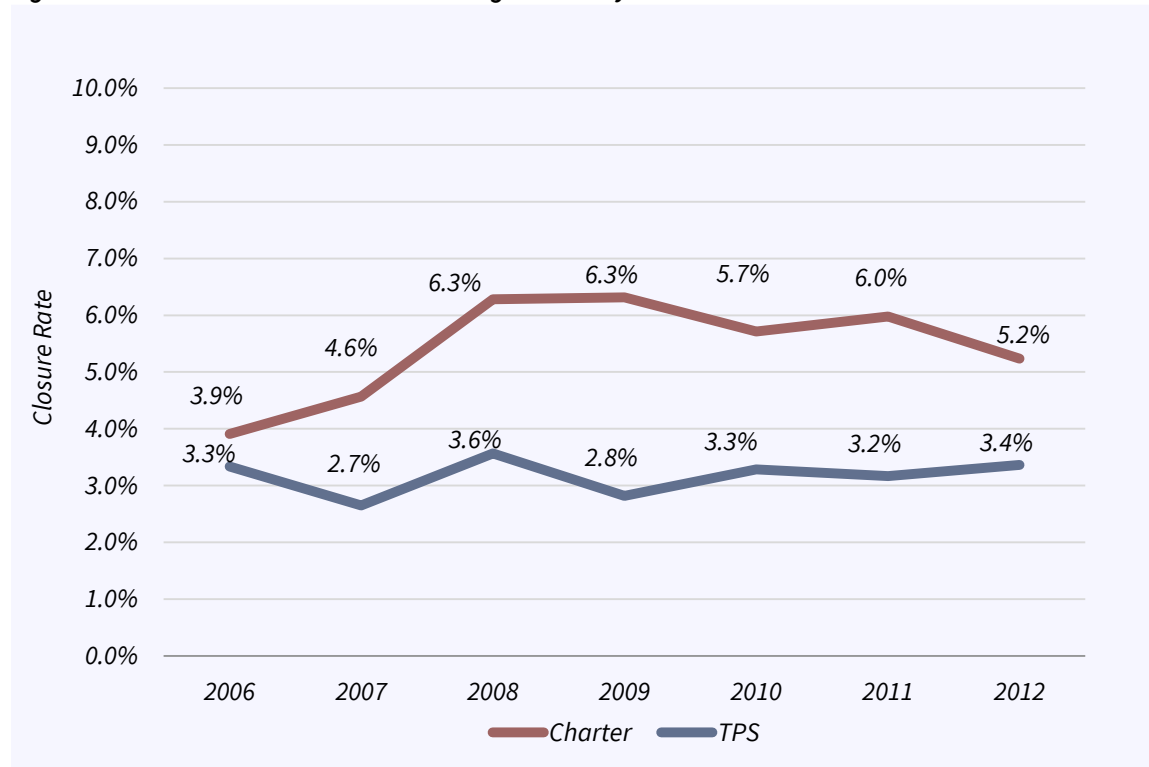
Figure 5: Rate of Closures of Low-Performing Schools by Sector



Note: The difference in the rate of closures between the two sectors is significant at the level of 0.01.

Year-by-year comparison in Figure 6 indicates that the rate of closures of low-performing charter schools has increased over time, from 3.9 percent in 2006 to a high of 6.3 percent in 2009; later years also showed an increased use of closure. The trend mirrors activity in many of the states included in this study to more diligently address the problem of charter schools that were not performing well. Conversely, closure of traditional public schools has remained largely stable over the same period, albeit at the lower rate as mentioned earlier.

Figure 6: Rate of Closures of Low-Performing Schools by Sector and Year



The disaggregation of closure rates by state in Table 3 reveals that the majority of the states have closed a higher percentage of low-performing schools in the charter sector than in TPS. The District of Columbia (D.C.) and Missouri (Kansas City and St. Louis) stood out in terms of the rate of charter closures. Many other states have also shut down a non-trivial percentage of low-performing charter schools. This pattern demonstrates that some authorizers take seriously their role as gatekeeper of the academic quality of the charter schools under their supervision. In contrast, the closure rate in the TPS arena was generally low, and only a few states (such as Michigan and D.C.) have pushed the use of closures to deal with low-performing schools.

Table 3: Rate of Closures of Low-Performing Schools by Sector and State

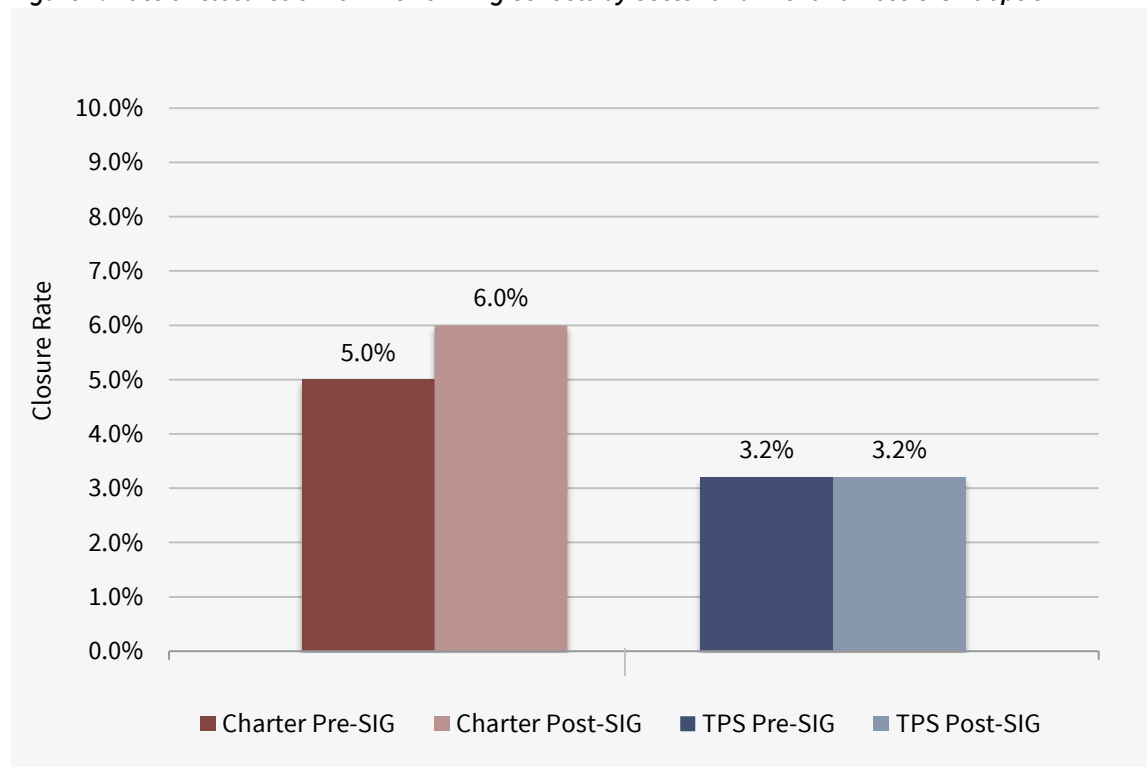
State	Number of Years under study	Number of Charter Closures	Rate of Charter Closures	Number of TPS Closures	Rate of TPS Closures
Arizona	7	33	4.5%	14	2.1%
Arkansas	7	5	16.7%	34	5.0%
California	6	44	7.5%	90	2.0%
Colorado	6	11	8.9%	47	3.2%
District of Columbia	7	3	21.4%	9	7.0%
Florida	7	34	11.4%	24	1.0%
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Minnesota	7	18	3.9%	62	5.8%
Missouri	7	8	28.6%	7	5.8%
Nevada	7	0	0.0%	1	0.2%
New Jersey	7	6	4.9%	33	1.8%
New Mexico	7	3	2.6%	3	0.7%
New York City	7	0	0.0%	31	3.6%
New York State	7	5	5.7%	37	1.5%
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Utah	7	0	0.0%	15	2.7%
Wisconsin	6	32	11.4%	43	3.3%

Note: For Missouri, only Kansas City and St. Louis were studied.

In 2009, the federal School Improvement Grants (SIG) program received an additional \$3 billion, the largest-ever amount of federal funds, through the American Recovery and Reinvestment Act. SIG outlined four possible interventions including closure. SIG invested the largest share of the funds in schemes to revive low-performing schools. Note that SIG applied to TPS only, as charter schools already had prescribed solutions for poor performance, namely that they would forfeit their charters. Thus, the implementation of SIG created an independent shift in the policy environment for TPS but not for charter schools. One possibility is that through the offering of the three other interventions, SIG pushed the use of closure lower in the option set or delayed its use, in which case we would see a decline in the use of closure in TPS. In the alternative, the focus on low-performing TPS may have contributed to the greater use of closure with underperforming charter schools seen in the last years of the study.

We classified the years before 2009-2010 in the study period as the pre-SIG era and 2009-2010 and the following years as the post-SIG era. The closure rates for each period are presented in Figure 7. The rate of closures in the charter sector was slightly higher in the post-SIG era than in the pre-SIG era, but the difference was not statistically significant. No change in the closure rate took place in the TPS sector from pre-SIG to post-SIG. The findings suggest that the use of closure was not affected by SIG, at least in the few years following its adoption.

Figure 7: Rate of Closures of Low-Performing Schools by Sector and Pre- and Post-SIG Adoption



Note: Illinois and North Carolina were excluded in the comparison as their data were only available for post-SIG years.

Figure 8 compares the likelihood of low-performing schools getting closed by grade span in the charter and TPS sectors. Although the number of closures was the largest at the elementary level, as shown in Figure 3, the share of low-performing middle schools slated to be closed was the highest in both sectors, standing at 8.6 percent and 4.5 percent in the charter and TPS sectors respectively. The rates of closures of low-performing schools for the other three grade spans ranked differently between the two sectors. Furthermore, the lowest rate of closures in the charter sector (4.8 percent for multi-level schools) was still higher than the highest closure rate in the TPS sector (4.5 percent for middle schools).

Figure 8: Rate of Closures of Low-Performing Schools by Sector and Grade Span

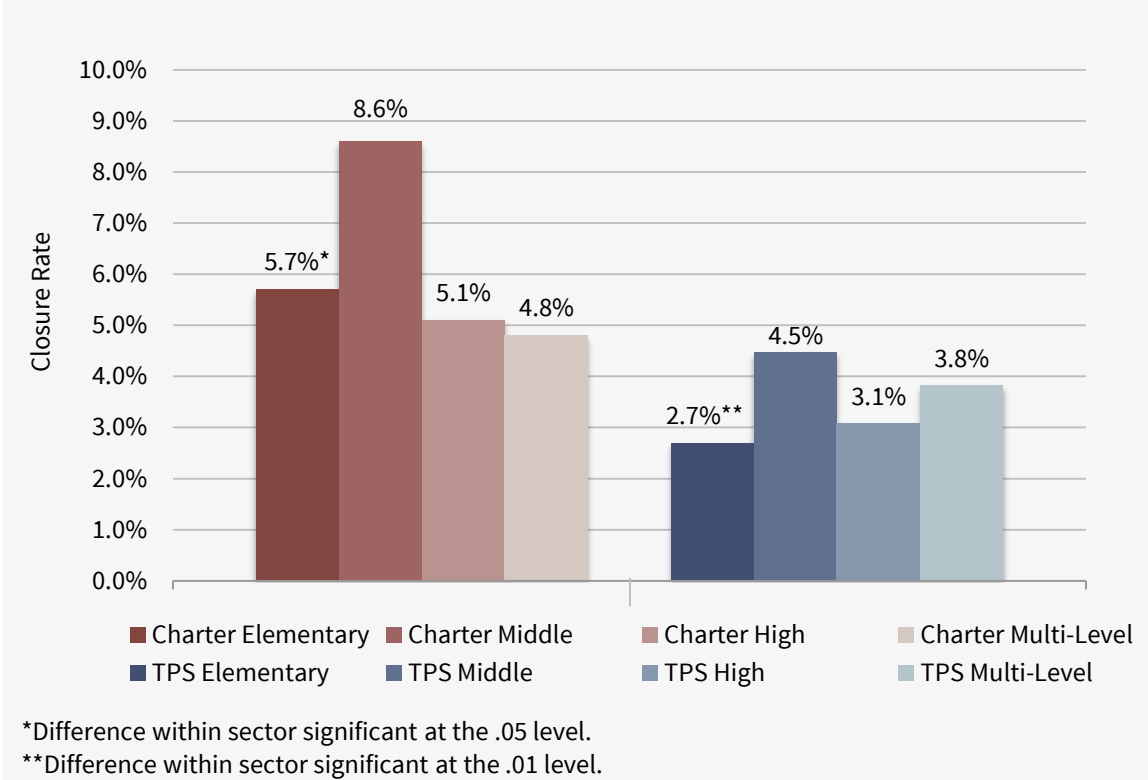
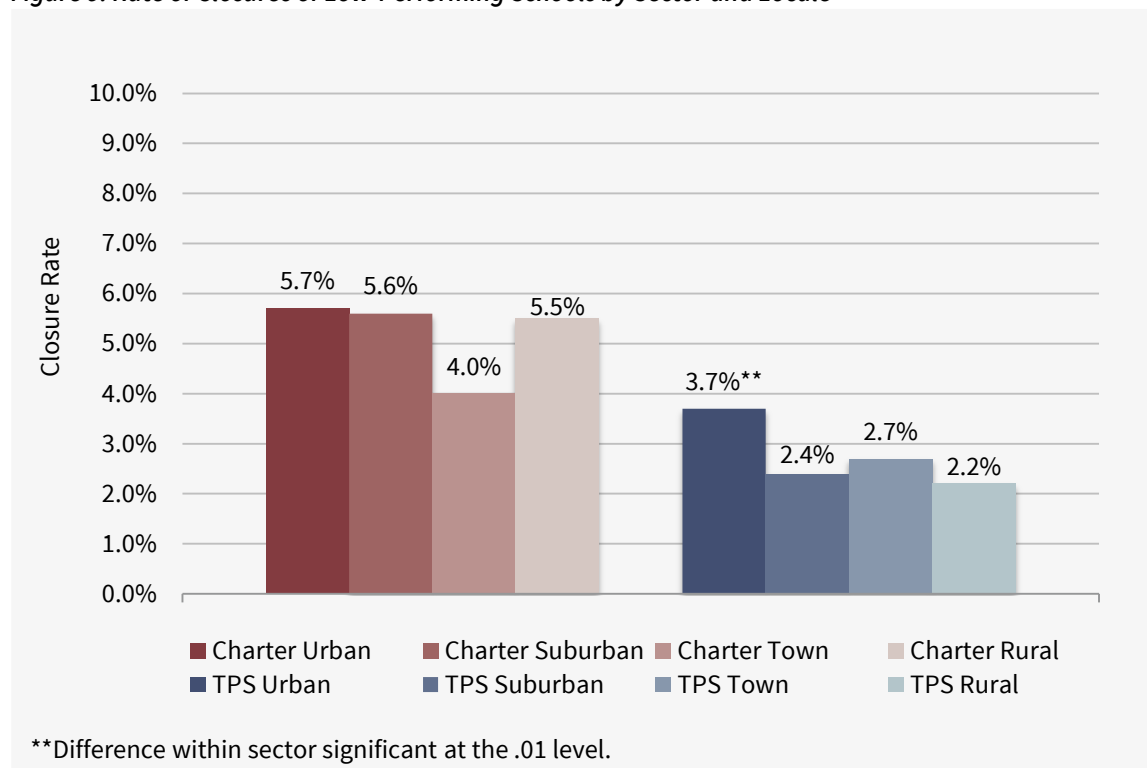


Figure 9 displays a more salient difference in the rate of closures by locale in school districts compared to the charter sector. No significant difference was found in the closure rate across locales in the charter sector, and the rates of charter closures in urban areas, suburbs, and rural areas were very close to each other.⁷ In the TPS sector, low-performing schools in urban areas faced the greatest likelihood of being closed, with a rate of closure (3.7 percent) significantly higher than the rates in the

⁷ The number of charter closures in towns and rural areas was small, which might make the charter closure rates in these two locales unstable.

other locales. The figure reinforces the notion that TPS closures in many areas of the country would leave no education option for the students in the low-performing schools.

Figure 9: Rate of Closures of Low-Performing Schools by Sector and Locale



What Do Closed Schools Look Like?

The performance profile of closed schools is surprising. One might expect the schools that eventually get closed would be lower-performing than those that are allowed to remain open. One might also expect that charter schools would be tapped for closure if they are low-performing and no better than the local TPS option. We examined the trends in academic performance and enrollment in closed charter and TPS schools from three years before closure to the final year of operation, making comparisons with similarly performing schools that remained open. For the convenience of reporting the findings, we use subscript notation as described in Table 4 to identify the years before a school closes, as shown below. School performance in t_{-1} is most likely used by authorities to make decisions about closure in t_0 .

Table 4: Notations for the Final Year of Operation and Pre-Closure Periods

Time Period Relative to School Closure	Reference
Final year of operation for the closed schools	t_0
The school year before closure	t_{-1}
The school year two years before closure	t_{-2}
The school year three years before closure	t_{-3}

Academic Performance

Figures 10 and 11 depict the average reading and math achievement of closed low-performing schools from t_{-3} to t_0 as compared to low-performing schools that remained open. Both closed and not-closed low-performing schools had highly negative achievement scores for reading and math in all the years. The average math scores were lower than the average reading scores for both closed and not-closed low-performing schools in both sectors and in all the years.

Figure 10: Trend in Reading Achievement of Closed and Not-Closed Low-Performing Schools by Sector

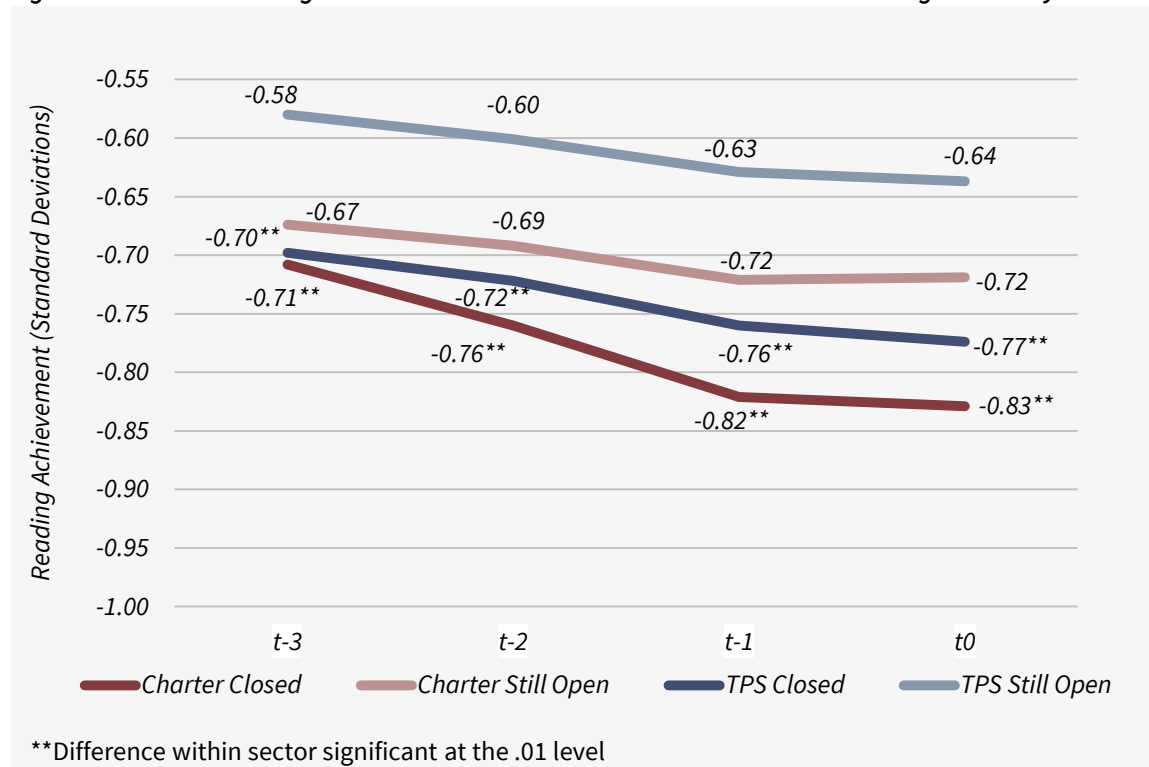
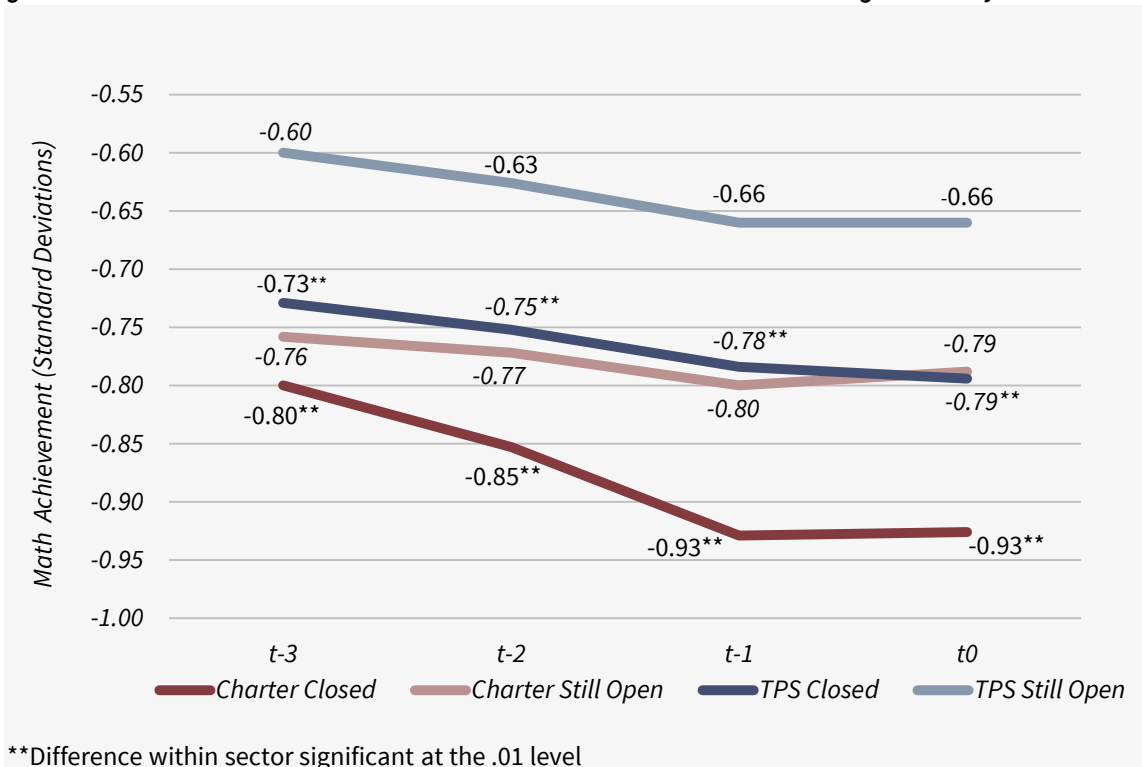


Figure 11: Trend in Math Achievement of Closed and Not-Closed Low-Performing Schools by Sector



Both the reading and math scores of closed schools kept declining from t_{-3} to t_{-1} and stayed flat in t_0 , a sign of chronic deterioration in achievement in schools slated for closure from several years before the official closure. In addition, schools that got closed performed more poorly than the low-performing schools that were permitted to remain open. As plotted in Figures 10 and 11, closed schools performed significantly worse than did low-performing schools that were not closed in both subjects in both sectors through all the years, and the gaps between closed and not-closed schools expanded continuously along with the passing of time.

Figures 12 and 13 indicate that low-performing charter schools got closed at a lower level of achievement than low-performing TPS. Specifically, the average scores in both subjects of closed charter schools were significantly worse than those of closed TPS schools in all the years, except for no significant difference in reading in t_{-3} .

Figure 12: Trend in Reading Achievement of Closed Charter Schools and Closed TPS

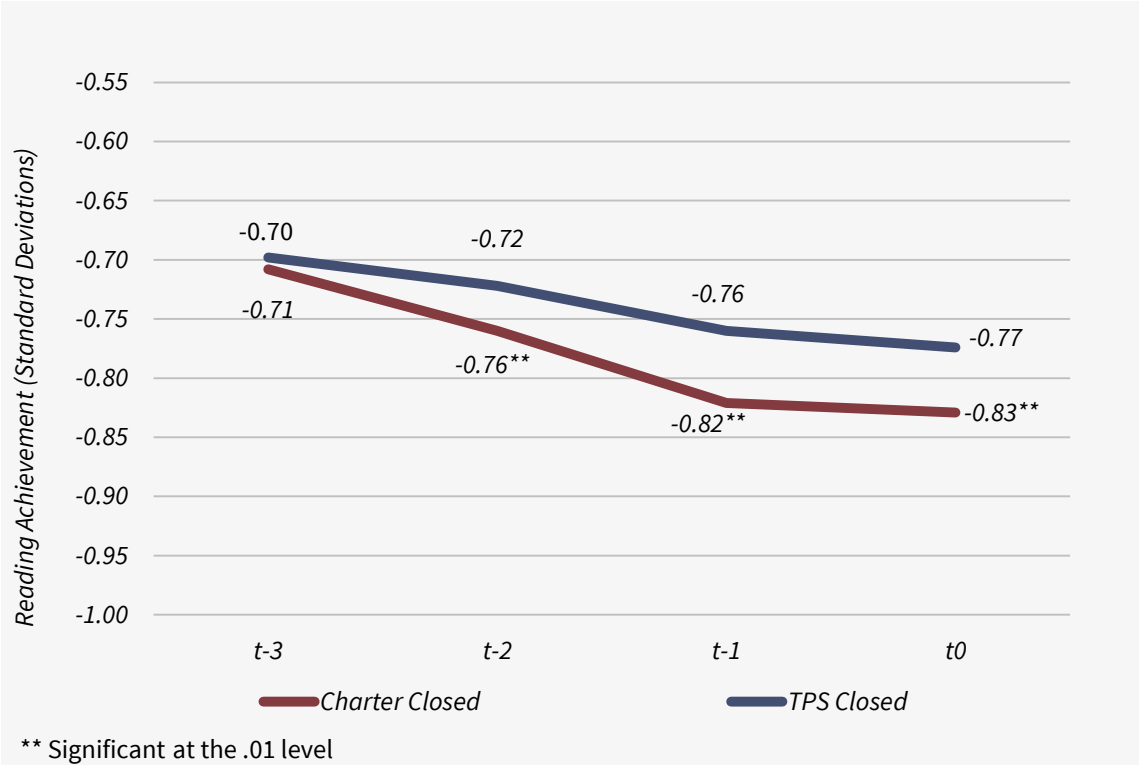
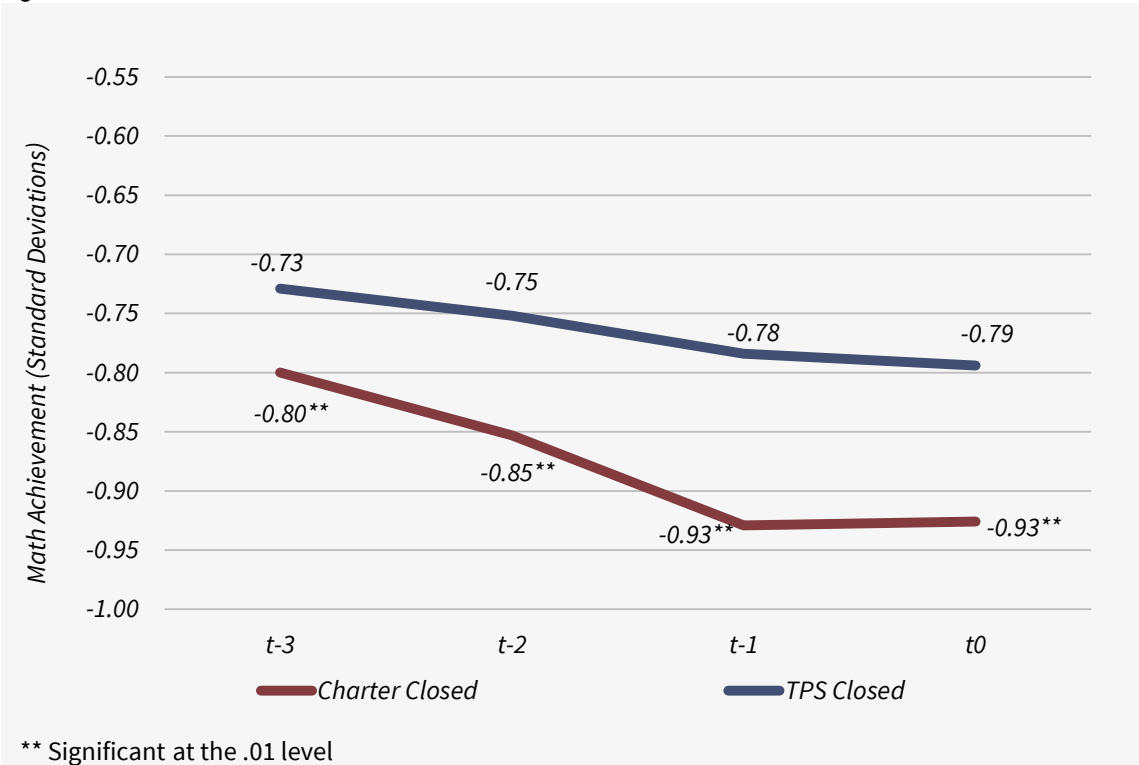


Figure 13: Trend in Math Achievement of Closed Charter Schools and Closed TPS



Figures 14 and 15 below show the trend in the average growth in reading and math for closed schools and the other low-performing schools that remained open. Recall that growth was measured as the change in achievement from one year to the next. By and large, both closed and not-closed low-performing schools had negative growth scores in reading and math from t_2 onward. The negative values indicate worse performance of a school in a year relative to the previous year. Again, the gains in math were weaker than the gains in reading for both closed and not-closed low-performing schools in both sectors and in all years.

Figure 14: Trend in Reading Growth of Closed and Not-Closed Low-Performing Schools by Sector

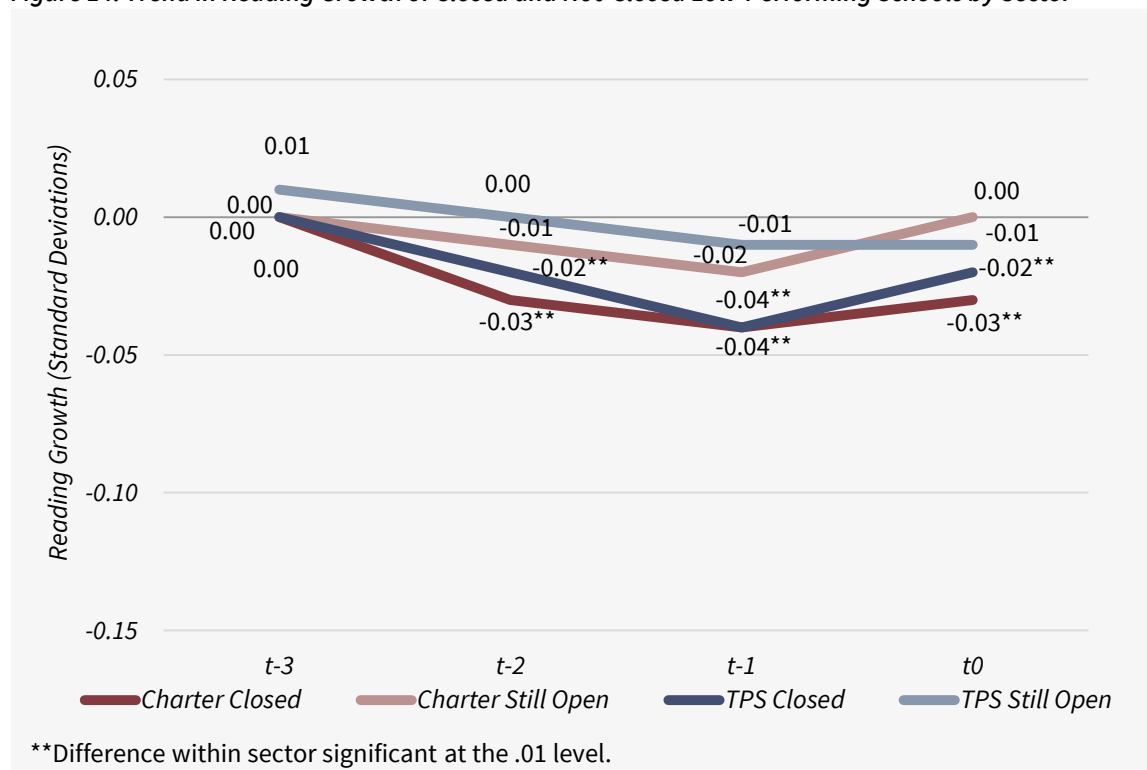
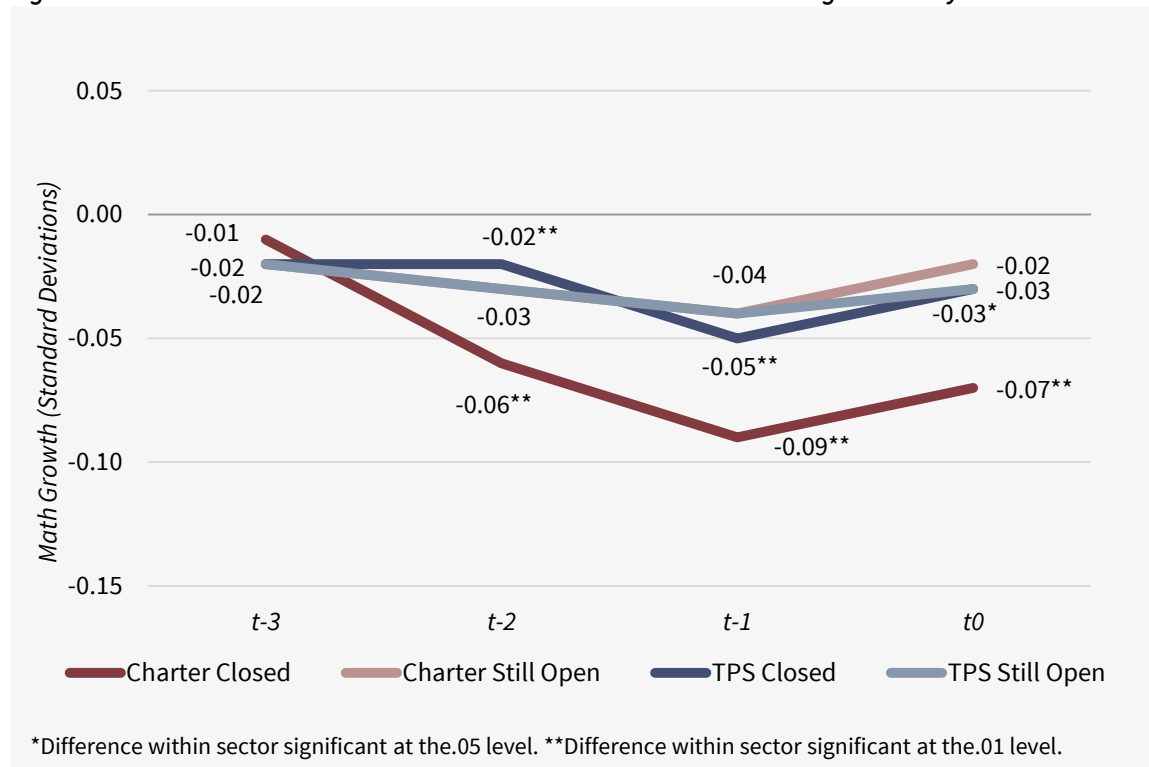


Figure 15: Trend in Math Growth of Closed and Not-Closed Low-Performing Schools by Sector



Note: The sections of the line “Charter Still Open” for t₃, t₂, and t₁ were completely covered by those of the “TPS Still Open” line as the math growth scores for these two categories of schools in t₃, t₂, and t₁ were the same. Corresponding growth scores were shown for the “TPS Still open” line.

Both reading and math growth scores in closed charter and TPS low-performing schools slipped from t₃ to t₁. Although the growth scores recovered slightly in t₀, they remained negative. This temporal trend again exhibited chronically poor academic performance of low-performing schools that were eventually closed. Compared to low-performing schools that remained open, closed schools made overall weaker progress in both subjects in the years leading up to closure. The combination of lower levels of achievement (as shown earlier) and smaller learning gains seemed to seal the fate of closing schools.

Figures 16 and 17 illustrate modest disadvantages in academic progress of closed charter schools relative to closed TPS. While reading growth was not significantly different between closed charter and traditional public schools in any year, closed charter schools had significantly less gain in math than closed TPS from t₂ to t₀, another sign of lower academic performance among closed charters than among closed TPS.

Figure 16: Trend in Reading Growth of Closed Charter Schools and Closed TPS

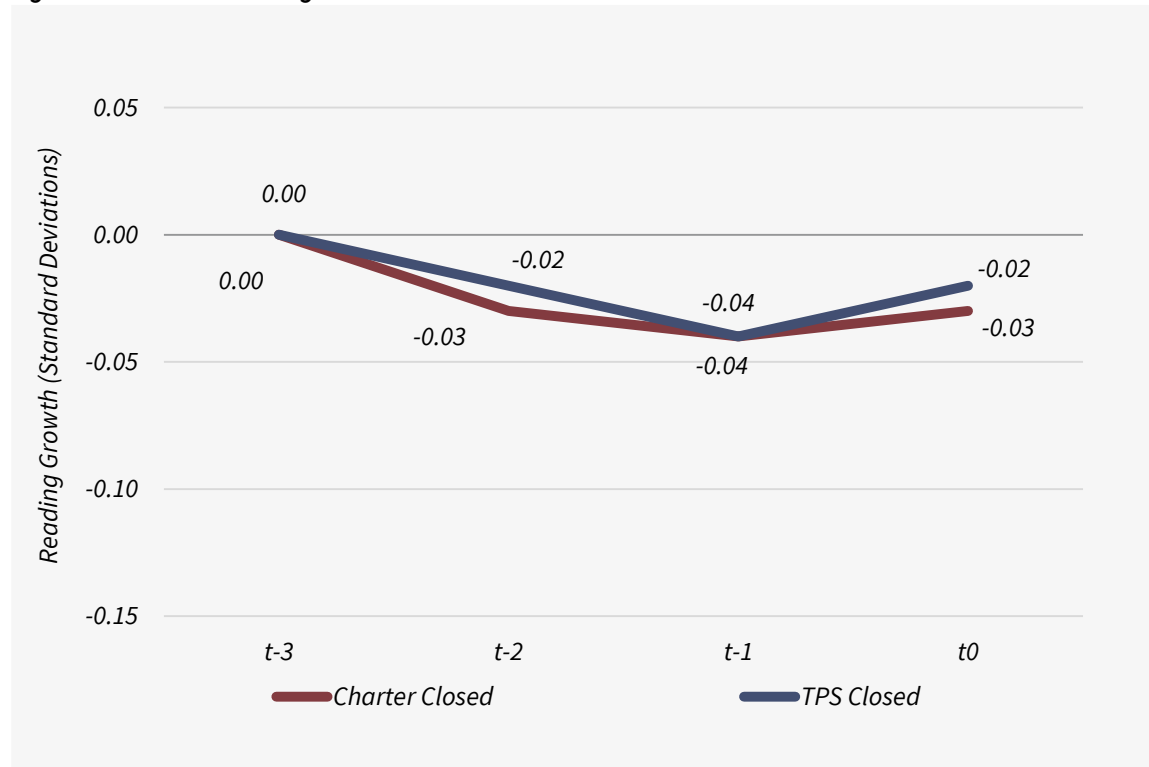
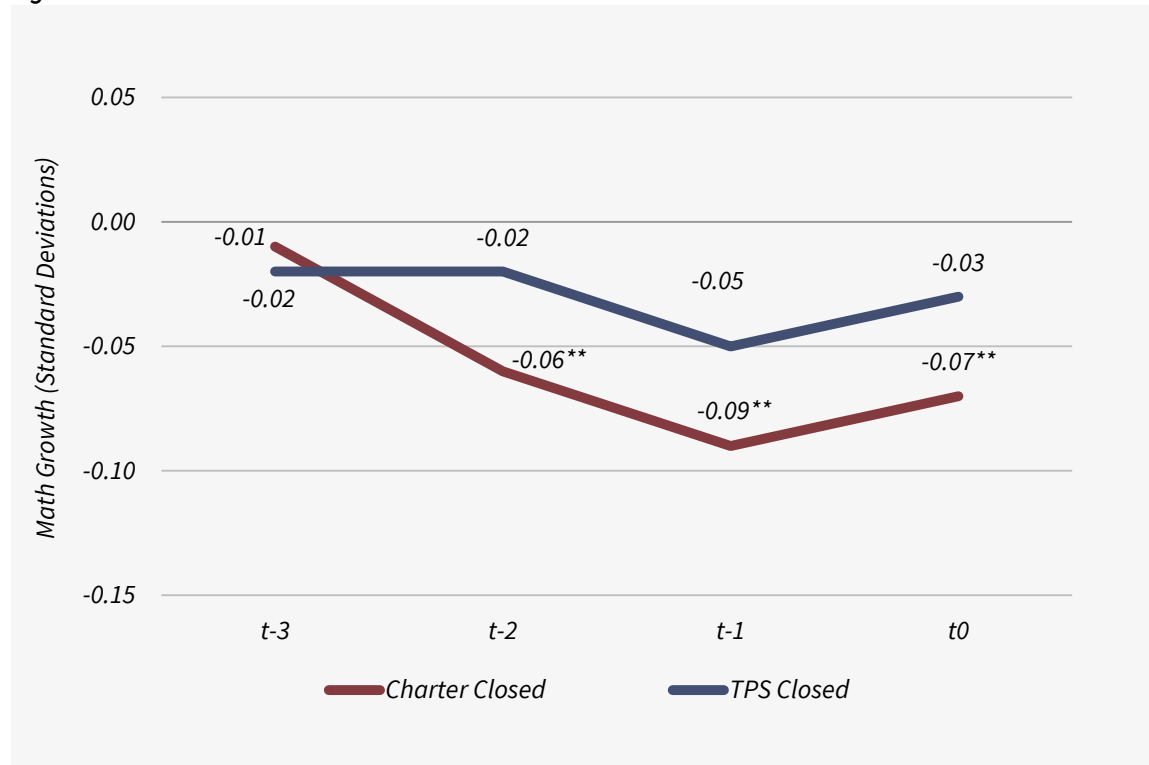


Figure 17: Trend in Math Growth of Closed Charter Schools and Closed TPS



Enrollment

Closed schools did not only turn worse academically in the last few years of operation, but also witnessed a decline in student enrollment. Figure 18 displays a continuous decrease in the average enrollment in closed low-performing schools from t_{-3} to t_0 in both charter and TPS sectors. Overall, charter schools had lower enrollment than TPS (Figures 18 and 19), which is the case across all levels of performance nationally. Furthermore, closed schools had lower enrollment than the other low-performing schools remaining open in both sectors in all the years, and the differences were statistically significant except for t_{-3} in the charter sector.

Figure 18: Trend in Enrollment of Closed and Not-Closed Low-Performing Schools by Sector

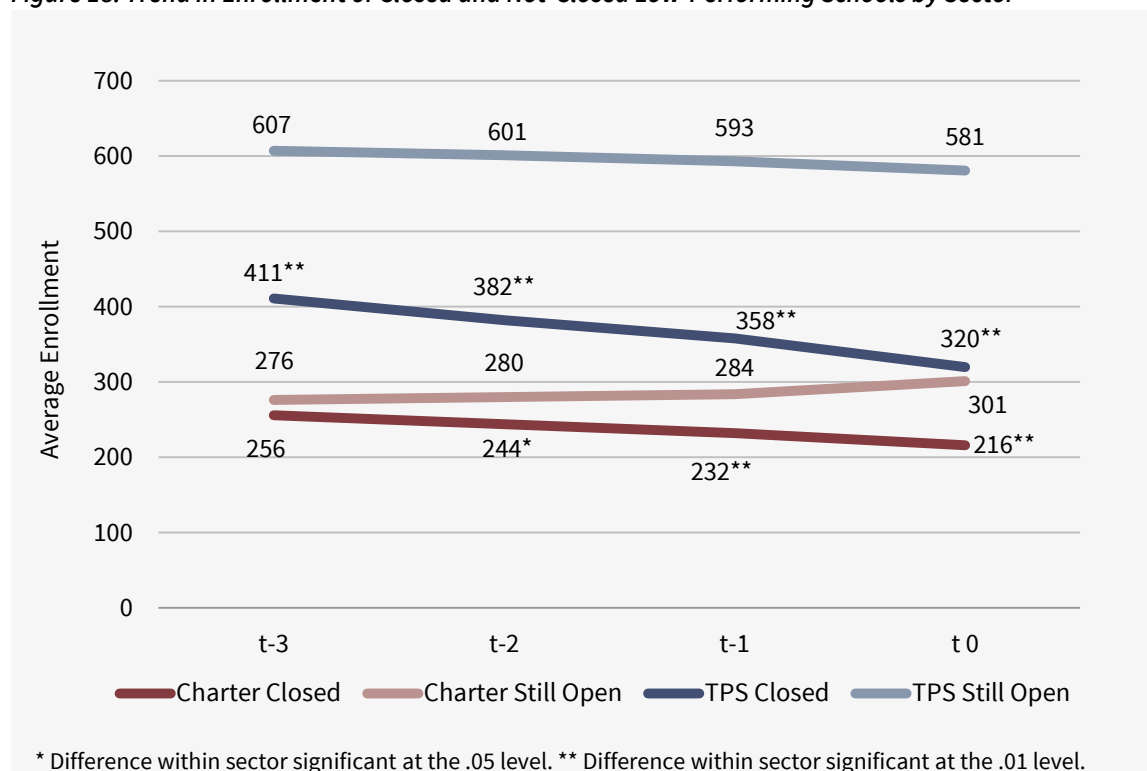
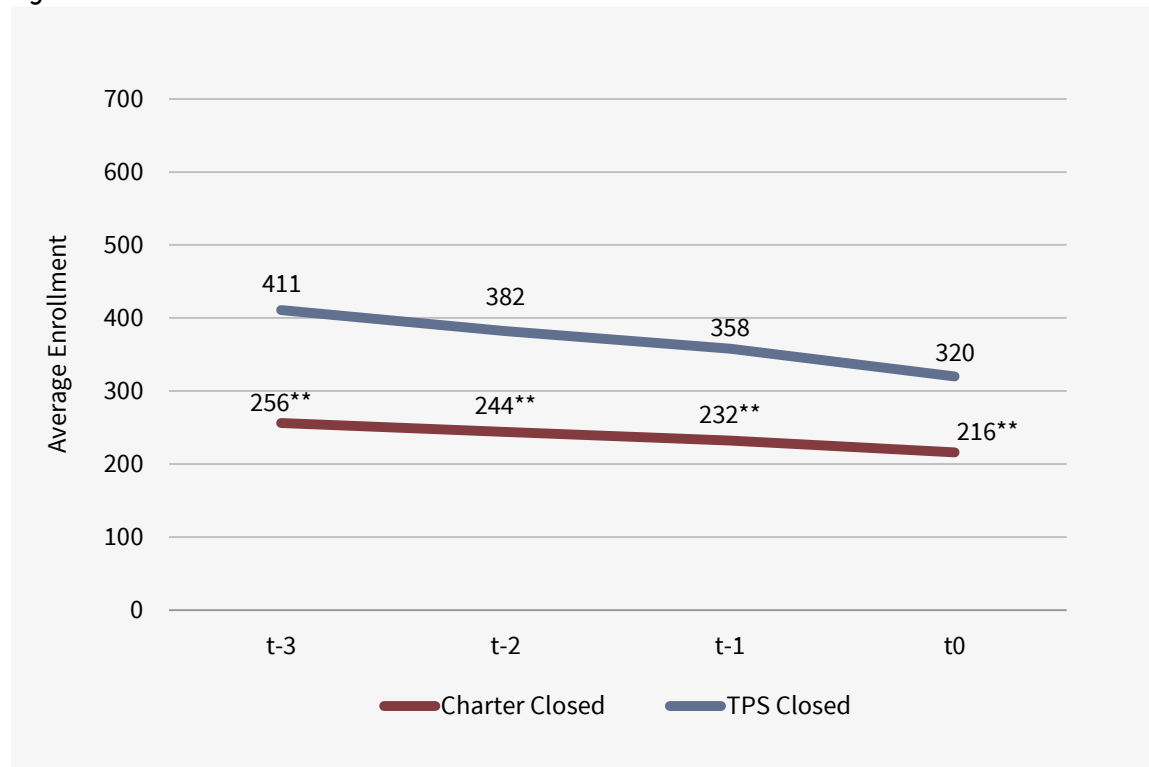


Figure 19: Trend in Enrollment of Closed Charter Schools and Closed TPS



Summary of the Landscape of Closures

This chapter illustrates an intricate landscape of closing academically low-performing schools. There were closures in all the states in the study period. However, closures were unevenly distributed and the likelihood for low-performing schools to be closed varied across states. The national scenario of closures appeared to be driven by a few key states, even more so in the TPS sector.

Elementary schools had the largest number of closures in absolute terms among all grade spans. Among low-performing schools, middle schools had the highest rates of closure. The focus of closures on elementary and middle schools might reflect the assumption that students have a longer time to recover and the availability of more than one school in the local system. High school closures were rarer, possibly because of strong community affinity and scarcer alternatives for students if they were displaced by closure.

Considering locale, closure of low-performing schools was largely an urban phenomenon, which is not surprising given rarer available receiving schools for affected students in suburbs, towns and rural areas.

The variations in closures between charter and TPS sectors were particularly salient. Although the number of charter closures was smaller than the number of TPS closures, a higher percentage of low-performing charter schools than low-performing TPS were closed. Disaggregation by state further

revealed a greater likelihood of low-performing charter schools getting closed than TPS in the majority of the states under study. These differences demonstrated a stronger inclination of using closure to hold schools academically accountable among charter authorizers than among districts.

Low-performing schools slated to be closed showed apparent signs of weakness in the years leading to closure. They had lower levels of academic achievement, weaker learning gains and smaller student enrollment than low-performing schools that were permitted to remain open in both charter and TPS sectors. In fact, there were visible downward trends in academic performance as well as in enrollment in closing schools in the last few years of operation. On average, closing charter schools were lower performing and enrolled a smaller number of students than closing TPS schools. These trends were observable almost in real time, but there seemed to be a lag in time before the radical action of closure was taken. In this sense, charter authorizers' determination and practice of shutting down low-performing schools still fell short of the stipulation in their contract with charter schools, although they were more likely to close poor-performing schools relative to districts. Meanwhile, districts were evidently tolerant of low levels of, and deterioration in, performance and enrollment. The adoption of SIG since 2009, rather than providing an impetus to employing practices that protect students, seemed to have given some education leaders extra time and resources for sustaining low-performing schools.

4. Are Similarly Low-Performing Schools Treated Equivalently?

Many policymakers consider equity in terms of student outcomes across various groups. There is another way that equity emerges: How are similarly performing schools treated? An important focus of this study examines the fates of low-performing schools across geographies, sectors and school attributes. The multistate, longitudinal data collected by CREDO provide a unique opportunity to ask, "Are similarly low-performing schools treated equivalently?" As shown in this chapter, non-academic biases were involved in the actions of education leaders, which created important inequities in how their schools and students fared.

Achievement of Charter and TPS Closures by State

The preceding section presented aggregate evidence that charter schools that closed had lower performance compared to TPS closures. We disaggregated the evidence by state to see if there were differences in the practice across our partner states. The breakdown of the comparison by state revealed striking differences. Table 5 reports by state the academic achievement of closed charters and closed TPS in t_{-1} , which is the period that was likely to be used by local authorities to make closure decisions.⁸ Within each sector, reading and math achievement scores of closed schools varied

⁸ There were no closed low-performing charter schools in Nevada, New York City, Rhode Island and Utah within our data window, so no scores for closed charters are reported for these four states.

substantially across states, from below -1.00 s.d. to about -.50 s.d. The relative performance of closing charters as compared to closing TPS also differed from state to state.⁹ Low-performing charter schools got closed at higher levels of achievement than TPS in six states. Closing charter schools performed worse than closing TPS in 13 states. No significant difference in either subject between closing charters and TPS was found in two states. In the remaining two states, closing charters performed better in one subject but worse in the other subject. These differences illuminated widely varying academic criteria in the practice of closing underperforming schools across states and sectors.

⁹ This comparison depended on lower performance in either subject.

Table 5: Average Reading and Math Achievement of Closing Low-Performing Schools by Sector and State

	Reading Achievement		Math Achievement	
	Charter Closed	TPS Closed	Charter Closed	TPS Closed
Arizona	-0.93**	-0.78	-1.00**	-0.82
Arkansas	-0.77**	-0.64	-0.83**	-0.65
California	-0.66	-0.67	-0.71**	-0.68
Colorado	-0.83**	-0.75	-1.04**	-0.78
District of Columbia	-0.58**	-0.78	-0.79	-0.80
Florida	-0.90**	-0.67	-1.08**	-0.72
Georgia	-0.66	-0.64	-0.72*	-0.68
Illinois	-0.65	-0.71	-0.80	-0.75
Louisiana	-0.50**	-0.76	-0.63	-0.71
Massachusetts	-0.80**	-0.95	-0.96	-0.91
Michigan	-0.70**	-0.79	-0.83	-0.85
Minnesota	-1.14**	-0.93	-1.30**	-0.93
Missouri	-0.74**	-0.49	-0.81**	-0.54
Nevada	--	-1.48	--	-1.35
New Jersey	-0.86**	-0.96	-0.96**	-0.89
New Mexico	-0.55	-0.65	-0.75	-0.69
New York City	--	-0.62	--	-0.66
New York State	-0.62**	-0.83	-0.57**	-0.97
North Carolina	-0.84	-0.81	-1.10**	-0.77
Ohio	-1.15**	-0.90	-1.22**	-0.93
Oregon	-0.84**	-0.56	-0.84**	-0.53
Pennsylvania	-0.93	-0.90	-0.99**	-0.89
Rhode Island	--	-0.83	--	-0.81
Tennessee	-0.56**	-0.83	-1.08*	-0.84
Texas	-0.83**	-0.59	-1.21**	-0.63
Utah	--	-0.61	--	-0.63
Wisconsin	-0.98**	-1.11	-1.12**	-1.21

Note: There were no closed low-performing charter schools in Nevada, New York City, Rhode Island and Utah within our data window, so no scores for the closed charters are reported for these four states.

* Difference in the achievement in a subject between closed charter and TPS significant at the 0.05 level.

** Difference in the achievement in a subject between closed charter and TPS significant at the 0.01 level.

Rate of Closures by Achievement

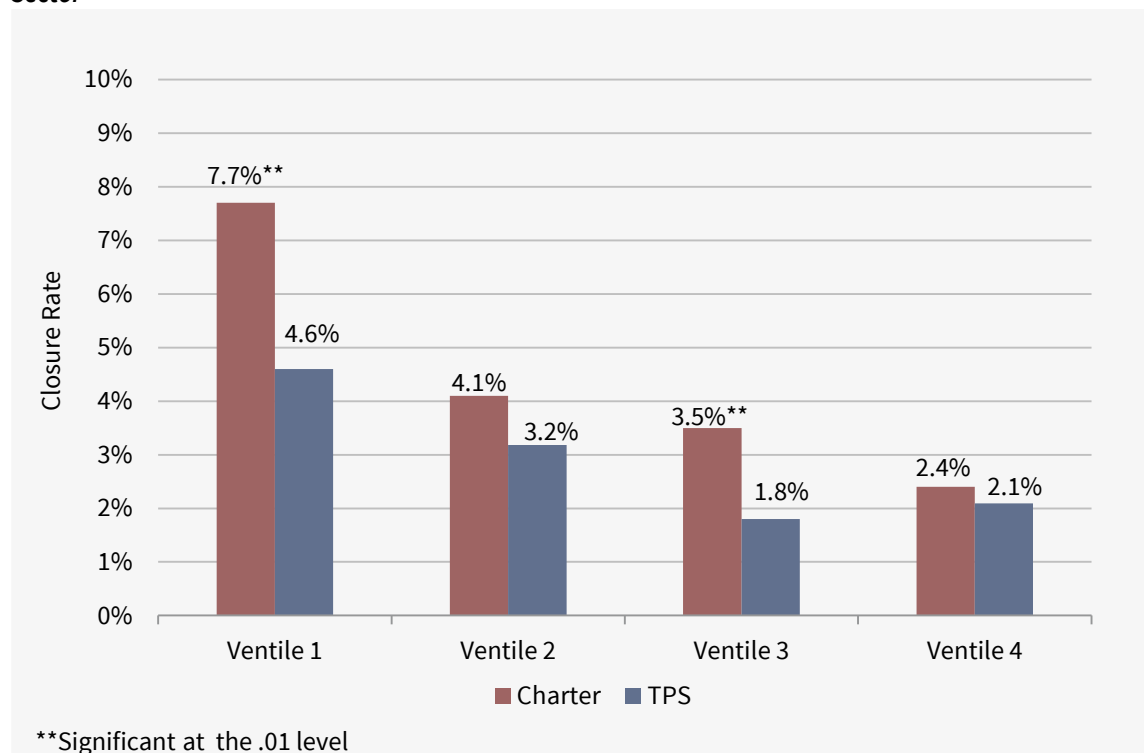
One way of examining equity in the policy and practice of closing low-performing schools is whether they are simply a perfunctory exercise. To explore this, we looked at how differently schools of similar performance were treated and whether there were system-driven inequalities that affected students directly, such as poverty and racial biases. We presented the findings using math achievement for brevity; our analyses revealed similar patterns when reading achievement was the focus.

Rate of Charter and TPS Closures by Achievement

As described in the previous chapter, a higher share (5.5 percent) of low-performing charter schools was closed than among low-performing TPS (3.2 percent). One obvious question is whether the treatment was equivalent across the range of performance: Did the lowest performing schools have different rates of closure than the higher-but-still-low-performing schools? One might expect authorizers and districts to have a greater focus on the lowest-performing schools in their care. Figure 20 shows the rate of closure broken down by each of the four lowest ventiles of math achievement on state achievement tests.¹⁰ Lower-performing schools had higher rates of closure than higher-performing ones in both sectors. With the exception of the lowest-ventile charter schools, the rate did not exceed 5 percent in any group. At the same time, the closure rates were higher in the charter sector than in the TPS sector in all four ventiles, and the differences were statistically significant in the first and third ventiles.

¹⁰ Each ventile represents 5 percent of schools in a state. Thus, Figure 20 represents the 20 percent of lowest-performing schools in the dataset.

Figure 20: Rate of Closures of Low-Performing Schools in the Bottom Four State Ventiles of Achievement by Sector



Demographics of Closed and Not-Closed Low-Performing Schools

The question of equitable treatment of schools extends to considerations of poverty and race. We took a look at overall differences in student characteristics of closed and not-closed low-performing schools first. Then we zeroed in on a more rigorous examination of closure practices for schools with similar performance but different demographic compositions of students. Table 6 shows that regardless of sector, closed schools had higher shares of students in poverty (i.e., eligible for free or reduced-price lunch) and black students and lower percentages of white and Hispanic students than low-performing schools that remained open.¹¹ Note that the combined share of black and Hispanic students was larger for closed schools in both sectors. Closed schools had a smaller percentage of English language learners than the other low-performing schools in both sectors. TPS closures had a slightly larger share of special education students than not-closed low-performing TPS.

One possible explanation of these differences is that schools cluster unevenly and result in some groups having larger representation in lower ventiles than others. If that were the case, the more frequent use of closure in lower ventiles discussed in the previous section might explain some or most of the variation in Table 6. To explore this, we tested the differences in the likelihood of closure for schools with different student demographics, even at a similar performance level. We focused on

¹¹ The percentages of Asian-Pacific, Native American and multiracial students were very small and not shown and discussed here.

comparisons of schools with different levels of poverty and different shares of minority students, since Table 6 displays salient overrepresentation of students in poverty and underserved minority students among closed schools.

Table 6: Demographics of Closed and Not-Closed Low-Performing Schools by Sector

	Charter		TPS	
	Closed	Still Open	Closed	Still Open
Number of Tested Students	35,809	846,888	229,829	12,685,753
Students in Poverty	80%**	76%	87%**	83%
Special Ed Students	11%	11%	14%**	13%
ELL Students	9%**	10%	13%**	20%
White Students	11%**	17%	11%**	13%
Black Students	58%**	49%	56%**	38%
Hispanic Students	27%**	29%	28%**	44%

**Significant at the 0.01 level.

Closure Rate by Poverty Level

Are schools with more students in poverty more prone to closure? Do schools with fewer poor kids get to remain open, even when they have similar levels of performance? To probe this question, we divided low-performing schools into two groups: higher-poverty schools in which 80 percent or more of the students were eligible for free or reduced-price lunch and lower-poverty schools with fewer than 80 percent of students receiving free or reduced-price lunch.¹²

Figure 21 shows that in both sectors, schools with higher shares of students in poverty had a higher closure rate than schools serving a lower share of poor students, but the difference was only statistically significant in the TPS sector.¹³ This finding may seem counterintuitive since the rates of closure were higher in charter schools. However, since authorizers are expected to take action with low-performing schools, the lack of strong significance may reflect more even practices by authorizers than in district settings. Figures 22 and 23 further show no significant difference between higher- and lower-poverty charter schools in each of the bottom four ventiles, while the difference in TPS was primarily driven by the actions with the schools in the bottom two ventiles.¹⁴ Taking into consideration the number and rate of TPS closures in the third and fourth ventiles, it is clear that districts were concentrating their use of closure on only the most dire performers.

¹² The 80 percent threshold is admittedly arbitrary. We conducted this analysis at other values as well and found that different thresholds created groups that were so unequal that they confounded the ability to test the hypothesis.

¹³ The difference in charter schools was weakly significant at the 0.10 level.

¹⁴ The differences in the first two ventiles in the charter sector were weakly significant at the 0.10 level.

Figure 21: Rate of Closures of Higher-Poverty and Lower-Poverty Low-Performing Schools by Sector

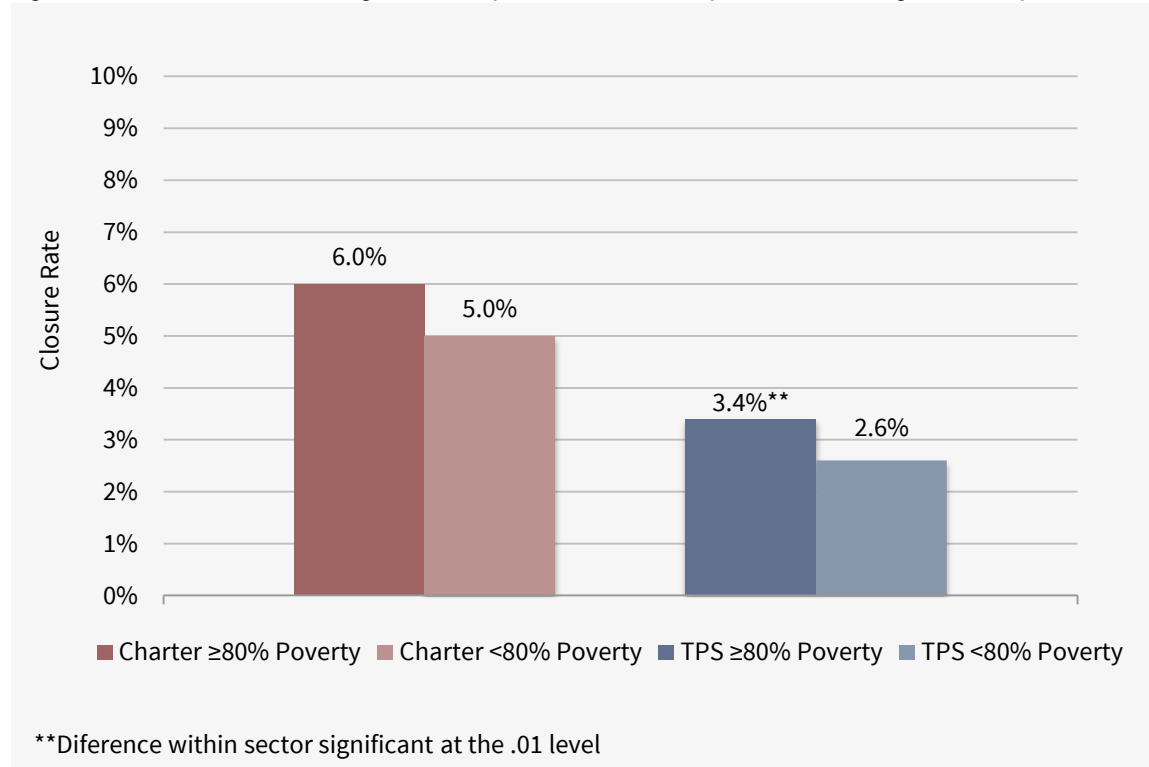


Figure 22: Rate of Closures of Higher-Poverty and Lower-Poverty Low-Performing Schools in Each of the Bottom Four State Ventiles of Achievement: Charter Sector

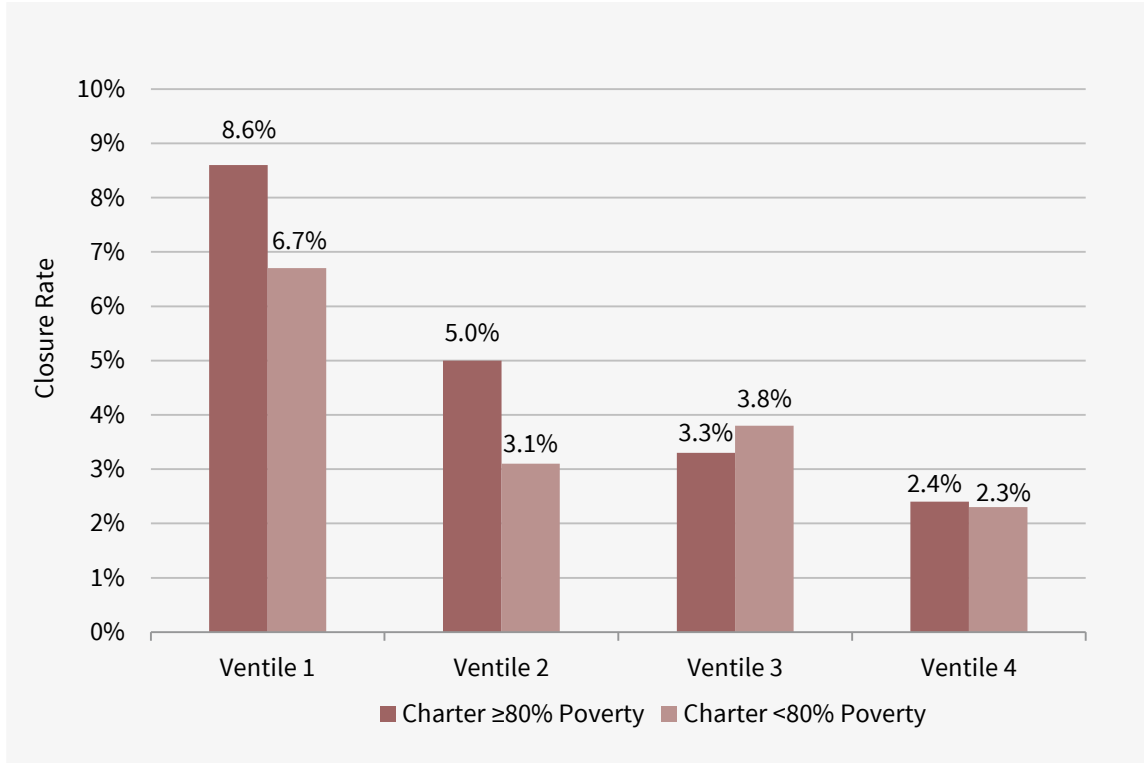
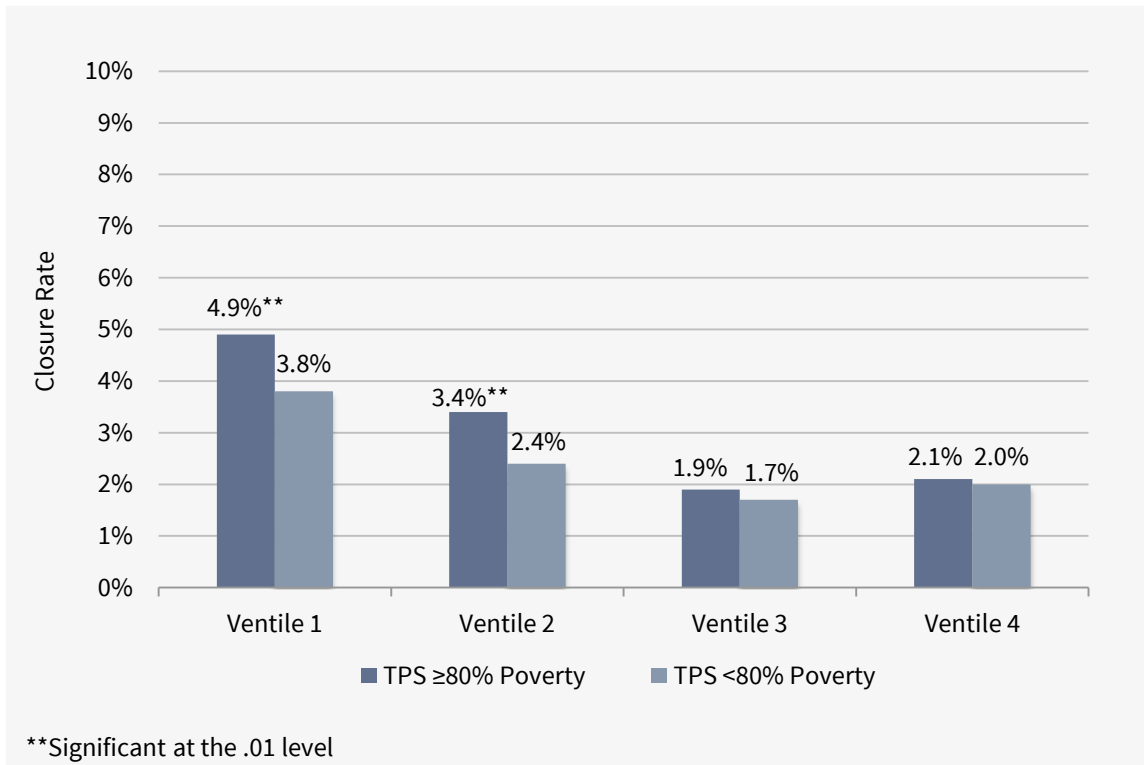


Figure 23: Rate of Closures of Higher-Poverty and Lower-Poverty Low-Performing Schools in Each of the Bottom Four State Ventiles of Achievement: TPS Sector



Closure Rate by the Percentage of Minority Students

Another inequity concern involves whether low-performing schools with different percentages of underserved minority students face different chances of getting closed, even when the schools are in the same bracket of performance. To examine this question, we grouped schools into two categories: higher-minority schools with 80 percent or more black and Hispanic students and lower-minority schools where black and Hispanic students accounted for less than 80 percent.

Evidence of minority bias surfaced from our analysis. Figure 24 illustrates that for all low-performing schools, those of higher minority were significantly more slated to be closed than lower-minority ones in both charter and TPS sectors. The bias recurred in nuanced comparisons in each of the four ventiles, as shown in Figures 25 and 26. In the charter sector, a significantly higher percentage of higher-minority schools got closed than lower-minority schools in the first and third ventiles. In the TPS sector, the differential treatment of higher- and lower-minority schools was driven exclusively by the actions with ventile-one schools, and it was the only time that TPS closed more than 5 percent of low-performing schools in a group.

Figure 24: Rate of Closures of Higher-Minority and Lower-Minority Low-Performing Schools by Sector

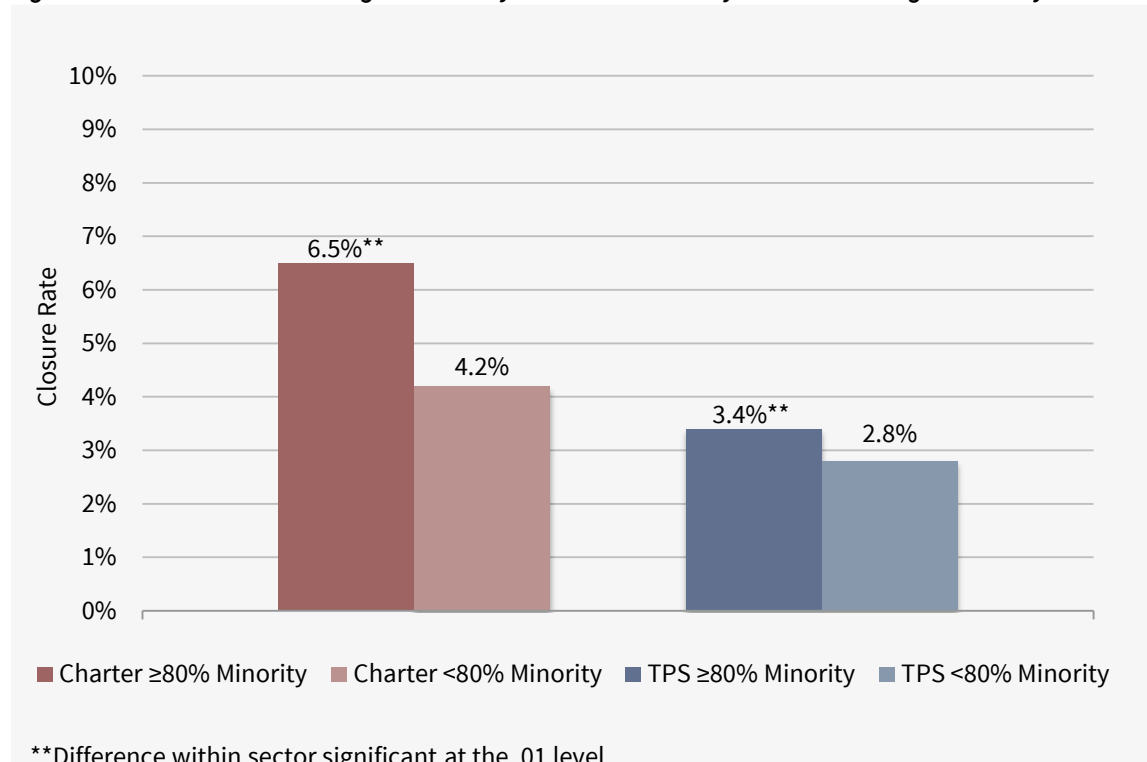


Figure 25: Rate of Closures of Higher-Minority and Lower-Minority Low-Performing Schools in Each of the Bottom Four State Ventiles of Achievement: Charter Sector

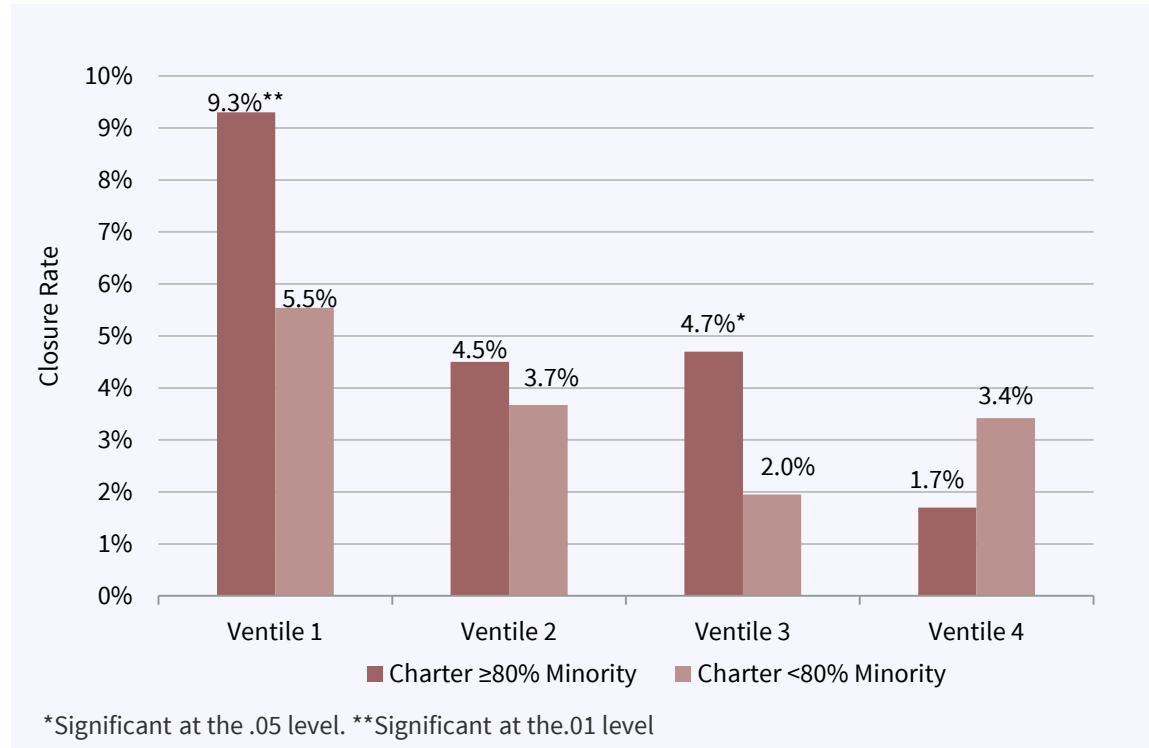
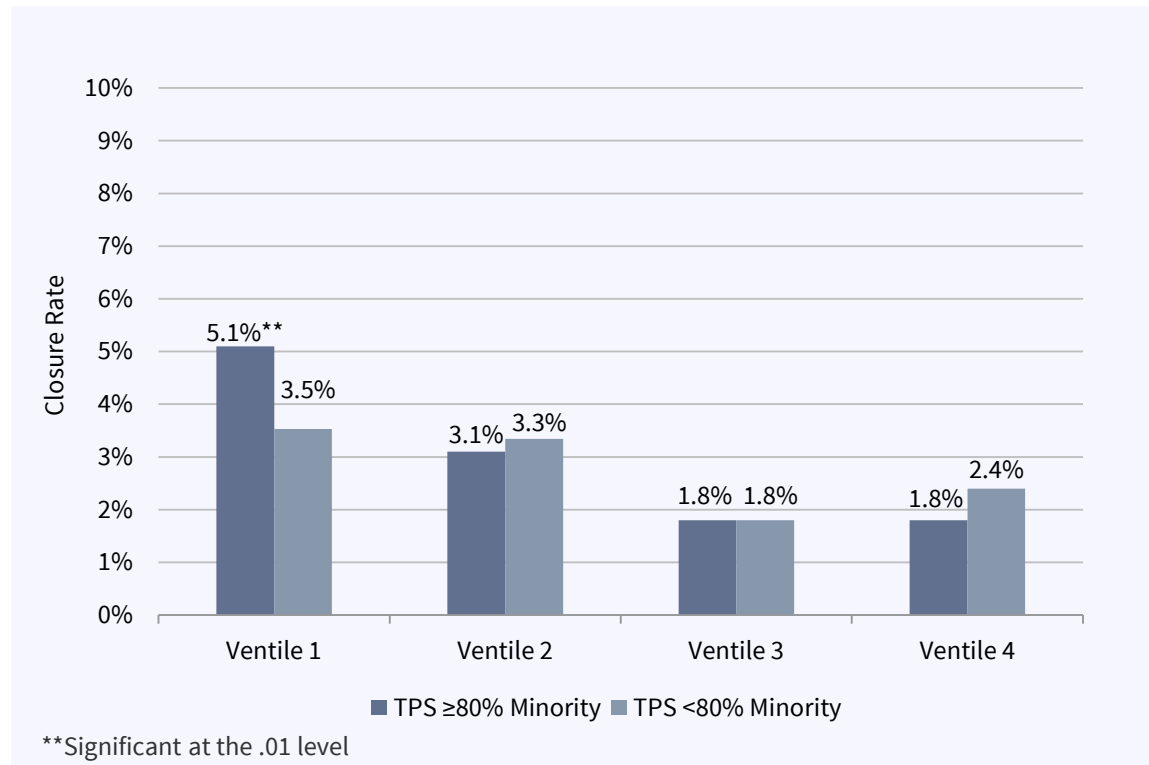


Figure 26: Rate of Closures of Higher-Minority and Lower-Minority Low-Performing Schools in Each of the Bottom Four State Ventiles of Achievement: TPS Sector



Rate of Charter Closures by Year of Operation

Earlier CREDO work on the quality of new charter schools suggested that most charter schools exhibited consistent performance that was observable early in the life of the school. Schools that showed early evidence of high student performance tended to stay high performers and the opposite was also true: schools with weak early performance rarely improved over time. This pattern raises a question about the timing of school closures: Do poor charter performers close when it becomes clear they are struggling, or does the use of fixed terms in the charter agreement defer review and action to specific intervals? TPS have different operating principles. In addition, most TPS have longer histories, so it is not feasible to examine closure by age in these schools.

Table 7 reveals no striking turning point in time at which low-performing charter schools faced a higher risk of being closed.¹⁵ The steady rate of closures suggests that intervention with low-performing schools was generated by the flow of information about them, not cadenced by the contract terms.

Table 7: Rate of Closures of Low-Performing Charter Schools by Years of Operation

Years of Operation	Number of All Charter Low-Performing Schools	Number of Closed Charter Low-Performing Schools	Rate of Closures of Charter Low-Performing Schools
2	574	33	6%
3	580	31	5%
4	552	29	5%
5	554	31	6%
6	497	22	4%
7	532	31	6%
8	429	22	5%
9	348	20	6%
10	267	17	6%
11	196	11	6%
12	108	6	6%
13	51	5	10%
(Missing value)	1,056	60	6%

¹⁵ As we identified low-performing schools and closures according to the school performance in a given year and the previous year, the results in the table start from two years of operation.

Summary of Equivalence of Closures

In several important ways, similarly low-performing schools were not treated equivalently in closure decisions. The rigor in applying academic criteria to closure of low-performing schools varied across the country. Regardless of sector, state to state, low-performing schools got closed at highly varied levels of academic achievement. The relative performance of charter schools slated for closure as compared to closing TPS also differed widely by state.

Academic concerns played some role in the closure decision, as evidenced by higher rates of closure of lower-ventile schools than for higher-ventile schools in both sectors. There is an open question about why such small shares of even the lowest-ventile schools continued. Regardless, students were not receiving equivalent protection. Some TPS districts and charter authorizers showed evidence of bias in their choice of closures among equivalently performing schools. In both sectors, higher-minority schools, particularly those in the lowest ventile, were more prone to be closed than similarly performing lower-minority schools. In addition, the closure rates of higher-poverty TPS in the bottom two ventiles were higher than the rates for lower-poverty TPS of similar performance. Apparently, charter authorizers did not always exclusively rely on academic criteria in dealing with underperforming schools, as agreed in the charter law. TPS districts' poverty and racial biases in their practice of closure run counter to many district leaders' claim that TPS are a haven for educational equity. These system-driven biases have important consequences for students.



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Closing Low-Performing Schools
2017

Volume II

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List of Acronyms & Definitions

CCD	Common Core of Data
CREDO	Center for Research on Education Outcomes
ELLs	English Language Learners
FERPA	Family Educational Rights and Privacy Act
NAEP	National Assessment of Educational Progress
NCES	National Center for Education Statistics
SIG	School Improvement Grants
TPS	Traditional Public School
VCR	Virtual Control Record
Growth	The year-to-year change in academic performance relative to one's peers. Growth can be positive or negative.

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Volume II

Roadmap to Volume II

This is the second volume of the report on the study of school closures. In Volume I, we explored the national landscape of closures of low-performing schools, illustrating how the closures are distributed across sectors, years, states, grade spans and locales and revealing the lack of equivalence of treatment of similarly performing schools across states, levels of poverty and shares of black and Hispanic students. This volume shifts the focus to students who attend closing schools, looking into those students' transfers before and after their schools closed and post-closure academic progress of students who stayed until the official closure.

As described in Chapter 2, the schools under study came from 26 states and were closed in the period between 2006-2007 and 2012-2013. Data for 2005-2006 and 2013-2014 were also used in some analyses where we tracked the school and student trajectories before or after closure. A school was defined as low-performing if its average reading and math scores were both in the bottom 20 percent (i.e., the bottom four ventiles) in a state in a given year and the previous year. We flagged closures and identified the final year of operation according to the coding of the Common Core of Data (CCD) from the National Center for Education Statistics (NCES).

Volume II focuses on the experience of students who were enrolled in the closed schools in their final years. In Chapter 5, we depict the pre- and post-closure transfers of students from closing low-performing schools, using descriptive analyses and tests of differences in statistics between groups. Many students left in the year before the schools closed. A little less than half of displaced closure students landed in better schools than the closed one in the year after closure. In the second and third years following closure, the majority of displaced students attended a school of the same quality as the one in which they had enrolled in the previous year.

Chapter 6 probes how closures of low-performing schools influenced the academic progress of their students. As explained in Chapter 2, our outcome of interest is the year-to-year growth in state

standardized achievement test scores. We assessed the impact of closure by benchmarking the growth of closure students against that of their virtual control records (VCRs), peers of identical traits and same or very similar baseline test scores, from continuing low-performing schools in the same sector. The quality of the receiving school emerged from our analysis as a crucial factor in post-closure academic success in both TPS and charter settings. Average closure students registered stronger growth as compared to their VCR counterparts in the same sector only when they were placed into superior schools, while relocation to inferior or similar-performing schools was linked to fewer academic gains. The picture was nuanced for students with additional needs, specifically English language learners and special education students.

We conclude the report with Chapter 7, in which we summarize major findings in both volumes and suggest their implications for policymaking and practices related to closure of low-performing schools.

5. Flow of Students Who Were Enrolled in Low-Performing Schools

The focus of preceding chapters has been on low-performing schools and the subset that are eventually closed. In this chapter, the inquiry shifts to the students who were enrolled in low-performing schools in the final years before closure. Unlike planned transfers at the end of elementary and middle schools, closure represents an unplanned disruption in the educational life of students. Affected students' choices are necessarily influenced by the array of alternatives available to them, which in turn may affect the degree of disruption of their schooling experiences.

This chapter explores the fates of students who attended low-performing schools in their last years of operation. We first looked at whether there is a discernible transfer of students from closing schools before the official closure. Our data revealed that some students departed before the final year of a closing school's operation and that these early leavers had different academic profiles compared to students who stayed until the official closure and students attending similarly low-performing schools that were not closed. Then we tracked the post-closure flow of students who were displaced by closure. We observed how many of them moved to the same or a different sector and how likely they landed in superior or inferior schools.¹⁶

For the students in a closing school's top grade, transfer to another school in the following year is inevitable. For this reason, only rising students were included in our analysis of the pre- and post-

¹⁶ For the interested reader, Figures 39 through 41 and Table 25 in Appendix A share a brief overview of the distribution of closure students across sectors, states, grade spans and locales. The presentation follows the same course as the descriptions of closing schools in Chapter 3.

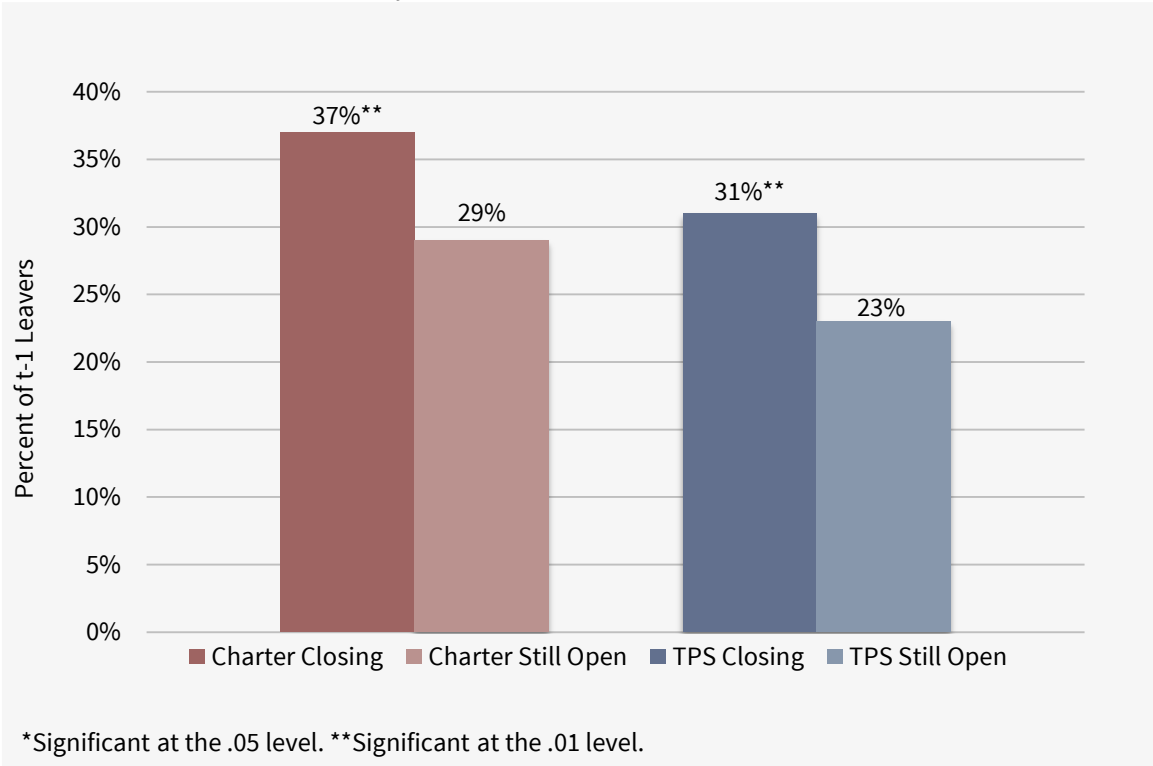
closure movement. For the sake of simplicity, we refer to the non-exit-grade students leaving a closing school in the year before official closure as “early leavers” or “ t_{-1} leavers” and those who stayed until the official closure as “staying students” or “stayers” in the following description of findings.

Pre-Closure Transfer of Students

As shown in Chapter 3, the academic performance and student enrollment in closing schools kept declining in the final years of operation. Did parents of students attending these schools possibly sense the deterioration and vote with their feet before local education leaders took radical actions?

Figure 27 illustrates that in both the charter and TPS sectors, more than 30 percent of students left closing schools in the year *before* the schools were closed (notated as t_{-1}). The percentage of transfer was significantly higher than that for continuing low-performing schools in the same sector in t_{-1} in the same year, suggesting greater concerns and stronger will of exiting on the part of parents of students enrolled in closing schools. In addition, the percentage of student transfers in the year before closure was significantly higher for closing charter schools than for closing TPS, consistent with the general pattern of parents of charter school students being more proactive in making choices of schools for their children than parents of TPS students.

Figure 27: Percentage of Non-Exit-Grade Students Transferring from Closing and Not-Closing Low-Performing Schools in the Year before Closure by Sector



Figures 28 and Figure 29 compare the academic performance of early leavers and staying students from closing charter and traditional public schools. As displayed in Figure 28, across both sectors, early leavers had significantly lower reading and math achievement scores than observed in that same year for staying students. Figure 29 displays the growth scores of early leavers and stayers in closing schools. Recall that growth was measured as the change in achievement from one year to the next, and the zero line indicates the average one-year growth for all the students. Figure 29 shows that reading and math growth scores were negative for both early leavers and stayers in closing schools in both sectors. Nevertheless, only in reading in closing TPS did early leavers have significantly weaker growth than stayers.

Figure 28: Reading and Math Achievement of t_{-1} Leavers and Stayers from Closing Low-Performing Schools by Sector

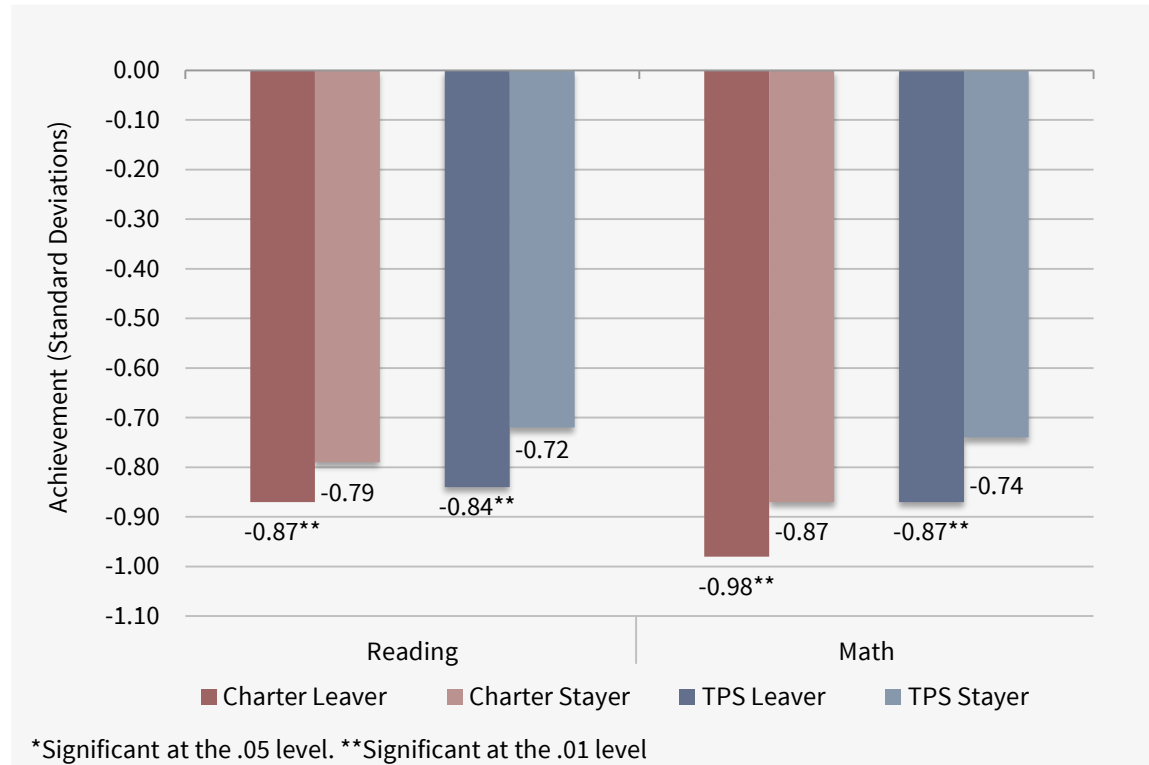
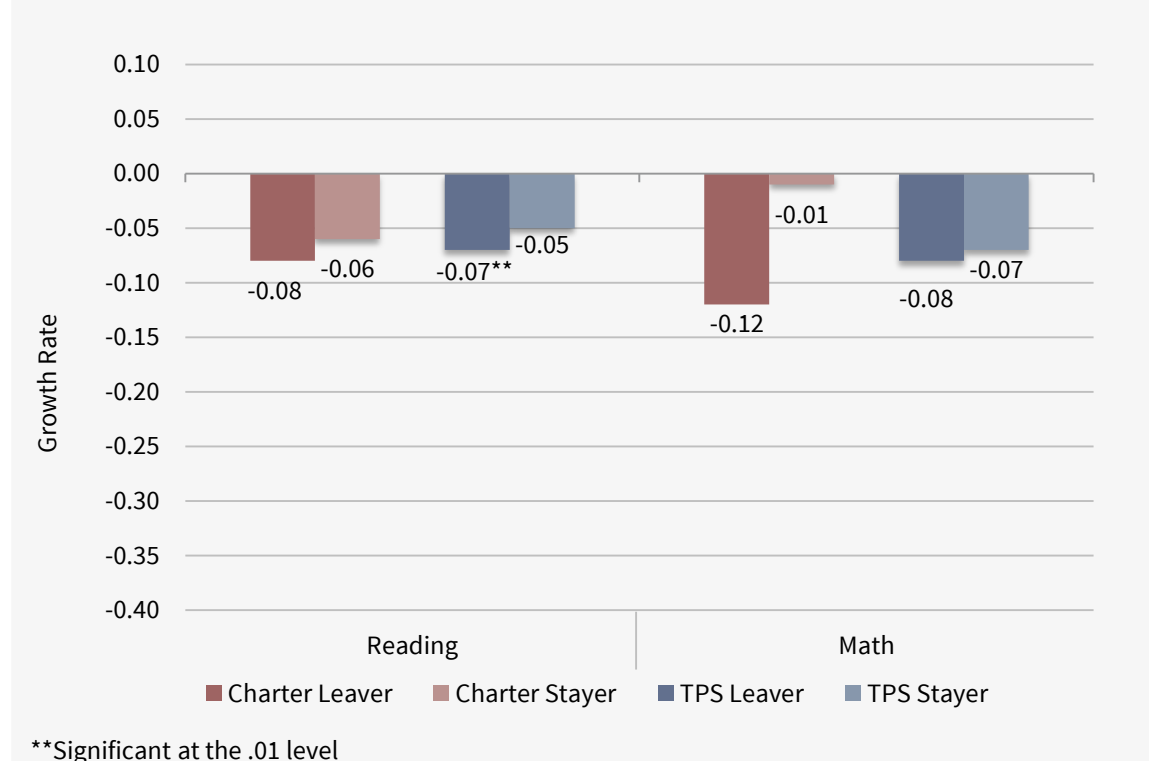


Figure 29: Reading and Math Growth of t_{-1} Leavers and Stayers from Closing Low-Performing Schools by Sector



We looked at how early leavers from closing schools performed academically in comparison with students who exited from not-closing low-performing schools in the same academic year. Figure 30 shows that the reading and math achievement scores of early leavers from closing schools were significantly lower than those of students who departed in the same year from continuing low-performing schools; the finding held for both sectors. Figure 31 further indicates that early leavers from closing schools had significantly fewer gains in both reading and math than t_{-1} leavers from not-closed low-performing schools in both sectors.

Figure 30: Reading and Math Achievement of t_{-1} Leavers from Closing and Not-Closing Low-Performing Schools by Sector

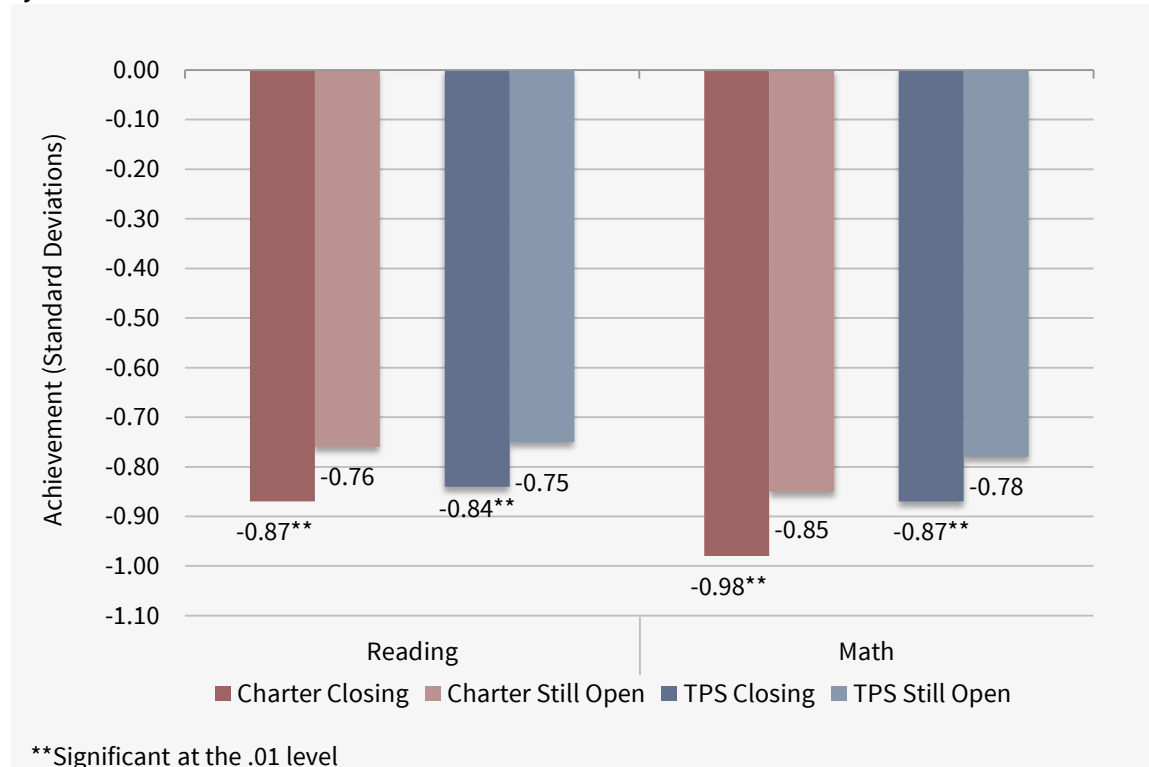
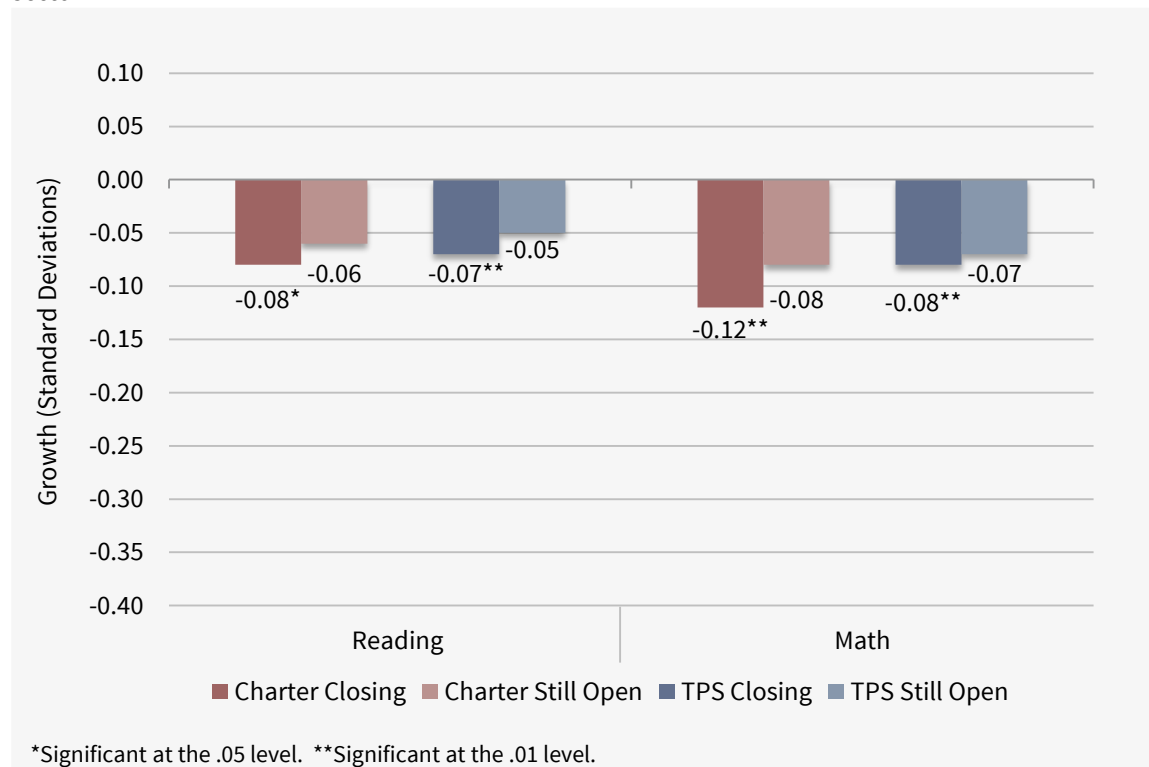


Figure 31: Reading and Math Growth of t_{-1} Leavers from Closing and Not-Closing Low-Performing Schools by Sector



These findings may sound counterintuitive at first glance. We probed the pattern further and through supplementary analysis learned that early leavers from closing schools were skewed to the lower state ventiles of achievement.

We also compared eligibility for free and reduced-price lunch, special education status and English language learner status of early leavers from closing schools with those of stayers as well as with those of students who leave continuing low-performing schools in t_{-1} . There were no substantial differences in those attributes between student groups.¹⁷

We probed how students who stayed until the official closure performed in t_0 relative to t_{-1} . Figure 32 demonstrates significantly lower math achievement in t_0 than in t_{-1} for stayers in closing charter schools and no significant differences in the other comparisons. Figure 33 exhibits somewhat different patterns in growth by sector and subject. Staying students in closing charter schools had less weak growth in reading but weaker growth in math in t_0 than in t_{-1} . Stayers in closing TPS achieved greater gains in both subjects in t_0 than in t_{-1} . However, the absolute growth score was zero or almost zero in the three cases where the gain in t_0 was larger than in t_{-1} .

¹⁷ The results are shown in Figures 42 and 43 in Appendix A.

Figure 32: Reading and Math Achievement of Students Who Stay until Closure by Time Period and Sector

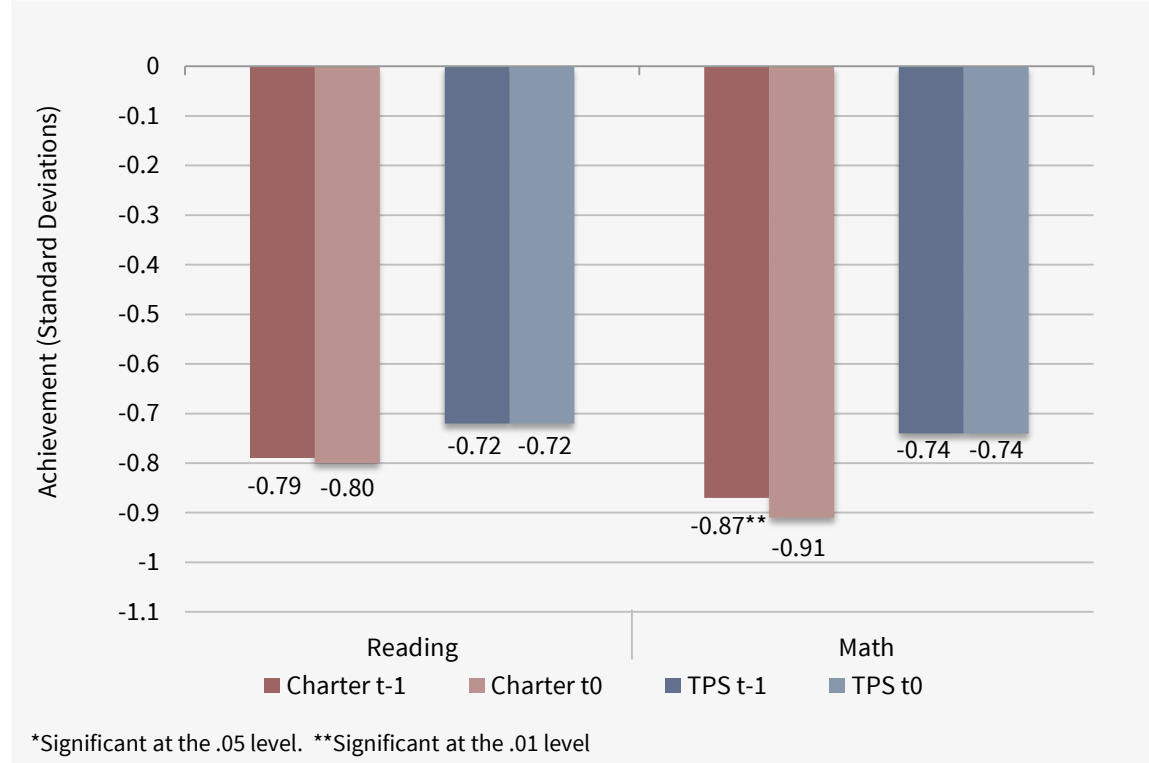
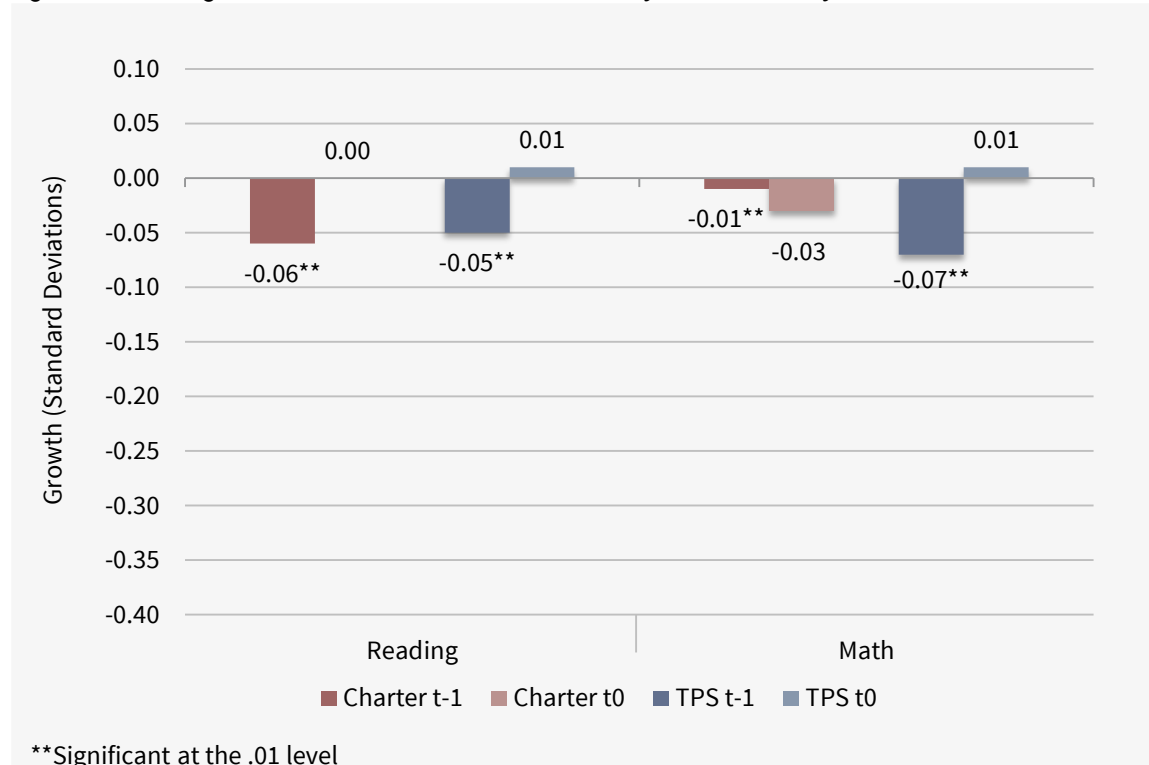


Figure 33: Reading and Math Growth of Students Who Stay until Closure by Time Period and Sector



Post-Closure Flow of Students

Where did closure students go after they left their closed schools? We examined how many of them stayed in the same sector and how likely they ended up in better or worse schools. We restricted this portion of the study to only those students who attended the closing schools in their final year of operation. For the convenience of presenting findings, we use the notations as shown in Table 8 to refer to the years when and after a school is closed.

Table 8: Notations for the Final Year of Operation and Post-Closure Periods

Time Period Relative to School Closure	Reference
Final year of operation for the closed schools	t_0
The year after closure	t_1
Two years after closure	t_2
Three years after closure	t_3

Sector of Post-Closure School of Enrollment

Table 9 shows the sector in which displaced closure students enrolled during the year following the closure of their original school, with the color-shaded cells indicating a transfer to the same sector. An overwhelming majority (82 percent) of students displaced by TPS closure landed in a TPS in t_1 while slightly over 40 percent of charter closure students stayed in the charter sector. The difference in the same-sector transfer for charter and TPS displaced students was not necessarily a mere reflection of preference, but was likely to be colored by the availability of the charter and TPS alternatives as well. As a point of reference, there are about a million students on the waiting list of charter schools in the country. Besides, there are no charter options for displaced students in some local systems if the only charter school there is shut down. These constraints make the same-sector transfer hardly a realistic option for many charter closure students.

Table 9: Sector to Which Students Transferred in t_1 by Sector of Closure

	Destination Sector in t_1	
	Charter Sector	TPS Sector
Charter Closed in t_0	41%	59%
TPS Closed in t_0	18%	82%

Quality of Post-Closure Schools

What happens to students after schools close is a matter of deep concern for parents, educators and policymakers. We tracked early leavers and students who remained until a school closed for three subsequent years. The analysis was structured by the quality of the new school relative to the quality of the closed school in each of the three post-closure years, measured by the school's state-specific

ventile of math achievement. A new school was considered superior if its achievement level was two or more ventiles higher than that of the closed school (also referred to as the t_0 school), equivalent if its achievement was in the same ventile or one ventile higher than that of the t_0 school, or inferior if its state ventile of achievement was lower than that of the t_0 school. For closed schools that fell into the lowest ventile, there could only be equivalent or superior transfers for their affected students; for the rest, moves could be inferior, equivalent or superior.

Our analysis addressed two large questions. First, how do students who are affected by closure fare in their next school enrollment? Does the fact that some students remain until closure affect the quality of their next-school placement? Second, is there evidence that students “take what they can get” once they have landed in a new school or do we see continued movement into other settings? We examine each question below.

Table 10 shows that regardless of sector, close to half of the students who were displaced by closure moved to better schools in t_1 , one third or more of these students attended equivalent schools, and fewer than 20 percent of them ended up with inferior placements. In both sectors, a larger percentage of early leavers went to superior schools than students who remained until the official closure, suggesting that lingering in a closing school might reduce the chance of finding a seat in a better school. Compared by sector, both early leavers and staying students from closing charter schools were more likely to get superior placement than corresponding groups of students from closing TPS. This difference is not surprising given that parents of closing charter schools had already had experience in navigating the school choice landscape.¹⁸

Table 10: Relative Quality of the t_1 School of t_0 Closure Students and t_1 Leavers

Sector of Closed School	Category of Students	Relative Quality of t_1 School		
		Inferior	Equivalent	Superior
Closed Charter	Early Leavers	10%	33%	58%
	t_0 Closure Students	19%	33%	48%
Closed TPS	Early Leavers	12%	38%	49%
	t_0 Closure Students	13%	42%	45%

¹⁸ Here is a note of caution about the equivalence of the comparisons: As shown in Table 26 in Appendix A, a higher percentage of early leavers attended schools in the bottom two state ventiles than did students displaced in t_0 in both sectors. In addition, a larger percentage of both categories of students in the charter sector came from closing schools in the bottom two ventiles than in the TPS sector. These differences suggest a possibility that the greater likelihood for early leavers (as compared to students displaced in t_0) and charter students (as compared to TPS students) to have better placement in t_1 was partly because they had departed from lower-quality schools.

Once students from closed schools were enrolled in their next schools, scenarios about schooling could diverge. Some families might reasonably seek stability for their students, regardless of school quality. On the other hand, they might have enduring concerns about the impact of school closure on their children’s chances for success and resolve to pursue the highest-quality schools available. In the latter case, there might be stronger options which were unavailable due to capacity constraints. While it was not possible to tease out the relevant motivations for individual students, the aggregate picture of placement over time provided at least a partial view of family behavior.¹⁹

Table 11 depicts the quality of the t_2 schools by the category of the t_1 schools for displaced students and early leavers. The darker cells illustrate the same quality of the t_1 and t_2 schools as compared to the closed school. The values along the diagonal show that in t_2 , the largest share of students remained in schools of the same quality as their first post-closure school. In each strand, early leavers showed a stronger preponderance than the students who remained until the school actually closed. It is not surprising that a large share of students who landed in superior settings in t_1 remained in that relative quality of schooling in t_2 .

There was evidence too that some families whose children failed to land in a higher-quality school in t_1 found ways for their children to move to better options in the next year. Around two-fifths of families whose children first enrolled in an inferior school in t_1 made an upward move in t_2 . Similarly, about one-quarter of students whose t_1 schools were equivalent in quality to their closed schools moved to better settings in t_2 . The countertrend was less prevalent: Small shares of students made moves to less desirable settings compared to their first post-closure placement.

Table 11: Relative Quality of the t_2 School of t_0 Closure Students and t_1 Leavers by Quality of the t_1 School

Relative Quality of t_1 School	Category of Students	Relative Quality of t_2 School		
		Inferior	Equivalent	Superior
Inferior	Early Leavers	66%	22%	13%
	t_0 Closure Students	56%	29%	15%
Equivalent	Early Leavers	9%	67%	25%
	t_0 Closure Students	11%	66%	23%
Superior	Early Leavers	4%	18%	79%
	t_0 Closure Student	4%	25%	71%

Table 12 illustrates the quality of the t_3 schools for each category of the t_2 schools. The changes from t_2 to t_3 were similar to those from t_1 to t_2 described above. Again, the values in the darker cells along the

¹⁹ There were several possible factors underlying the placement over time beyond parental motivation for change, such as planned school changes at exit grade, school itself getting better or worse, and family moving within the state.

diagonal indicate that the schools the majority of students attended in t_3 were of the same quality as their t_2 schools. Some of the students whose t_2 schools were inferior or equivalent to their t_0 schools landed in better settings in t_3 . Specifically, about 40 percent of students going to inferior schools in t_2 enrolled in higher-quality schools in t_3 , and close to 30 percent of students with equivalent placement in t_2 saw improvement in the school setting in t_3 . The percentage of students who experienced downward mobility in school quality in t_3 was small.

Table 12: Relative Quality of the t_3 School of t_0 Closure Students and t_1 Leavers by Quality of the t_2 School

Relative Quality of t_2 School	Category of Students	Relative Quality of t_3 School		
		Inferior	Equivalent	Superior
Inferior	Early Leavers	60%	28%	12%
	t_0 Closure Students	65%	23%	13%
Equivalent	Early Leavers	10%	64%	26%
	t_0 Closure Students	15%	56%	29%
Superior	Early Leavers	4%	18%	78%
	t_0 Closure Student	4%	20%	76%

Summary of the Flow of Students from Closing Schools

Our analysis revealed that a significant number of students voluntarily left closing schools in the year before the official closure, suggesting that some parents were “in the know” about the schools their children attended. (This also reinforces the idea that closure decisions were made in t_1 and implemented at the end of the following year.) The percentage of early leavers was higher for closing charter schools than for closing TPS, which corresponds to the conventional wisdom that in general parents of charter school students have greater experience in seeking the best schooling options available for their children. In both the charter and TPS sectors, early leavers from closing schools had poorer academic performance than staying students. They also performed worse than students who transferred from not-closed low-performing schools in the same sector in an equivalent time window.

A substantial proportion of closure students stayed in the same sector as their closed schools in the year after closure. An overwhelming majority of TPS students displaced by closure attended another TPS. Over 40 percent of charter displaced students went to a charter school, which is impressive given that the charter school alternatives are limited or have admission schedules that do not align with end-of-year closures.

The biggest concern about school closure is the fate of the students who have been involved. Nearly half of displaced students in this study ended up in higher-performing schools in the year after closure. Realistically, this option was constrained by the quality of the alternative supply. The proportion of superior placement was higher for charter closure students than for TPS closure

students, an indication of the stronger experience of parents of charter school students in navigating the school choice landscape. In both sectors, a higher percentage of early leavers from closing schools than of displaced students landed in better settings in the year after they transferred, implying early departure might be somewhat advantageous given limited seats in nearby better schools.

We saw that some families made further changes in the schools their displaced students attended in later post-closure periods. The pattern of enrollment in extended periods suggested that many families sought stability over improved quality in their choice of schools. Some students who had not landed well in the first one or two years after closure attended a better school in the subsequent year. That said, in the second and third years after closure, the majority of students enrolled in a school of the same quality as the school they attended in the previous year. Districts and charter authorizers still have a long way to go to offer superior alternatives for students displaced by school closure. And as will be shown in the next chapter, the quality of the alternatives matters greatly for the students affected by school closures.

6. Post-Closure Student Academic Performance

Any discussion about school closure as an education improvement approach is incomplete without a deep understanding of what happens to the learning outcomes of the students who are involved. Whether closure students fare better academically should factor directly into an overall assessment of the practice and should heavily influence popular opinion on the matter. Given the mixed findings in earlier studies of smaller areas (as reviewed in the Introduction chapter), providing a broad-based examination of student academic outcomes following school closure was a prime motivation for this study.

The investigation of student outcomes involves tracking students' post-closure experiences. Not surprisingly, these pathways become more complex over time. The cleanest picture of the impact arises from the experience of the students who remain in their schools until the schools close. Using longitudinally linked data on students in all schools in the bottom 20 percent of performance in the 26 states included in this study, it was possible to measure the academic progress of students who were affected by school closures and compare their experiences to what would have occurred had the school not closed. The comparison condition was created by matching each closure student to a VCR consisting of identical students in other low-performing schools that continued to operate. (Our method for generating VCR peers is described in Chapter 2 in Volume I and Appendix B in this volume.) Two sets of comparisons were made throughout the analyses: charter closure students with their VCRs from the other low-performing charter schools and TPS closure students and their VCRs from the other low-performing traditional public schools.

The outcome of interest is the academic growth of students as reflected in yearly gains on state achievement test scores. Looking at academic growth ensures a clear estimate of the impact of the schools that students attend. In this case, it permitted us to gauge how closure students fared in the specific schools they attended in the three years following school closure. The results are presented in marginal terms; that is, we take the VCR comparison experience as the baseline and describe closure students' performance as positive (i.e., greater progress) or negative (i.e., less progress) against the baseline.

We first scrutinized the average yearly progress of closure students up to three years after their schools closed, overall and by subgroup, as compared to their VCR peers from the other low-performing schools that remained open. (Some students had shorter periods of follow-up due to exits from the public system, progression into untested high school grades or eclipse at the end of the study window.) The results illustrate that over the three years after closure, the average negative effects of closure persisted for students and, for some, became more intense over time. Then we probed whether the impact of closure differed by the quality of the receiving school by tracking closure students in the year after closure. We found that in general and by sub-population, closures benefited the academic growth of students who landed in higher-performing schools but impaired the performance of students with equivalent or inferior school placement.

Academic Progress in the Three Years Following School Closure

Our analysis rested on two assumptions that are in tension. We assumed it might take some time for some students' performance to stabilize after their educational experience is disrupted by closure. On the other hand, the impact might dissipate over time after closure, as students accumulate additional time in school. In this section, we describe the academic progress of closure students over the three years after their schools closed. As mentioned above, some students had shorter periods to track due to structural changes. The overall yearly growth in the reading and math test scores for all closure students, as compared to those of their VCR peers from the same sector, are reported first. Then we disaggregate the relative growth of closure students by subgroup.

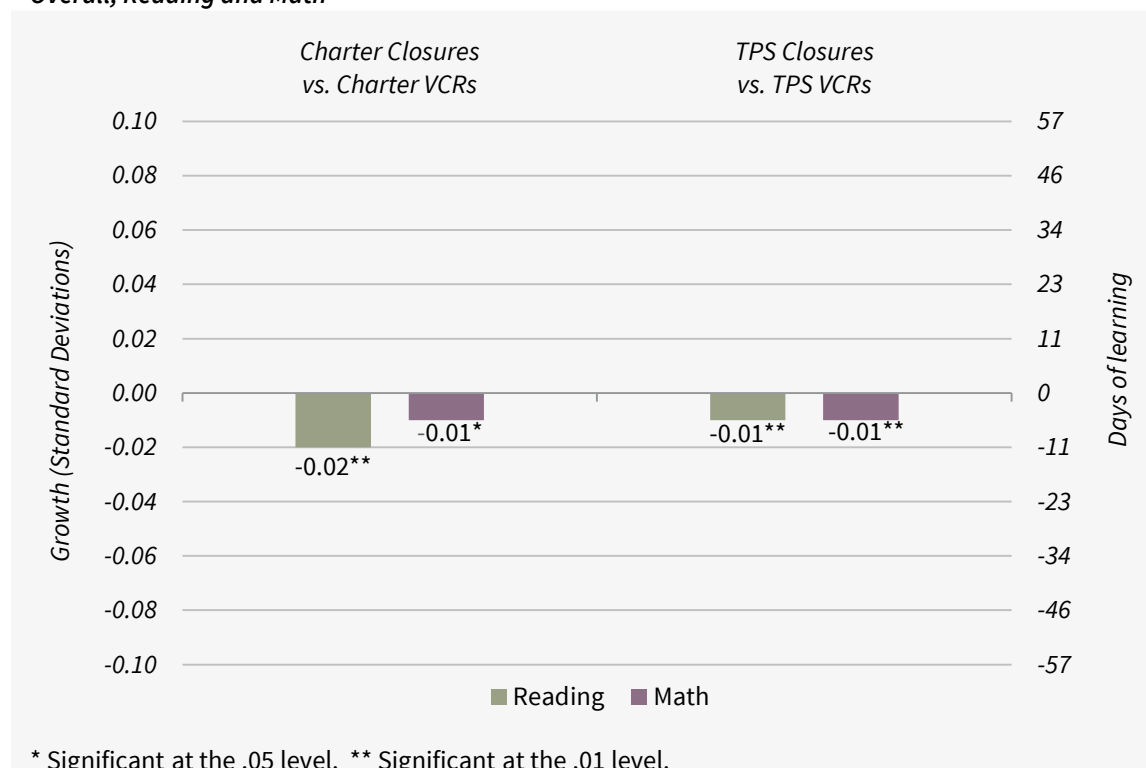
Overall, the effect sizes for closure students were negative in comparison with their VCRs from the same sector. A negative effect size for the closure students does not mean the students have not made an improvement in academic achievement, but means the students have not advanced as much as expected based on their characteristics. In fact, as Table 27 in Appendix A indicates, both closure students and their VCR peers registered slightly positive average growth in reading and math in the three years after closure.

Average Academic Impact in the Three Years after Closure

Figure 34 illustrates the impact of school closure on student academic progress in the three years following closure. In this figure, the impact of closure is measured by the mean yearly growth of closure students over all three years relative to the progress of students in continuing low-performing schools. (Year-by-year results will be presented below.) Charter closure students had weaker growth than their VCRs from low-performing charter schools that remained open, amounting to 11 fewer days

of learning in reading and six fewer days of learning in math per year. TPS closure students also made less academic progress than did their TPS VCRs, lagging behind by six days of learning each year in both subjects. The relative negative growth of charter and TPS closure students suggests that closure of low-performing schools somewhat hampered academic progress for the average student.

Figure 34: Average Yearly Growth of Closure Students as Compared to VCR Peers Up to Three Years after Closure – Overall, Reading and Math



While the overall impact analysis establishes a baseline for discussion, these results are not subtle enough to provide insight for policy implications. A clearer picture of more granular distribution around the averages along with relevant factors will add to a general understanding of the impact of closure. Hence, we made a further exploration of the closure effects by state, lapsed time since closure, number of closures students have experienced and sub-population.

Impact by State

Our general analysis used statistical methods to control for differences between states. These differences may provide useful insight into state policy environments, so we compared the average yearly progress of closure students and their VCRs by state. As Table 13 shows, states varied in the degree to which school closure was helpful to the students affected by the closures, with more positive results found in the charter sector. Looking into both reading and math growth scores,

charter closure students did not differ significantly from their VCR peers in the majority of the states, achieved stronger growth in one subject in five states, and suffered weaker gains in one or both subjects in six states. In the TPS sector, only two states saw positive impacts for closure students relative to their VCRs; 14 states witnessed relative negative impacts; and the other states had no significant difference.

Focusing on the good results, there were more states with positive outcomes for charter school closure students (Arizona, Colorado, DC, Missouri and New Mexico) than for TPS students (Massachusetts and Pennsylvania). This finding is perhaps not surprising, since charter authorizers are explicitly tasked to be watchful. Looking at the effect sizes in Table 13 side by side with the closure rates in Table 3 in Chapter 3, there seemed to be “choreographing” by charter authorizers in some states with positive results. For example, Colorado, the District of Columbia and Missouri shut down a relatively high share of low-performing charter schools (Table 3) and at the same time saw stronger academic growth among charter closure students relative to their VCR peers. It is likely charter closures in these states were handled by authorizers who cared about quality, so there were better chances for students to land well. Practices in the states that have produced positive results may hold useful lessons for the remaining states.

Table 13: Average Yearly Growth of Closure Students as Compared to VCR Peers Up to Three Years after Closure by State

	Charter Closures vs. Charter VCRs		TPS Closures vs. TPS VCRs	
	Reading	Math	Reading	Math
Arizona	0.04	0.07*	-0.04	-0.06*
Arkansas	-0.12**	0.06	-0.03**	-0.01
California	-0.03**	-0.01	0.00	0.00
Colorado	0.05*	0.01	0.00	-0.01**
District of Columbia	0.27*	0.03	0.03	-0.02
Florida	0.00	0.01	-0.05**	-0.04**
Georgia	0.00	-0.03	-0.04**	-0.03**
Illinois	0.02	-0.02	-0.01	0.01
Louisiana	--	--	-0.01	-0.03**
Massachusetts	0.02	0.02	0.01	0.06**
Michigan	-0.03*	-0.01	0.00	0.01
Minnesota	0.01	-0.06	-0.01	-0.02
Missouri	0.15**	0.00	0.04	-0.03
Nevada	--	--	-0.14	-0.21
New Jersey	-0.06*	-0.05	-0.01	-0.02*
New Mexico	0.26**	0.01	0.04	-0.10*
New York City	--	--	-0.02	-0.03**
New York State	-0.07**	-0.06**	0.00	0.00
North Carolina	-0.10	-0.01	-0.06	-0.26**
Ohio	-0.04**	-0.05**	-0.02**	-0.02**
Oregon	0.10	0.05	-0.06**	-0.04**
Pennsylvania	0.00	0.01	0.01	0.01**
Rhode Island	--	--	-0.01	-0.04
Tennessee	-0.16	-0.08	0.01	-0.01
Texas	0.01	0.03	-0.01**	-0.01*
Utah	--	--	-0.05**	-0.10**
Wisconsin	-0.03	-0.01	0.00	0.00

Note: (1) There were no closed low-performing schools in Nevada, New York City, Rhode Island and Utah within our data window, so no results were reported for charter closure students for these four states. (2) No results are reported for charter closure students in Louisiana as there was only one charter closure in 2009 within our data window and no continuing low-performing charter school in 2009 to draw VCRs from.

* Significant at the 0.05 level.

** Significant at the 0.01 level.

Impact by Lapsed Time since Closure

Figures 35 and 36 plot the year-by-year growth of closure students one, two and three years after closure relative to their VCRs in the same growth period. They reveal distinct patterns by sector.

Charter closure students did not differ significantly in growth from their VCRs in t_1 and t_2 but performed significantly worse in both reading and math in t_3 . TPS closure students made significantly less progress in both subjects than their peers from not-closed low-performing TPS in t_1 , caught up in t_2 , and achieved a significantly greater gain in math in t_3 . The mechanisms underlying the varying impacts by the lapsed time since closure between the two sectors are worth detailed investigation in future research.

Figure 35: Year-by-Year Growth of Closure Students One, Two and Three Years after Closure as Compared to VCR Peers – Reading

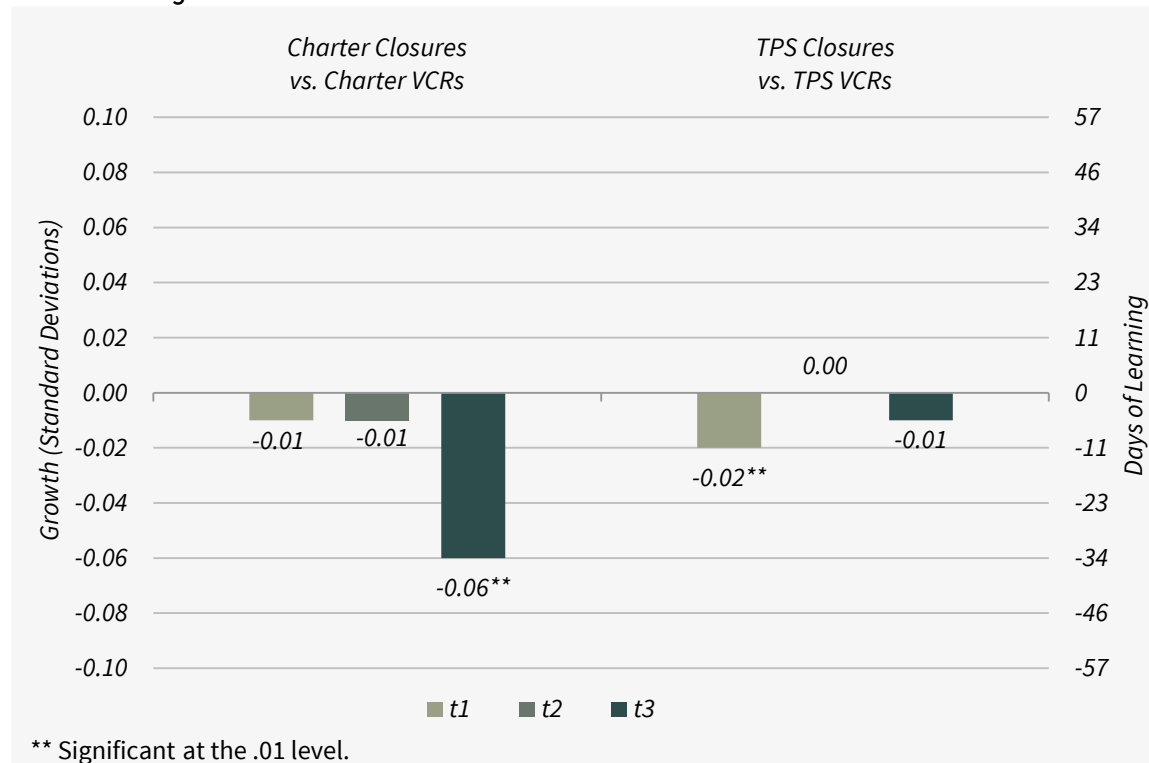
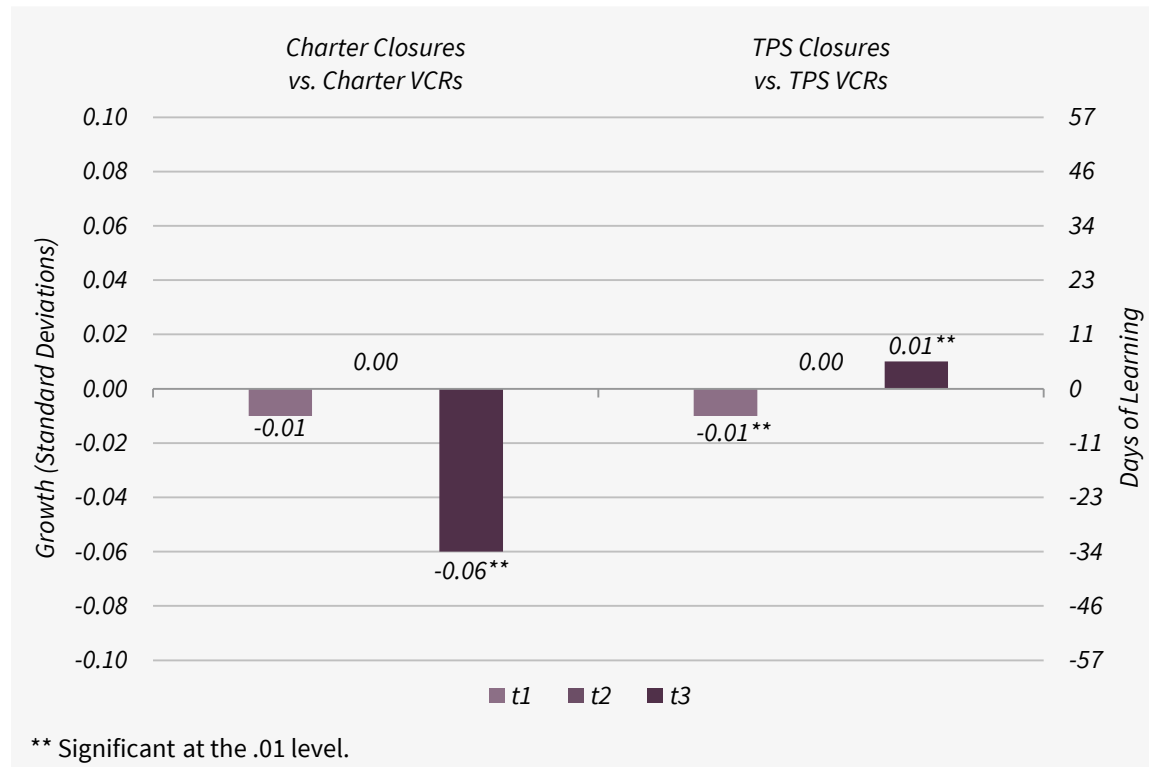


Figure 36: Year-by-Year Growth of Closure Students One, Two and Three Years after Closure as Compared to VCR Peers – Math



Academic Impact by the Number of School Closures a Student Experiences

Around 4 percent of matched charter closure students and 3 percent of matched TPS closure students experienced two school closures within our study window. We examined whether two closure experiences worsened the impact of closure. Table 14 illustrates that both charter and TPS students with a single experience of closure made significantly less progress in both reading and math than did their counterparts in the same sector without any closure experiences. Nevertheless, the second experience of closure did not further aggravate the negative impact, with only one exception: TPS closure students with two closure experiences had significantly weaker growth as compared with TPS students who experienced only one closure.

Table 14: Average Yearly Growth of Closure Students Up to Three Years after Closure: By the Number of Closures Experienced

	Charter Closures vs. Charter VCRs		TPS Closures vs. TPS VCRs	
	Reading	Math	Reading	Math
1 vs. no closure	-0.02**	-0.01*	-0.01**	-0.01**
2 vs. 1 closure	-0.03	-0.02	-0.01	-0.04**

* Significant at the 0.05 level.

** Significant at the 0.01 level.

Impact by Sub-Population

Understanding the impact of any education policy is important both in the aggregate and in the extent to which the policy affects students with different attributes. In the case of school closures, the question of differential impacts across student groups is especially germane since, as shown in Chapter 4, low-performing schools with higher levels of poverty or larger proportions of minority students were more likely to be closed. The higher propensity to close traditional public schools with larger shares of poverty or minority students coupled with the larger number of TPS that were closed make the question acutely pertinent.

Table 15 presents the average yearly progress in reading and math for various student groups in each sector of school closure in the three years after closure. The values reflect the closure students' performance compared to their VCR peers. Breaking out the various sub-populations revealed that school closure placed students at about the same academic growth as their peers in low-performing schools that did not close. There were, however, some noteworthy exceptions. For charter school closures, students in poverty, particularly black students in poverty, saw worse impacts in reading than their peers in low-performing schools that continued to operate. Multiracial closure students had weaker growth in math. Special education students and Hispanic students who were not in poverty posted greater academic gains in reading. In the TPS closures, there were no bright spots: Black students, black students in poverty, and white students faced worse impacts after school closures than the common experience of their peers in other continuing low-performing schools. Asian-Pacific and multiracial closure students fared worse in reading. The general progress of the other groups suggested similar results as peers in other low-performing schools that continued operating.

Table 15: Average Yearly Growth of Closure Students as Compared to VCR Peers Up to Three Years after Closure by Sub-Population

	Charter Closures vs. Charter VCRs		TPS Closures vs. TPS VCRs	
	Reading	Math	Reading	Math
Poverty	-0.04**	-0.01	0.00	0.00
ELL	-0.01	-0.01	-0.01	0.01
Special Education	0.07**	-0.01	0.00	0.01
Black Students	0.01	0.00	-0.01*	-0.01*
Hispanic Students	0.03	0.00	-0.01	-0.01
White Students	-0.03	-0.01	-0.01**	-0.02**
Asian-Pacific Students	0.01	-0.12	-0.02*	-0.02
Native American Students	0.08	-0.11	-0.01	-0.04
Multiracial Students	-0.02	-0.12*	-0.03*	-0.02
Black Students in Poverty	-0.02**	-0.01	-0.01**	-0.01**
Black Students Not in Poverty	-0.02	-0.03	-0.01	-0.02**
Hispanic Students in Poverty	-0.02	-0.01	0.00	-0.01
Hispanic Students Not in Poverty	0.08**	0.07	-0.02	0.00

* Significant at the 0.05 level.

** Significant at the 0.01 level.

Academic Progress by Quality of Receiving School

The overall effect of the impact of closure on student academic progress masked the variations by the quality of the schools to which closure students transferred. As shown in Chapter 5, nearly half of closure students ended up in better schools, and many went to schools equivalent or inferior to their closed schools. Does the quality of the next school make a difference in the academic progress of closure students? We examined the growth of closure students in the year after closure as compared to their average peers by the level of quality of their receiving school relative to the closed school.²⁰ We further explored whether the differential impacts by the quality of the receiving school were prevalent across sub-populations. We are agnostic on whether the next school was assigned by districts or selected by parents. The key question is whether the choices were helpful to the students who survived a school closure, whoever did the enrollment allocations.

Overall Impact of Post-Closure School Quality on Student Academic Progress

Recapping from Figures 35 and 36, Table 16 shows that in the first growth period, charter closure students did not progress significantly differently from their VCRs from low-performing charters that

²⁰ Because substantial proportions of students made subsequent moves in years two and three following closure, a longer range of analysis such as three post-closure years would have involved 27 different move patterns and would not have added any clarity to the findings.

were not closed, while TPS closure students made significantly fewer gains in both subjects than did their TPS VCRs.

Table 16: Relative Growth of Closure Students as Compared to VCR Peers in Growth Period 1-Overall

	Charter Closures vs. Charter VCRs		TPS Closures vs. TPS VCRs	
	Reading	Math	Reading	Math
Growth	-0.01	-0.01	-0.02**	-0.01**

** Significant at the 0.01 level.

Figures 37 and 38 show an evident role of the quality of the receiving school in the post-closure academic progress of closure students. The performance of closure students in their new schools was strongly associated with the quality of the school in both sectors, even more so in TPS where the differences were significant across the board. For both charter and TPS closure students, the value of superior school placement was stronger in math than in reading by a considerable amount. Compared to the average VCRs from continuing low-performing schools in the same sector, a reading benefit equivalent to 11 days of extra learning was found among TPS and charter closure students landing in superior receiving schools, while the math benefit increased to 40 days of extra learning for charter closure students in subsequent superior settings. Conversely, the moves to inferior and equivalent schools clearly demonstrated continued injury to the progress of students who had already experienced closures in the first place. The largest growth gap between superior and inferior school placements was found in math for charter closure students, standing at 108 days of learning.

Figure 37: Breakdown of Relative Reading Growth of Closure Students as Compared to VCR Peers in t_1 by the Relative Quality of the t_1 Receiving School

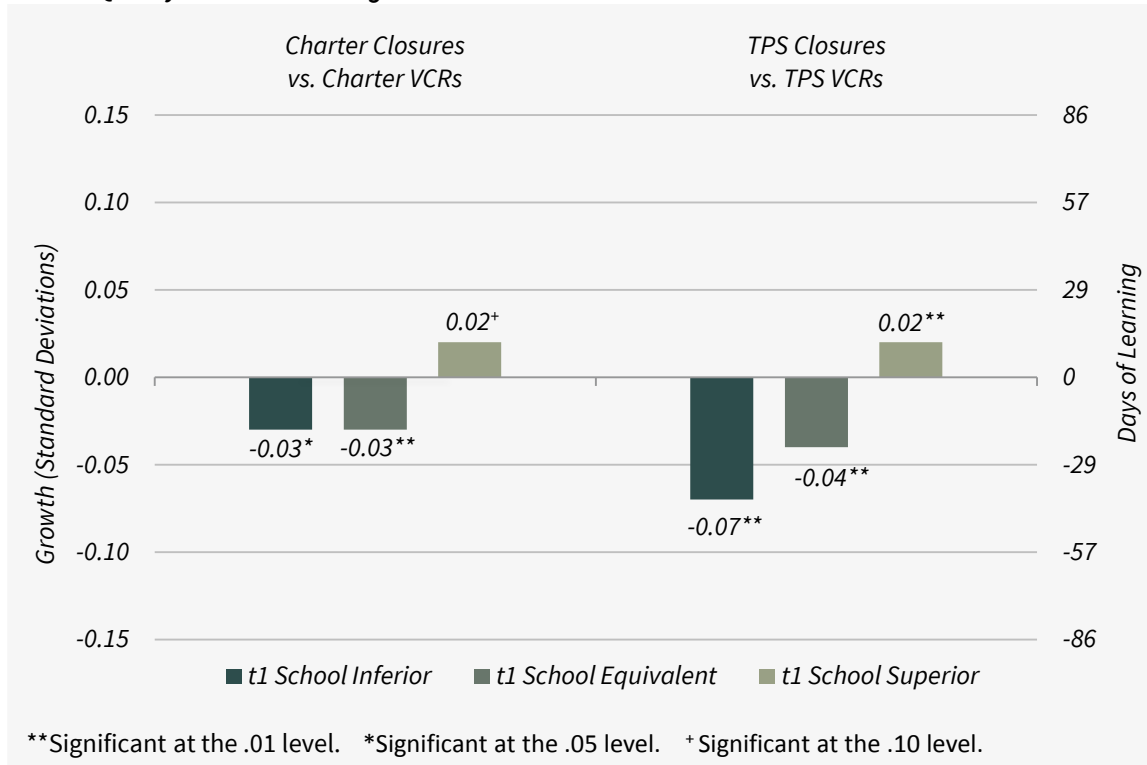
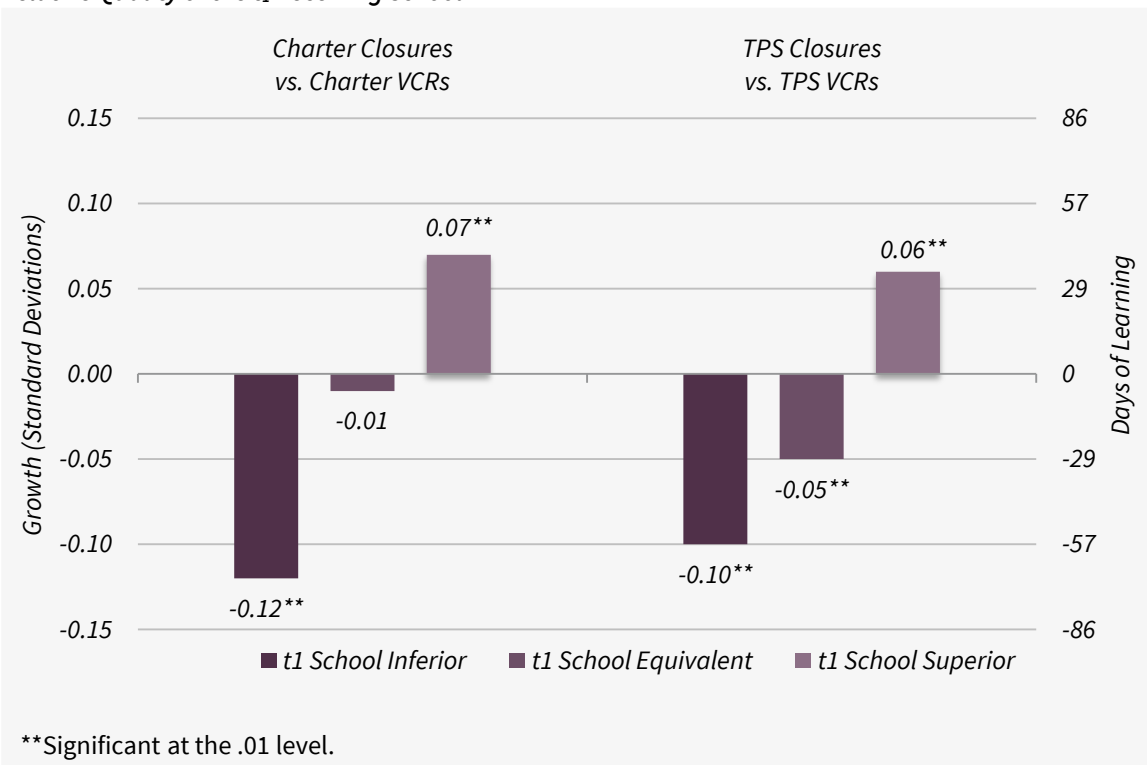


Figure 38: Breakdown of Relative Math Growth of Closure Students as Compared to VCR Peers in t_1 by the Relative Quality of the t_1 Receiving School



Impact of Post-Closure School Quality by Sub-Population

We further explored the differential impact of attending a superior, equivalent or inferior school across different sub-populations of closure students.

Table 17 exhibits sporadic, inconsistent and sometimes counterintuitive impacts of the quality of the receiving school on closure students with high needs. For students in poverty, only those from charter closures registered significantly weaker growth in math relative to their VCRs if they landed in an inferior school. For English language learners, those from closed charter schools who gained seats in superior schools achieved stronger growth in reading, while those from closed TPS and with inferior placement made greater gains in math. Charter special education closure students had weaker growth in math if they ended up in an inferior school; counterintuitively, TPS special education closure students witnessed weaker growth in math if they went to a better school, made greater progress in math if their next school was equivalent to the closed one, and achieved greater gains in both subjects if they went to an inferior school. The counterintuitive patterns found among some TPS ELL and special education closure students might be accounted for by their high-need status or their small numbers. What mattered more for them might be to what extent the new school met their specific needs rather than the general quality of the school.

Table 17: Breakdown of Impact of Closure on Students of Poverty, ELL and Special Ed Status in t_1 by the Relative Quality of the t_1 Receiving School

	Charter Closures vs. Charter VCRs		TPS Closures vs. TPS VCRs	
	Reading	Math	Reading	Math
Students in Poverty				
Poverty* t_1 School Superior	-0.05	0.01	0.00	0.00
Poverty* t_1 School Equivalent	0.00	0.04	-0.01	0.02
Poverty* t_1 School Inferior	-0.08	-0.10*	0.00	0.01
ELL Students				
ELL* t_1 School Superior	0.07*	0.02	-0.02	-0.01
ELL* t_1 School Equivalent	-0.05	0.00	0.01	0.02
ELL* t_1 School Inferior	-0.08	-0.06	0.00	0.05**
Special Education Students				
Sped* t_1 School Superior	0.04	-0.02	0.00	-0.03**
Sped* t_1 School Equivalent	0.02	-0.04	0.00	0.03**
Sped* t_1 School Inferior	0.01	-0.16*	0.03*	0.04**

* Significant at the 0.05 level.

** Significant at the 0.01 level.

Table 18 separates the academic progress of closure students of each race/ethnicity in the year following closure relative to their average VCRs by the quality of the school they transferred to. For charter closures, relocation to a superior school led to stronger growth in reading for black students and greater gains in math for Hispanic students. The effect size was particularly large in math for upward-moving Hispanic students, equivalent to 74 days of additional learning.

Table 18: Breakdown of Impact of Closure on Students of Different Races and Ethnicities in t_1 by the Relative Quality of the t_1 Receiving School

	Charter Closures vs. Charter VCRs		TPS Closures vs. TPS VCRs	
	Reading	Math	Reading	Math
Black Students				
Black* t_1 School Superior	0.06*	0.05	0.03**	0.07**
Black* t_1 School Equivalent	-0.01	-0.03	-0.02*	-0.06**
Black* t_1 School Inferior	0.03	0.00	-0.07**	-0.12**
Hispanic Students				
Hispanic* t_1 School Superior	0.03	0.13**	0.03*	0.06**
Hispanic* t_1 School Equivalent	-0.03	-0.08	-0.02	-0.08**
Hispanic* t_1 School Inferior	0.04	-0.06	-0.08**	-0.12**
White Students				
White* t_1 School Superior	-0.05	0.01	0.03**	0.06**
White* t_1 School Equivalent	-0.02	-0.03	-0.03**	-0.05**
White* t_1 School Inferior	0.10	0.03	-0.09**	-0.11**
Asian-Pacific Students				
Asian-Pacific* t_1 School Superior	--	--	0.01	0.09**
Asian-Pacific* t_1 School Equivalent	0.05	--	-0.06**	-0.12**
Asian-Pacific* t_1 School Inferior	--	0.05	-0.04	-0.19**
Native American Students				
Native American* t_1 School Superior	0.22	-0.12	0.04	0.04
Native American* t_1 School Equivalent	--	-0.26	-0.05	-0.13**
Native American* t_1 School Inferior	--	--	-0.19**	-0.15**
Multiracial Students				
Multiracial* t_1 School Superior	0.04	-0.18	-0.01	0.04
Multiracial* t_1 School Equivalent	-0.22	-0.13	-0.10**	-0.06*
Multiracial* t_1 School Inferior	-0.16	-0.14	-0.12*	-0.05

Note: Cells with "--" indicate the number of observations was smaller than the minimum required in the suppression rule of our state partners.

* Significant at the 0.05 level.

** Significant at the 0.01 level.

The role of the quality of the receiving school in learning gains was more prevalent among TPS closure students of different racial/ethnic characteristics. As shown in Table 18, attendance in a superior

school in the post-closure year was associated with higher gains in both subjects for black, Hispanic and white students and stronger growth in math for Asian-Pacific students. Going to an equivalent or inferior school led to weaker progress in both subjects almost across the board. The magnitude of the impact in inferior settings exceeded that of equivalent placement and supported the proposition that the quality of subsequent educational settings is extremely important. It is also notable that in most cases, the effect size was larger for math than for reading.

Does the quality of the receiving school help alleviate or intensify the impact of closure on the most underserved groups, such as black and Hispanic students in poverty? Table 19 shows compelling effects for both groups and even more marked impacts in TPS closures. Specifically, with the average charter peers as the benchmark for comparison, black students in poverty from charter closures made greater progress in math when they landed in a better school and fewer gains in both subjects if they moved to an inferior school. For black students in poverty from TPS closures, superior school placement brought about greater gains in both reading and math, while ending up in an equivalent or inferior setting led to weaker progress in both subjects.

Table 19: Breakdown of Impact of Closure on Black Students in Poverty and Hispanic Students in Poverty in t_1 by the Relative Quality of the t_1 Receiving School

	Charter Closures vs. Charter VCRs		TPS Closures vs. TPS VCRs	
	Reading	Math	Reading	Math
Black Students in Poverty				
Black* Poverty* t_1 School Superior	0.02	0.06**	0.02**	0.06**
Black* Poverty* t_1 School Equivalent	-0.01	0.02	-0.04**	-0.05**
Black*Poverty* t_1 School Inferior	-0.04*	-0.09**	-0.07**	-0.11**
Hispanic Students in Poverty				
Hispanic* Poverty* t_1 School Superior	0.01	0.14**	0.02**	0.05**
Hispanic* Poverty* t_1 School Equivalent	-0.06*	-0.04	-0.03**	-0.07**
Hispanic* Poverty* t_1 School Inferior	-0.06	-0.19**	-0.08**	-0.08**

* Significant at the 0.05 level.

** Significant at the 0.01 level.

Similar patterns were found for Hispanic closure students in poverty. Relative to their average counterparts from not-closed charters, there were more gains in math for poor Hispanic students from charter closures who landed in better schools, weaker growth in reading for those attending equivalent schools, and fewer gains in math with inferior placement. The impact of the quality of the receiving school was pervasive for Hispanic students in poverty from TPS closures, with attendance in superior schools associated with greater gains in both reading and math and placement into equivalent or inferior schools related to weaker growth in both subjects.

Summary of Post-Closure Student Academics

This chapter examines post-closure academic progress of students from charter and traditional public schools. At the aggregate level, both charter and TPS closure students had weaker average yearly growth than their VCR peers in the three years after their schools closed. When we disaggregated our investigations by geography, time or student subgroup, a strong but nuanced picture emerged. States differed in whether and how closure students progressed in reading and math tests relative to their VCRs in the same sector. Some states did post partially positive impacts for their closure students, and more of such positive examples came from the charter sector than from TPS. States where closure students fared well academically may hold useful lessons for decision-makers of school closure policies to learn from, which is worth exploring in a subsequent study.

Year-by-year analysis demonstrated that charter closure students did not lag behind their VCRs until the third year after closure, while TPS closure students performed worse than their counterparts in not-closed TPS in the first year, caught up in the second year, and made greater progress in math in the third year. Why the two sectors differed in the year-by-year academic impact of school closure is an area of future research. A small fraction of students had a second experience of school closure. In general, the second closure did not further aggravate the negative impact on academic growth.

The role of the quality of the receiving school in post-closure student academic progress stood out in our probing and was even more prevalent for TPS closure students. Overall, closure students transferring to a superior school were likely to achieve greater growth, which is encouraging as we adopted a lenient measure of the superiority of the receiving school (achievement being two or more ventiles higher than the closed school). On the contrary, closure students who ended up in inferior or equivalent settings were prone to making fewer academic gains than their peers in other low-performing schools that remained open. These patterns held for students of various racial and ethnic characteristics and somewhat for charter closure students in poverty. They were pronounced for conventionally most-underserved groups such as black and Hispanic students in poverty.

The discernible impact of the quality of the receiving school means that if students can be moved to even a slightly better school, then closure can have positive results. However, if students are sent to schools which are similarly low-performing or even worse than their closed schools, closure generally will result in negative learning outcomes. Considering that only close to half of closure students landed in superior settings (Chapter 5), there is still a large gap to fill in the policy and practice of relocating closure students so that school closures promote rather than hinder the learning of affected students.

7. Summary and Implications

Closing academically failing public K-12 schools has gained momentum as a policy instrument of accountability over the past decade and more. Advocates believe that closing failing schools helps improve the academic fates of students by removing damaging learning environments and enabling students to move to better schools. School closures also are expected to provide an incentive for the continuing schools to improve. Opponents are concerned that school closures will jeopardize student outcomes due to the disruption and stress induced by an involuntary change of schools. Despite heated debate over the issue, empirical evidence is scant and fragmented. Taking advantage of the unique longitudinal, multistate data that CREDO has amassed, this study represents the most comprehensive investigation of closure of low-performing schools to date.

Major Findings

Closures of low-performing schools were prevalent but not evenly distributed. Closures were on the rise in the study period. Geographically, closures appeared to be concentrated in a few key states, especially so in the TPS sector. Considering locale and grade span, closure was mostly an urban phenomenon focused largely on elementary schools, where students have a longer time to recover and communities tend to have more than one school in the system to receive affected students. High school closures were rarer, probably because of strong community affinity and scarcer alternatives.

Low-performing schools that were eventually closed exhibited clear signs of weakness in the years leading to closure compared to other low-performing schools. Closing schools had lower academic performance and smaller student enrollment than low-performing schools that were permitted to remain open. In fact, there were steady declines in both academic achievement and growth in closing schools in the last three years before closure. Enrollment in those schools also dwindled in the last few years of operation.

Variations in closures of low-performing schools by sector were particularly salient. Although the number of charter closures was smaller than that of TPS closures, the percentage of low-performing schools getting closed was higher in the charter sector than in the TPS sector. This pattern was particularly pronounced in the first (from the bottom) state ventile of achievement. On average, the academic performance of closed charter schools was lower than that of closed TPS. However, the performance differences between the charter and TPS closures varied widely from state to state, which suggests that districts and charter authorizers operated in different legislative and regulatory environments. It was also clear that within states, decision-makers in the charter and TPS sectors exercised varying degrees of political will and drew on different approaches when they determined how to deal with low-performing schools.

Closures of low-performing schools were not blind to socioeconomic status or race/ethnicity of the students who were enrolled. In both the charter and TPS sectors, and particularly in the lowest ventile of achievement, low-performing schools with a larger share of black and Hispanic students were more likely to be closed than similarly performing schools with a smaller share of disadvantaged minority students. Moreover, the closure rates for higher-poverty low-performing TPS in the bottom

two ventiles surpassed the rates for lower-poverty TPS of similarly low performance. These observed inequivalent tendencies raise the issue of equity in decision-making about school closures.

There was an obvious early departure of students before the official closure. In both sectors, a higher percentage of students transferred from closing schools one year before the official closure than students attending continuing low-performing schools in the same period. The rate of early transfers was higher for closing charters than for closing TPS. Early leavers from both charter and TPS closures had worse academic performance than students who remained until the official closure as well as students who transferred from not-closed low-performing schools in the same sector in the same year.

A little less than half of displaced closure students landed in better schools. This held for both sectors. A higher share of displaced charter students ended up in better school settings than TPS closure students, compatible with the stronger capabilities of parents of charter school students in maneuvering through school choices. The chance for superior placement among students who left in the year before school closure was somewhat higher, implying some advantage for early departure given limited seats available in better local schools. Some students who did not land well in the first one or two years after closure attended a better school in the next year. However, the dominant pattern was for the schools that students attended in the second and third years following closure to mirror the quality of their schools in the previous year. The pattern possibly reflected families' preference for stability over improved quality in their choice of schools or the realistic constraint of the options of quality alternatives. These findings resonate with a widely held concern that there is a shortage of better options for students displaced by school closures. This concern is well founded as better schools are critically important for students' future academic progress.

The quality of the receiving school made a significant difference in post-closure student outcomes. Closure students who attended better schools tended to make greater academic gains than did their peers from not-closed low-performing schools in the same sector, while those ending up in worse or equivalent schools had weaker academic growth than their peers in comparable low-performing settings. This pattern was stronger for TPS closure students. The finding also held for a number of racial/ethnic groups and was particularly salient for black and Hispanic closure students. The effect was most pronounced for black and Hispanic students in poverty. However, the academic benefit of closure is systematically constrained as the supply of superior alternatives for closure students is limited and there are systemic access challenges such as parent information and district placement practices.

Implications

Views on how to deal with academically failing schools diverge among policymakers, educators and parents. As the most radical measure, closure has received politically charged debate. The findings revealed in this study establish a foundation for evidence-based discussion about the implications of closing low-performing schools.

Closing chronically low-performing schools seems to be an inevitable option. The widespread failure of the school improvement strategies under the SIG programs (Dragoset, et al., 2017) makes the option of keeping chronically low-performing traditional public schools open in the hope of making progress over time unattractive and impractical. Previous research by CREDO has also demonstrated that a charter school that performs poorly at the beginning is very unlikely to improve later on (Peltason & Raymond, 2013; Woodworth & Raymond, 2013). Hence, closing persistently low-performing schools seems to be pushed to the front as an inevitable alternative. However, our findings point out several intricacies of – and call for caution in – implementing this bold policy measure.

Decision-makers need to assure equity in dealing with low-performing schools. Only a small fraction of low-performing schools have been closed, and our evidence suggests that closures of low-performing schools were biased by non-academic factors. In particular, closures were tilted toward the most disadvantaged schools such as the ones with higher concentrations of students in poverty and higher shares of black and Hispanic students, raising the issue of equity in the practice of closures. Districts and charter authorizers face exposure in this regard. They will benefit from reviewing their closure policies and processes and identifying and refraining from explicit and unconscious biases in decision-making about closing low-performing schools.

Distinct patterns of closures in the charter and TPS sectors call for attention to accountability in both systems. School districts have been more tolerant of low-performing TPS, as evidenced by lower rates of closures of low-performing schools in sum and by category in the TPS sector than in the charter sector. Although districts are likely to be confronted with greater pressure from various stakeholders when dealing with academically failing schools, the well-being of students should be their top concern. Responsible districts should never let chronically low-performing schools continuously erode student learning outcomes. In the charter sector, there should not be schools with very poor performance, particularly in the lowest state ventile, since the contract with authorizers obliges individual schools to meet certain academic goals. The existence of poor-performing charter schools raises the question of how accountability is implemented. Apparently, agreement with the terms on paper is not always sufficient. What matters more is the will on the part of charter authorizers to execute the terms and take actions when things go wrong in schools.

Individual states will benefit from reviewing their closure criteria and processes and by learning from the experiences of successful states. The state is the locus for the formulation and supervision of many education policies and practices. Our data demonstrated that states varied extensively in the prevalence of closing low-performing schools, the academic criteria that were applied in the decisions about closures, and the focus on ensuring student academic progress in post-closure periods. Individual states are yet to review the level of rigor in their creation and implementation of policies and practices for coping with low-performing schools. They can also learn useful lessons from their counterparts that have successfully closed low-performing schools, relocated closure students to better schools and promoted improved academic performance of post-closure students.

The quality of the receiving schools plays a significant role in the academic progress of closure students. However, superior alternatives are limited. Innovative measures are needed to yield positive outcomes for students. Closing low-performing schools alone does not automatically lead to better outcomes for students, but needs to be accompanied by effective follow-up measures to ensure better treatment of students. Our findings of the role that the quality of the receiving school played in the academic progress of closure students suggest it is crucial to assign affected students to higher-performing schools. However, we cannot pin all our hopes on higher-performing schools if there are many students to place. Not even half of the displaced students in our analysis were able to land in better schools. The chance for superior placement will grow slimmer if there are further increases in the practice of closure. Additional options need to be designed – starting new schools, for example. It is true that new schools are likely to be mixed in quality. But if poorly performing schools are closed and better schools are kept, there will be an accumulation of high-quality schools over time.

Appendix A. Supplementary Findings

Number of Low-Performing Schools That Closed by Sector, State and Year

Tables 20 and 21 list the number of closures by state and year in the charter and TPS sectors, respectively, in our study period.

Table 20: Number of Closed Low-Performing Charter Schools by State and Year

	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13
Arizona	5	3	6	4	6	4	5
Arkansas	0	0	0	2	0	2	1
California	5	2	13	4	10	10	
Colorado	1	2	0	4	1	1	2
District of Columbia	0	1	0	0	2	0	0
Florida	3	5	9	1	5	6	5
Georgia	1	0	1	1	2	1	1
Illinois				1	0	0	0
Louisiana	0	0	0	1	0	0	0
Massachusetts	0	1	1	0	0	0	1
Michigan	2	5	1	9	5	8	
Minnesota	1	2	3	2	5	1	4
Missouri	0	0	0	3	1	4	0
Nevada	0	0	0	0	0	0	0
New Jersey		0	0	1	0	3	2
New Mexico	0	0	1	0	0	0	2
New York City	0	0	0	0	0	0	0
New York State	0	2	0	1	0	1	1
North Carolina						1	2
Ohio	0	9	7	11	0	5	12
Oregon	0	1	2	2	0	0	0
Pennsylvania		1	2	0	0	0	0
Rhode Island	0	0	0	0	0	0	
Tennessee	1	0	0	0	0	0	1
Texas		1	2	2	0	3	0
Utah	0	0	0	0	0	0	0
Wisconsin	5	1	7	7	5	7	

Note: Empty cells indicate state-years outside the data window of the study.

Table 21: Number of Closed Low-Performing TPS Schools by State and Year

	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13
Arizona	0	1	2	2	0	2	7
Arkansas	3	3	4	9	1	9	5
California	18	11	17	15	11	18	
Colorado	3	14	4	10	3	6	7
District of Columbia	0	3	0	0	2	0	4
Florida	3	5	3	5	3	0	5
Georgia	3	8	16	2	10	15	5
Illinois				4	8	8	46
Louisiana	3	5	16	13	15	3	3
Massachusetts	7	11	16	0	15	2	4
Michigan	32	18	45	16	27	45	
Minnesota	12	10	4	10	12	2	12
Missouri	1	2	2	1	0	0	1
Nevada	0	0	0	0	1	0	0
New Jersey		6	6	5	6	6	4
New Mexico	0	1	1	1	0	0	0
New York City	10	5	2	3	8	0	3
New York State	3	4	6	3	8	0	13
North Carolina						4	1
Ohio	18	10	18	35	15	8	8
Oregon	4	2	2	2	3	3	2
Pennsylvania		5	11	13	17	34	11
Rhode Island	0	0	2	1	1	5	
Tennessee	7	0	7	2	1	3	4
Texas		10	7	10	16	13	18
Utah	4	10	0	0	1	0	0
Wisconsin	10	4	6	6	12	5	

Note: Empty cells indicate state-years outside the data window of the study.

Number and Rate of Closures by State Ventile of Achievement

Tables 22 to 24 report the number of and the rate of closures of low-performing schools in each state ventile of math achievement, overall and then by the poverty level and the concentration of minority (black and Hispanic) students, in charter and TPS sectors respectively.

Table 22: Number and Rate of Closures of Low-Performing Schools by Sector and State Ventile of School Achievement in Math

State Ventile	Charter			TPS		
	Number of All Low-Performing Schools	Number of Closures	Rate of Closures	Number of All Low-Performing Schools	Number of Closures	Rate of Closures
1	2,632	202	7.7%**	12,183	560	4.6%
2	1,796	74	4.1%	11,805	375	3.2%
3	948	33	3.5%**	9,069	163	1.8%
4	381	9	2.4%	5,062	106	2.1%
Sector Subtotal	5,757	318	5.5%**	38,119	1,204	3.2%

** Difference in the rates of closures of charter and TPS low-performing schools significant at the 0.01 level.

Table 23: Number and Rate of Closures of Higher-Poverty and Lower-Poverty Low-Performing Schools by Sector and State Ventile of School Achievement in Math

Charter Sector						
State Ventile	Charter ≥80% Poverty			Charter <80% Poverty		
	Number of All Low-Performing Schools	Number of Closures	Rate of Closures	Number of All Low-Performing Schools	Number of Closures	Rate of Closures
1	1,328	114	8.6%	1,304	88	6.7%
2	969	48	5.0%	827	26	3.1%
3	553	18	3.3%	395	15	3.8%
4	249	6	2.4%	132	3	2.3%
Charter Subtotal	3,099	186	6.0%	2,658	132	5.0%
TPS Sector						
State Ventile	TPS ≥80% Poverty			TPS <80% Poverty		
	Number of All Low-Performing Schools	Number of Closures	Rate of Closures	Number of All Low-Performing Schools	Number of Closures	Rate of Closures
1	8,813	432	4.9%**	3,370	128	3.8%
2	8,758	302	3.4%**	3,047	73	2.4%
3	5,971	111	1.9%	3,098	52	1.7%
4	3,145	67	2.1%	1,917	39	2.0%
TPS Subtotal	26,687	912	3.4%**	11,432	292	2.6%

** Difference in the rates of closures of higher-poverty and lower-poverty low-performing schools significant at the 0.01 level.

Table 24: Number and Rate of Closures of Higher-Minority and Lower-Minority Low-Performing Schools by Sector and State Ventile of School Achievement in Math

Charter Sector						
State Ventile	≥80% Minority			<80% Minority		
	Number of All Low-Performing Schools	Number of Closures	Rate of Closures	Number of All Low-Performing Schools	Number of Closures	Rate of Closures
1	1,495	139	9.3%**	1,137	63	5.5%
2	1,006	45	4.5%	790	29	3.7%
3	538	25	4.7%*	410	8	2.0%
4	235	4	1.7%	146	5	3.4%
Charter Subtotal	3,274	213	6.5%**	2,483	105	4.2%

TPS Sector						
State Ventile	≥80% Minority			<80% Minority		
	Number of All Low-Performing Schools	Number of Closures	Rate of Closures	Number of All Low-Performing Schools	Number of Closures	Rate of Closures
1	8,497	430	5.1%**	3,686	130	3.5%
2	7,907	245	3.1%	3,898	130	3.3%
3	4,912	89	1.8%	4,157	74	1.8%
4	2,523	45	1.8%	2,539	61	2.4%
TPS Subtotal	23,839	809	3.4%**	14,280	395	2.8%

* Difference in the rates of closures of higher-minority and lower-minority low-performing schools significant at the 0.05 level.

** Difference in the rates of closures of higher-minority and lower-minority low-performing schools significant at the 0.01 level.

Distributions of Closure Students

In this section, we counted the number and described the distribution of closure students, using the enrollment data provided in the Common Core of Data from the National Center for Education Statistics (NCES). In the 26 states over the period of our study, 450,264 students were enrolled in low-performing schools that closed. As Figure 39 displays, around 15 percent of closure students came from the charter sector and about 85 percent of them attended closing TPS. Not surprisingly, the number and percentage of closure students differed across states, as shown in Table 25.

Figure 39: Distribution of Students Enrolled in Closing Low-Performing Schools by Sector

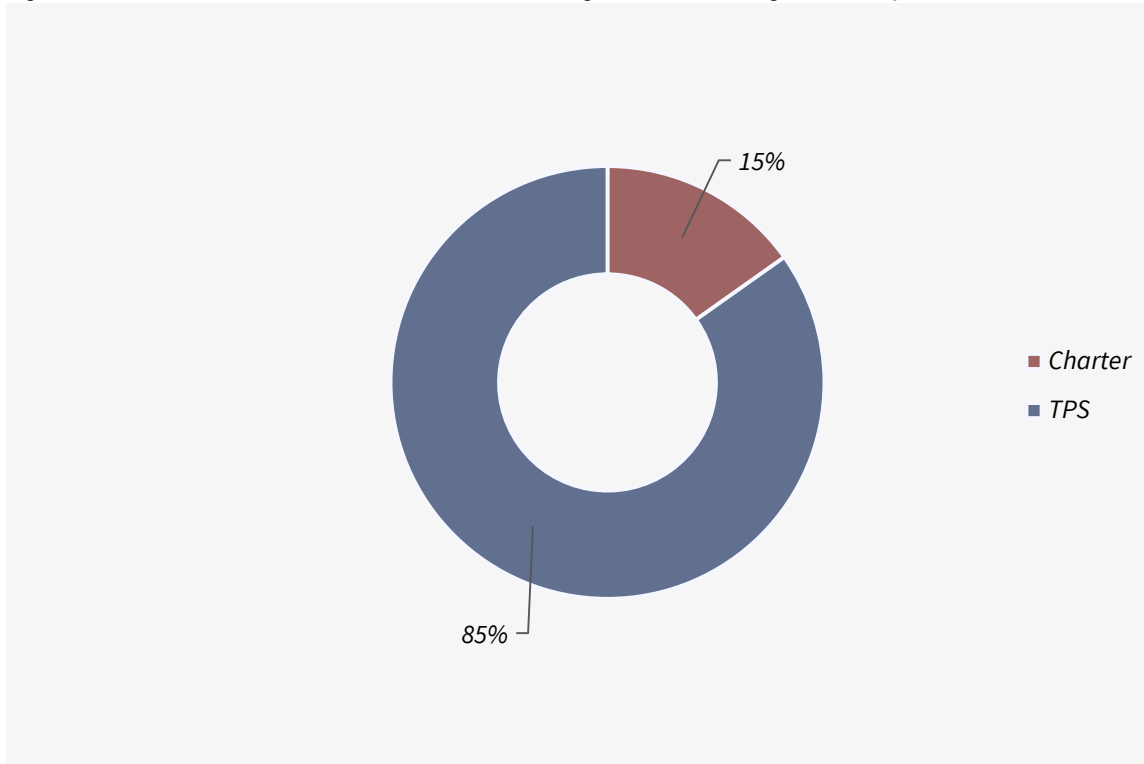


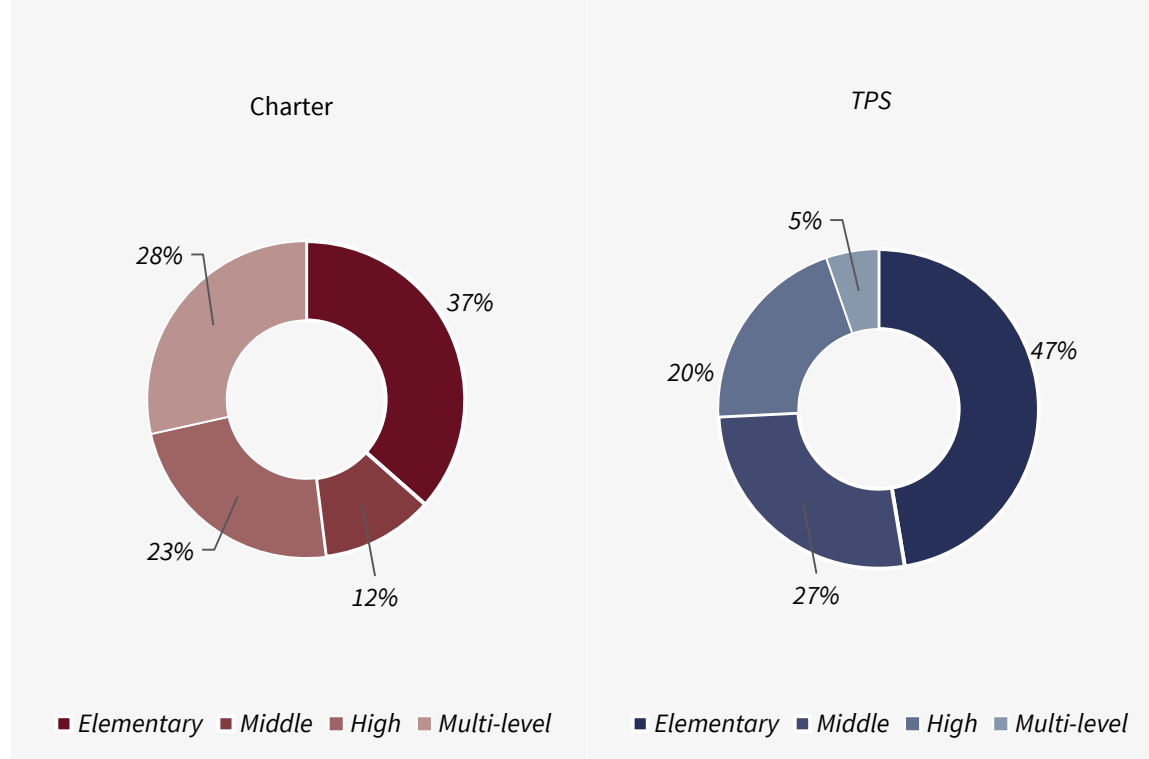
Table 25: Distribution of Students Enrolled in Closing Low-Performing Schools by Sector and State

State	Number of Years under study	Number of Charter Closure Students	Percentage of Charter Closure Students	Number of TPS Closure Students	Percentage of TPS Closure Students
Arizona	7	3,552	5.2%	3,064	0.8%
Arkansas	7	819	1.2%	9,313	2.4%
California	6	9,744	14.3%	27,199	7.1%
Colorado	6	5,636	8.2%	14,156	3.7%
District of Columbia	7	294	0.4%	1,349	0.4%
Florida	7	4,337	6.3%	5,410	1.4%
Georgia	7	2,353	3.4%	25,901	6.8%
Illinois	4	316	0.5%	18,556	4.9%
Louisiana	7	308	0.5%	18,312	4.8%
Massachusetts	7	810	1.2%	19,987	5.2%
Michigan	6	8,979	13.1%	57,929	15.2%
Minnesota	7	1,926	2.8%	9,320	2.4%
Missouri	7	3,820	5.6%	1,467	0.4%
Nevada	7	0	0.0%	14	0.0%
New Jersey	7	1,945	2.8%	12,707	3.3%
New Mexico	7	233	0.3%	426	0.1%
New York City	7	0	0.0%	6,898	1.8%
New York State	7	2,251	3.3%	10,300	2.7%
North Carolina	2	513	0.8%	1,025	0.3%
Ohio	7	9,709	14.2%	33,656	8.8%
Oregon	7	339	0.5%	4,305	1.1%
Pennsylvania	6	1,027	1.5%	35,184	9.2%
Rhode Island	7	0	0.0%	3,100	0.8%
Tennessee	7	255	0.4%	7,153	1.9%
Texas	6	917	1.3%	35,273	9.2%
Utah	7	0	0.0%	8,844	2.3%
Wisconsin	6	8,242	12.1%	11,091	2.9%

Note: There were no closed low-performing schools in Nevada, New York City, Rhode Island and Utah within our data window. So the number of charter closure students for these four states was zero.

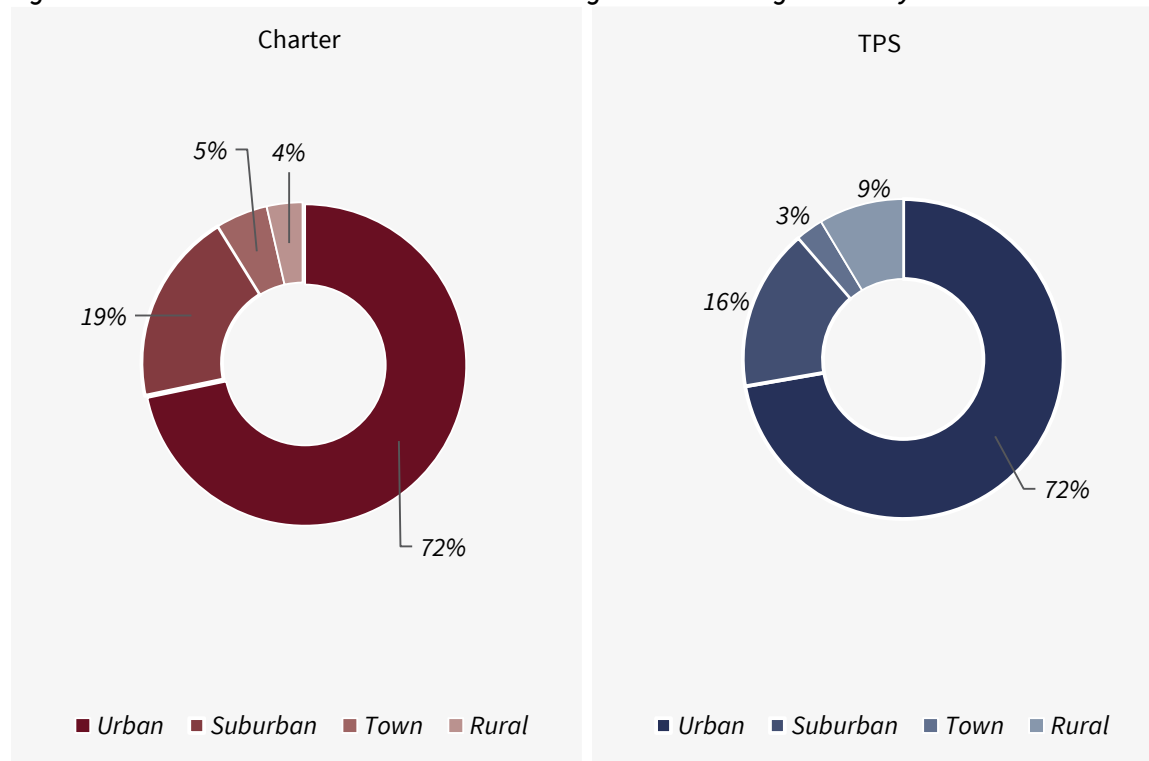
Closing elementary schools enrolled the largest number of closure students among all grade spans in both the charter and TPS sectors (Figure 40). Nearly 40 percent of charter closure students were enrolled in elementary schools, followed by close to 30 percent in multi-level schools and fewer in high and middle schools. In the TPS sector, about half of closure students came from elementary schools, followed by nearly 30 percent from middle schools and even fewer from high and multi-level schools.

Figure 40: Distribution of Students Enrolled in Closing Low-Performing Schools by Sector and Grade Span



Similar to the distribution of closed schools by locale described in Chapter 3 (see Figure 4), Figure 41 shows that an overwhelming majority (72 percent) of closure students were enrolled in urban schools, followed by around 20 percent in suburban schools and a tiny percentage in town and rural schools, in both sectors.

Figure 41: Distribution of Students Enrolled in Closing Low-Performing Schools by Sector and Locale



Poverty, Special Ed, and ELL Statuses of Students Enrolled in Closing Schools

Figure 42 shows non-substantial differences in the poverty, special education and ELL statuses of early (t_{-1}) leavers as compared to staying students in closing schools. In both charter and TPS sectors, an overwhelming majority of early leavers from closing schools were eligible for free and reduced-price lunch, the measure of poverty. The percentage of early leavers living in poverty (79 percent) was a little lower than the percentage of stayers in poverty (82 percent) in closing charter schools. Conversely, the percentage of early leavers in poverty (86 percent) was slightly higher than that of stayers in poverty (85 percent) in closing TPS schools. In closing schools in both sectors, the percentage of early leavers of special education status was a little higher than that of stayers in closing schools, while there was a lower percentage of ELL students among early leavers than among stayers.

Figure 42: Poverty, ELL and Special Ed of Early Leavers and Stayers from Closing Low-Performing Schools by Sector

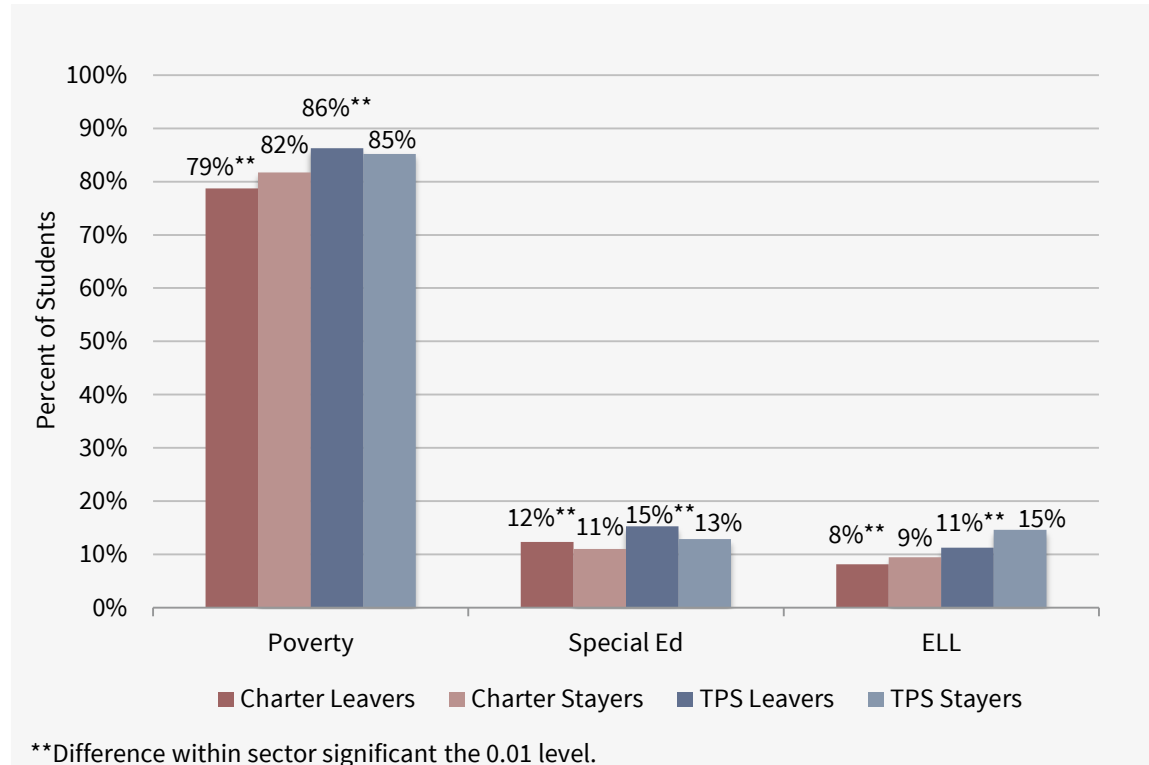
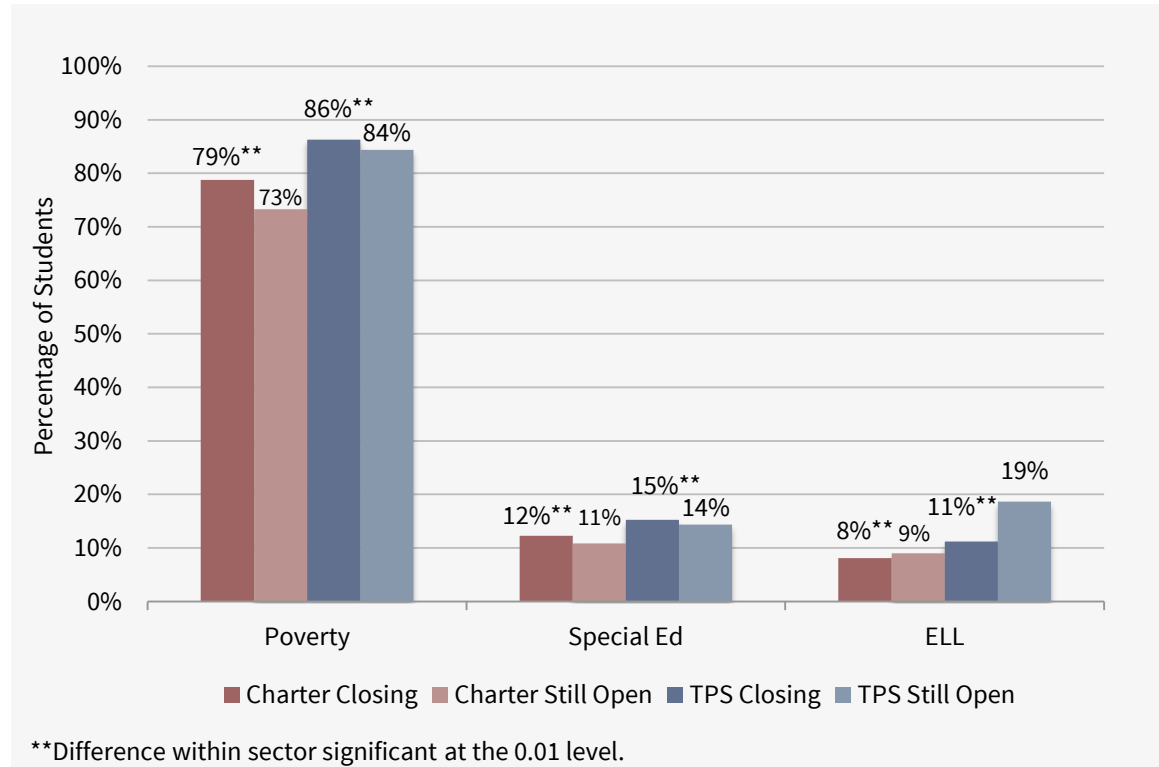


Figure 43 compares the poverty, special education and ELL status of early leavers from closing schools and students who transferred from not-closing, low-performing schools in t_{-1} . The patterns of the differences in all three statuses between t_{-1} leavers from closing and continuing low-performing schools were similar in the charter and TPS sectors. Specifically, a higher percentage of early leavers from closing schools were eligible for free and reduced-price lunch than t_{-1} leavers from the other low-performing schools that stayed open. The percentage of special education students was higher among early leavers from closing schools than among t_{-1} leavers from continuing low-performing schools, while the percentage of ELL students among early leavers from closing schools was lower than t_{-1} leavers from not-closing, low-performing schools.

Figure 43: Poverty, ELL and Special Ed of Early Leavers from Closing and Not-Closing Low-Performing Schools by Sector



Distribution of Early Leavers and Stayers from Closing Schools by State Ventile of Achievement

Table 26: Distribution of Early Leavers and t_0 Closure Students by Sector and State Ventile of Math Achievement of Their Respective t_0 Schools

Sector of Closure in t_0	Category of Students	Ventile 1	Ventile 2	Ventile 3	Ventile 4
Closed Charter	Early Leavers	57%	24%	12%	7%
	t_0 Closure Students	48%	25%	22%	5%
Closed TPS	Early Leavers	44%	34%	13%	9%
	t_0 Closure Students	41%	32%	19%	8%

Average Yearly Nominal Growth of Closure Students and Their VCRs

Table 27: Average Yearly Nominal Growth in Reading and Math of Closure Students and VCR Peers from Not-Closed Low-Performing Schools up to Three Years after Closure

	Charter Closures vs. Charter VCRs		TPS Closures vs. TPS VCRs	
	Closure Students	VCRs	Closure Students	VCRs
Reading	0.02	0.03	0.01	0.01
Math	0.01	0.01	0.01	0.02

Appendix B. Technical Appendix

Consolidating Student Data from Multiple States

To create a national student dataset for this study, CREDO worked with the state departments of education in the 26 states as listed in Table 1 in Volume I of the full report. Because each state used its standards and tests to evaluate student academic achievement, it was necessary for CREDO to standardize the values to make them comparable. CREDO did this by creating a bell curve for each test – by subject, grade, state and year – where the average student score on the test became the central value and all other scores were distributed around it. The transformation placed each student’s performance in relation to all other equivalent tested students, making it ready for comparison with other students. By comparing each student’s performance relative to the other students from one year to that same student’s relative performance in the next year, CREDO could estimate if the student was growing academically at a rate which was faster, similar or slower than the rate of the peers.

CREDO was able to combine growth results from multiple grades, states and years. Even though the average academic achievement in state A might differ from the average academic achievement in state B, a change in the academic achievement (growth) of .05 standard deviation in state A and a .05 standard deviation change in achievement in state B both represented the same level of improvement relative to their peers in the students’ home states. This is one of the reasons measures of academic growth are superior to simple measures of academic achievement, the level of which can vary greatly from state to state.

Multiple Datasets

Longitudinal Data

We used the longitudinal data that CREDO had consolidated for addressing the national landscape of closures, (in)equivalence of closure of similarly performing schools, and pre- and post-closure student movement. Wherever applicable, we generated aggregate-level measures such as the average test scores from student data when we ran school-level analyses.

Matched Data

When examining the impact of closure on student academic progress, we used the virtual control record (VCR) method developed by CREDO (Davis & Raymond, 2012). The first step in conducting a VCR analysis is to create a matched data set. The matched data set consists of treated students (in this case students from closed schools) and demographically identical students in the control group. In this study, treated students were students from a closed school who had from one to three growth periods after the closure of their original school, did not attend an alternative school in subsequent

comparison years, and had test data in the final year of operation for the closure school and the year before.²¹

We created control groups for students from closed charter schools and TPS separately for this analysis. The control group consisted of students at similarly low-performing schools in the same sector that continued to operate.

Selection of Comparison Observations

A fair analysis of the impact of closure requires a comparison group which matches the demographic and academic profile of closure students to the fullest extent possible. As in previous CREDO studies, this study employed the virtual control record (VCR) method of analysis developed by CREDO. The VCR approach created a “virtual twin” for each closure student who was represented in the data. If matched, this virtual twin would differ from the closure student only in that one student attended a closing school. The VCR matching protocol has been assessed against other possible study designs and judged to be reliable and valuable by peer reviewers (Fortson, Verbitsky-Savitz, Kopa, & Gleason, 2012).

Using the VCR approach, a virtual twin was constructed for each closure student by drawing on the available records of students with identical traits and identical or very similar baseline test scores but who were enrolled in a continuing low-performing school in the same sector.²² Factors included in the matching criteria were:

- Grade level
- Gender
- Race/ethnicity
- Free or reduced-price lunch eligibility
- English Language learner status
- Special education status
- Test score on state achievement tests in the final year of operation for the closed school

²¹ We do not include closure students who attended alternative schools in subsequent comparison years so that the estimation of the impact of closure on student academic progress is not biased by different educational experiences in alternative schools. We drop students without a test score in the final year of operation for the closed school as this score is one of the key matching variables, as will be demonstrated soon. In addition, we set the condition of having test scores for the year before the last year of operation for the closed school because this score is one of the control variables in our regression analyses of the impact of closure on student growth.

²² Achievement scores are considered similar if they are within 0.1 standard deviation of the closure student’s achievement in the final year of operation for the closed school.

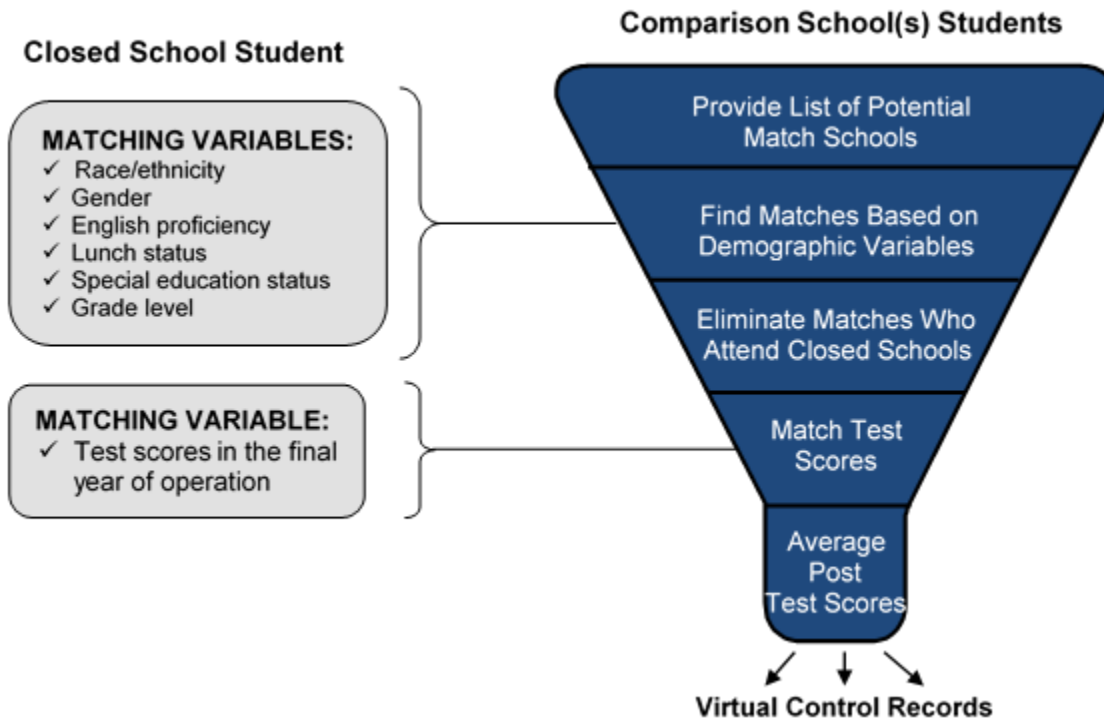
Figure 44 shows the matching process used by CREDO to create the virtual twins linked to each closure student. In the first step, CREDO identified all low-performing schools that were permitted to remain open by state and year. These schools in the same state and identified as low-performing for the final year of operation for a closed school were referred to as “comparison schools” for that particular closed school. Once a school was identified as a comparison school for a particular closed school, all the students in that low-performing school became potential matches for students in that particular closed school. All of the student records from all of a closure’s comparison schools were pooled and became the source of records for creating the virtual twin match.²³

The VCR matching method then eliminated any of the students from the match pool whose demographic characteristics did not match exactly to the individual closure student. As part of the match process, we also dropped from the match pool any students who were enrolled in a closed or alternative school in subsequent comparison years and who did not have test scores one year before the final year of operation for the closed school.

Using the records of students at comparison schools in the final year of operation for the closed school, CREDO randomly selected up to seven comparison students with identical values on the matching variables in Figure 44, including identical or very similar test scores in the final year of operation for the closed school. Students with similar test scores were used only when there were not enough comparison students with exact test score matches. The values for the selected comparison students were then averaged to create values for the virtual twins. As all other observable characteristics were identical, the only observable characteristic that differed between the closure student and the VCR was attendance in a closing school. The test score in the final year of operation for the closed school represented the impact on academic achievement of both the observable and the unobservable student characteristics up to the time of the match. Since we matched on observable characteristics and the test score in the final year of operation for the closed school, we concluded that any differences in the post-closure scores were primarily attributable to school closure.

²³ Each closure school has its own independent comparison school list, and thus a unique pool of potential VCR matches.

Figure 44: CREDO VCR Methodology



VCR Matched Samples

As stated above, VCRs for closure students were drawn from comparison schools, that is, low-performing schools in the same sector that continued to operate. Table 28 shows the match rates and the characteristics of the target students who met the criteria for inclusion in the impact analysis and matched students for whom a VCR has been created. The match rate for TPS closure students with TPS VCRs stood at 90 percent, making this matched sample highly reflective of the tested TPS students who met the conditions for our impact analysis. The match rate for charter closure students with charter VCRs was 61 percent. A plausible explanation for this lower match rate is that the number of charter comparison schools was small and charter schools tended to have small student enrollment. Both limitations added to the difficulty of finding a charter VCR for each charter target student. Nonetheless, as shown below, the characteristics of matched charter closure students were not that different from those of all charter target students.

Table 28: Demographics of Target and Matched Students

	Charter Closures		TPS Closures	
	Target Students	Matched Students	Target Students	Matched Students
Number of Tested Students	16,838	10,194	128,522	115,434
Match Rate		61%		90%
Students in Poverty	82%	89%	88%	89%
Special Ed Students	9%	5%	13%	11%
ELL Students	11%	10%	13%	12%
White Students	9%	5%	12%	12%
Black Students	58%	66%	53%	54%
Hispanic Students	29%	27%	30%	30%
Asian-Pacific Students	1%	0.2%	3%	2%
Native American Students	1%	1%	1%	1%
Multi-Racial Students	1%	1%	1%	1%

Table 28 shows the characteristics of the target students and matched students in each sector in the impact analysis. There was a high degree of similarity in all the attributes between TPS matched students and all TPS target students. Charter matched students were similar to all charter target students on five of nine characteristics and looked moderately different on the other four dimensions. Compared to all charter target students, a higher percentage of matched charter closure students was eligible for free or reduced-price lunch, and a lower percentage held special education status; they also had a higher percentage of black students and a lower percentage of white students.

Models for Analysis of the Academic Impact of School Closure

After constructing a VCR for each closure student, we then set out to develop a model capable of providing a fair measure of closure impact. The National Charter School Research project by CREDO provided a very useful guide to begin the process (Betts & Hill, 2006). First, it was useful to consider student growth rather than achievement. A growth measure provided a strong method to control for each student’s educational history as well as the many observable differences between students that affected their academic achievement. The baseline model included controls for each student’s grade, race, gender, free or reduced-price lunch status, special education status, English language learner status, and whether they were held back in the previous year. The literature on measuring educational interventions found that the best estimation techniques must also include controls for baseline test scores (Betts & Tang, 2011). Each student’s prior-year test score was controlled for in our baseline model. Additional controls were also included for state, year and test score in the year before the final year of operation for the closed school. The study’s baseline model is presented below.

$$\Delta A_{i,t} = \theta A_{i,t-1} + \beta X_{i,t} + \rho Y + \sigma S + \gamma C_{i,t} + \varepsilon_{i,t} \quad (1)$$

where the dependent variable is

$$\Delta A_{i,t} = A_{i,t} - A_{i,t-1} \quad (2)$$

and $A_{i,t}$ is the state-by-test z-score for student i in period t ; $A_{i,t-1}$ is the state-by-test z-score for student i in the year before t ; $X_{i,t}$ is a set of control variables for student characteristics and test scores in the year before the final year of operation for the closed school; Y is a year fixed effect; S is a state fixed effect; C is an indicator variable for whether student i attended a closed school in t_0 ; and ε is the error term.

In addition to the baseline model above, we explored additional interactions beyond a simple binary to indicate closure. These included both “double” and “triple” interactions between the closure variable and student characteristics. For example, to identify the impact of closure on different racial groups, we estimated models that broke the closure variable into “closure_black,” “closure_Hispanic,” etc. To further break down the impact of closure by race and poverty, the variables above were split again. For example, black closure students were further split into students who were eligible for free and reduced-price lunches (“closure_black_poverty”) and those who did not (“closure_black_nonpoverty”).

We also investigated the differential impact of going to a superior, equivalent or inferior school on the growth of closure students for the first growth period. To that end, we estimated models that disaggregated the closure variable into “closure_superior,” “closure_equivalent” and “closure_inferior.” To examine the impact of the quality of the receiving school on students of different characteristics, we split the interaction of closure and the quality of the receiving school into “closure_superior_black,” “closure_equivalent_Hispanic,” etc. In the further exploration of the impact of the quality of the receiving school by race and poverty, the variables above were broken down again. For example, black closure students who attended a superior school were broken into “closure_superior_black_poverty” and “closure_superior_black_nonpoverty.”

Presentation of Results

In this report, we presented the impacts of school closure on student academic progress in terms of standard deviations. The base measures for these outcomes were referred to as z-scores in statistics. A z-score of 0 indicates the student’s achievement is average for his or her grade. Positive z-scores represent higher performance while negative z-scores represent lower performance. Likewise, a positive effect size value means a student or group of students has improved relative to the students in the state taking the same exam. This remains true regardless of the absolute level of achievement for those students. As with the z-scores, a negative effect size means the students have on average lost ground compared to their peers.

While it is fair to compare two effect sizes relationally (i.e., 0.08 is twice 0.04), this must be done with care as to the size of the lower value. It would be misleading to state one group grew twice as much as another if the values were extremely small such as 0.0001 and 0.0002.

Finally, it is important to consider if an effect size is significant or not. In statistical models, values which are not statistically significant should be considered as no different from zero. Two effects sizes, one equal to .001 and the other equal to .01, would both be treated as nil if neither were statistically significant.

To assist the reader in interpreting the meaning of effect sizes, we included an estimate of the average number of days of learning required to achieve a particular effect size. This estimate was calculated by Dr. Eric Hanushek and Dr. Margaret Raymond based on the latest National Assessment of Educational Progress (NAEP) test scores. Using a standard 180-day school year, each one standard deviation (s.d.) change in effect size was equivalent to 570 days of learning.

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