Closing Schools in a Shrinking District: Does Student Performance Depend on Which Schools are Closed?

John Engberg
RAND Corporation

Dennis Epple
Carnegie Mellon University

Brian Gill
Mathematica Policy Research, Inc.

Holger Sieg
University of Pennsylvania

Gema Zamarro
RAND Corporation

Ron Zimmer
Vanderbilt University

I. Background

Closing schools is one of the most controversial decisions a district can make. Nevertheless, urban districts across the nation are closing schools due to declining enrollments, and federal policy is promoting school closure as an important strategy to deal with chronically low-performing schools. The recent upsurge in school closings has given rise to concerns about the impact on student achievement, neighborhoods, families, and teaching staff.

Our analysis evaluates the impact of school closures on student achievement by analyzing student achievement growth before and after the closures. This research builds off two studies that have examined school closures in Chicago (de la Torre and Gwynne, 2009; Young et al., 2009).[1] [2] While this previous research has been informative, it has not addressed the non-random sorting of students out of closed schools into new schools. Moreover, prior research has not yet had an opportunity to examine a school closure plan that explicitly sought to move students from low-value-added schools to high-value-added schools.

II. Paper objective

In this study, we examine an urban district that had to close schools as a result of shrinking enrollment, and chose to make student achievement a major criterion in determining which schools would be closed, with the aim of closing low-performing schools and moving their students to schools with stronger test score gains. Our analysis evaluates the impact of school closures on student achievement by analyzing student achievement growth before and after the closures. We take into consideration some of the non-random student sorting into new schools by using school assignments based on residential location as an instrument in an instrumental variable approach. We also statistically control for the contemporaneous effects of other reforms within the district.

III. Setting

The setting of our study is a mid-sized urban district in the northeast.

IV. Population/Participants/Subjects

The students affected by the school closures were disproportionately African American and impoverished, and had lower test scores than the district-wide population.

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[1] The authors compared the expected learning trajectories (as measured by math and reading test scores) to the students' actual learning trajectories. The authors found a negative effect on student achievement in the year the closings were announced, but found neither positive nor negative effects once students were enrolled in their new schools. However, the researchers also found that only six percent of students transferred to schools that had test scores in the top quartile of the district and students generally transferred to schools that were academically weak—suggesting that the school closure policy failed to place students in the best schools.

[2] SRI International examined the Renaissance 2010 initiative in Chicago which had the goal of closing 60 to 70 schools and opening 100 new smaller schools by 2010. This study used a matched strategy to examine two cohorts of students from closed schools attending 23 newly-created schools and found that students generally performed at the same levels as matched comparison students (Young et al., 2009).

V. Reform Effort

In initiating the reform plan, the district hoped to move from a system of small schools with significant variation in educational quality, equity and cost effectiveness to a system of quality schools that promote high student achievement in the most equitable and cost-effective manner. Overcapacity was great enough that the district closed 22 schools at the conclusion of the 2005-06 school year. In selecting schools to be closed, academic performance was not the only criterion, but it was the first priority. The district designed the closure plan with the principle that any students who had to be moved because their school was closed would be moved to a school at least as high-performing as (and ideally higher-performing than) the one they left. Our aim is to examine the extent to which the district's approach succeeded in producing better results for students forced to move, without undermining the achievement of students who did not move.

VI. Research Design

We use an instrumental variable approach to estimate the effects of school closures for students moving to new schools. Further details are described below.

VII. Data Collection and Analysis

We had access to the district's student data warehouse that tracked students over time. The district has maintained student-level data on enrollment, demographics, residential location and state achievement test performance since the late 1990s. We were able to construct an analytic data set that associated students with their annual standardized assessment scores, the schools they were attending, their residential location (and assigned neighborhood school, not always the same one attended), and their economic need at the time of the test, as measured by participation in the federal free and reduced-price lunch (FRL) program. These time-varying characteristics were linked to time-invariant demographic characteristics. This study uses panel data for students in grades 3 through 8 for four consecutive school years from 2005-06 to 2008-09. To be considered in our analysis the student must be present in the district at the time of the reform, school year 2005, and in the year immediately after the reform. The final sample consists of 8,646 students who contributed to 19,580 observations.

Ideally, if school closings were exogenous and unexpected events, uncovering their effect would be straightforward using standard OLS regression models. In practice, parents may try to engage in actions (such as relocating their children into better schools) that may endogenously alter the outcomes of the school closures. Our strategy to address the unobserved differences is an instrumental variables approach. The instruments we propose use information about the student's residence and school catchment areas to construct variables based on students' school assignments.

The model is a value-added approach with controls for pre-closure test scores:

$$Y_{it} = \beta_0 + \beta_1 Y_{i0} + \beta_2 X_{it} + \beta_3 P_{it} + \varepsilon_{it}, \quad t=1,2,3 \qquad (1)$$

where the dependent variable Y_{it} represents the math achievement score for student *i* in each of the first three years after school closures. We include the student's math achievement score immediately prior to school closures, Y_{i0}, to control for student ability. X_{it} is a vector of student characteristics that include demographic variables such as gender, race, indicators for the student demographics, and a set of grade and year dummies. In addition, we include an indicator for students who voluntarily change schools for reasons other than closures (e.g., residential mobility) and a measure of the percentage of students in the school that are new to the school for similar reasons. We run a similar analysis with reading test scores as the outcome of interest.

Closures and reassignments are represented by several policy variables (P_{it}). In particular, we estimate the overall impact of school closings on students' outcomes via a dummy variable indicating if the student *i* was in a closed school, interacted by year dummies for each year following closure *(t=1,2 and 3)*. In addition, we examine whether changes in quality between the closed school and the school the student attended after closures are related to student outcomes. We do this by including the difference in the school performance index (which is the district's value-added measure) between the closed school and the school the student attends immediately after the closings (*t=1*), both measured in *t=0*.

Finally, it is important to recognize that students in schools that remained open could nonetheless experience changes in their schooling experiences due to the arrival of displaced students. School size, for example, increased with school closures. To control for the possible effects of closures on these non-displaced students, we include the fraction of the school that student *i* attends that is comprised of students from closed schools. The set of policy variables also includes dummy variables for other reform efforts occurring within the district including a dichotomous variable indicating if student *i* attends a reconstituted school in year t, and a dichotomous variable to distinguish K-8 from K-5 and middle schools.

Estimating the effects of school closings requires addressing challenges stemming from non-random student assignment to schools. For example, students who are assigned to schools that remain open and who anticipate the arrival of a large proportion of displaced students may try to move to other schools. Similarly, students from closed schools may try to relocate from their assigned school into different schools they think are most suitable for them. Under these circumstances, variables included in P_{it} which use information on actual school attended could be correlated with measurement error or other omitted variables, leading to spuriously significant effects.

Therefore, school variables in P_{it} are instrumented with information on the assigned school. This approach follows Hoxby and Weingarth (2006) who used information about the student's residence and school catchment areas to construct variables based on a student's "simulated cohort." A student's "simulated cohort" is the group of students who are assigned to a specific school. We then constructed a variable denoting the proportion of new students that were expected to move to the school the student is assigned to, given the school assignments. This variable serves as instrument for the proportion of students arriving from closed schools. Similarly we created a variable indicating the difference in quality between the closed school and

the school the student was assigned after closure (*t=1*). This variable is then used as instrument for the difference in quality between the closed school and the new school.

VIII. Results

Table 1 shows the estimated coefficients of policy variables included in the model. The relocation variable is negative and statistically significant in the first year in both math and reading, which suggests that there are transitional effects for students from closed schools. The coefficient suggests that a move out of a closed school could reduce a student's performance in the first year by 0.17 of a standard deviation in math and 0.21 of a standard deviation in reading. Although the second and third year effects are statistically insignificant, the coefficients suggest that the negative effect may persist over time, at least in math.

Meanwhile, the difference in the school performance index used by the district to measure school value added is positive and statistically significant in the first and second year in both subjects and nearly statistically significant in the third year. This suggests that the district's strategy of seeking to move students to higher-performing schools was well founded: students moving to higher-performing schools saw smaller declines in achievement, and those who moved to substantially higher-performing schools could have seen no negative impact at all, as the benefit of the higher-performing school cancelled out the negative effect of moving.

Finally, the coefficient on the effects on students in receiving schools (i.e., percent influx from closures) is not statistically significant in reading or math in any of the first three years after closure. Moreover, the point estimates are generally inconsequential. For instance, the first year estimate indicates that a school with 10% of its population made up of students coming from closed schools would have an average achievement that is 0.015 standard deviations less than a school with no students coming from closed schools.

Overall, this suggests that closing schools can have adverse transitional effects for students in closed schools, but these effects can be offset by relocation to schools with stronger academic performance. Moreover, there is no evidence that the influx of new students has negative achievement implications for the students in the receiving schools.

Table 1: IV estimated coefficients for school closure variables

t	Relocation Dummy (CL)	Difference in District's Value Performance Index	Percent Influx from Closures (PC)
Math			
1	-0.1687* (0.0504)	0.0741* (0.0209)	-0.1527 (0.2677)
2	-0.1632 (0.1063)	0.0707* (0.0268)	-0.3810 (0.4228)
3	-0.1297 (0.0970)	0.0572 (0.0359)	-0.1087 (0.3792)
Reading			

1	-0.2136* (0.0484)	0.0736* (0.0187)	-0.4653 (0.2335)
2	-0.0720 (0.0611)	0.0726* (0.0229)	0.0170 (0.2917)
3	-0.0502 (0.0554)	0.0490 (0.0311)	-0.1995 (0.2143)

* Indicates significance at the 5 percent level

VI. Conclusion

The results show that the transition to new schools can have an adverse effect on achievement gains for students from closed schools, but these effects can be minimized when students attend schools with higher average performance. The analysis also shows no detectable adverse effects on students in existing schools due to the influx of students from the closed schools. These findings substantially advance the existing research on the effects of school closures, because they are the first to address non-random sorting of students, and they are the first to examine the effects of a school-closing policy specifically designed to move students to higher-performing schools—thereby having direct relevance to ongoing debates about what to do about chronically low-performing schools. The results suggest that if a district needs to close schools, then closing low performing schools and transferring students to higher performing schools can minimize any adverse effects. However, our analysis does not necessarily support school closures as means for improving student achievement. These results suggest that the achievement of students transferring from closed schools will happen only if students are moved to schools that are dramatically higher-performing than the ones they left.

References

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