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DO SCHOOL DISTRICTS MATTER?

Reuters

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EXECUTIVE SUMMARY

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School districts occupy center stage in education reform in the U.S. They manage nearly all public funding and are frequently the locus of federal and state reform initiatives, e.g., instituting meaningful teacher evaluation systems. The most charismatic leaders over the last decade, people such as Michelle Rhee and Joel Klein, have received considerable national media attention. Financial compensation for district leaders is high, with many being paid more than the chief state school officers who oversee the entire systems in which they serve. Some private philanthropies pour money into initiatives to improve district performance. Others invest in ways that suggest that they too think districts are important but as impediments to rather than instruments of reform.

Despite the centrality of school districts in all the ways described, we know very little from existing research about how important they are to student achievement relative to other institutional components for delivering education services, including teachers and schools. Neither do we have information on the size of the differences in effectiveness among districts or whether there are districts that show exceptional patterns of performance across time, e.g., moving from low to high performing.

We begin to fill these information gaps in the present report by analyzing 10 years of data involving all public school students and school districts in Florida and North Carolina. We find that school districts account for only a small portion (1% to 2%) of the total variation in student achievement relative to the contribution of schools, teachers, demographic characteristics of students, and remaining individual differences among students. Within just the institutional components affecting student achievement, the effect of schools is about twice that of districts whereas the effect of teachers is about seven times larger than that of districts.

Even though district effects are only a small piece of the pie that represents all the influences on student achievement, there are still differences among the academic achievement of demographically similar

students in higher and lower performing districts in North Carolina and Florida that are large enough to be of practical and policy significance. Combining the data from both states, 4th and 5th grade students in a district that is at the 70th percentile in district effectiveness are more than 9 weeks ahead of similar students in a district at the 30th percentile of effectiveness in their learning of reading and math. There are also districts that have displayed exceptional patterns of performance in terms of student achievement over the last decade, including districts that beat their demographic odds every year, districts that consistently underperformed, districts that had nose-dive declines, and districts that experienced transformative growth. These findings provide an empirical justification for efforts to improve student achievement through district-level reforms and should be a tantalizing fruit for those who want to better understand why some districts are better than others and translate that knowledge into action.

Do School Districts Matter?

Introduction

School districts occupy center stage in education policy

The roughly 14,000 regular school districts in the U.S. occupy a central position in the policy and practice of education reform. The evidence for this assertion is multifaceted. If, for instance, we follow the money we find that school districts are the accountable agents for nearly all of the roughly $500 billion annual public investment in elementary and secondary education through federal, state, and local tax revenues.

Many of the most popular and aggressively promoted school reform efforts of federal and state governments are focused on school districts. Performance-based teacher evaluation is a case in point. The Obama administration's Race-to-the-Top competition and NCLB state waivers both required states to commit to plans under which individual school districts would adopt teacher evaluation systems that produce meaningful differentiation of teachers, based in part on differences among teachers in the ability to raise student test scores. In carrying out this agreement with the federal government, states have provided some broad guidelines to districts in how to design their evaluation systems, but most of the details are left up to individual districts to work out.

The central role of individual school districts is also implied by the media attention that has been given to prominent school superintendents such as Michelle Rhee in Washington, D.C. and Joel Klein in New York City. Rhee, for example, was on the cover of Time Magazine in 2008 with the lead, "Michelle Rhee … head of the D.C. public schools … could transform public education."

Many of the most popular and aggressively promoted school reform efforts of federal and state governments are focused on school districts.

The pay scale for superintendents also indicates their perceived importance. In New York State, for example, 63 district leaders each received over $300,000 in salary and benefits for the 2011-12 school year, with the superintendent at the top of the list receiving a salary and benefits package of $541,000.[1] Compensation packages for district

superintendents are typically much higher than for state-level education officials. To continue with the example of New York, the state commissioner of education receives a salary of $212,500, which is substantially less than the salary of many local school district superintendents in the state system he oversees.

Private philanthropy has invested heavily in district-level reforms on the premise that districts are powerful agents for change. One of those philanthropies, the Eli and Edythe Broad Foundation, has led the way in initiatives that are predicated on the importance of school districts. For instance, their annual Broad Prize for Education bestows $1 million on the urban school district that in their judgment has shown the best performance and improvement.

Other reform initiatives are focused at the district level in the interesting sense that they are premised on the assumption that traditional school districts are the problem rather than the solution. Thus advocates for charter schools, vouchers, inter-district choice, on-line education, and school portfolio management are making a statement about the importance of traditional school districts by insisting that they offer a better alternative.

What do we know about the impact of school districts on student achievement?

When we turn from policies that assume the importance of school districts to empirical evidence on their impact, we move from a rich to a sparse landscape. Little is known about the impact of school districts on student achievement. And what seems to be known from an earlier generation of education research rests on a highly questionable set of methods. A typical study of the importance of school districts conducted 15 years ago would be based on correlations between answers to survey questions by district superintendents and district-level student achievement. The finding, for example, that a combination of answers to questions about leadership style by district superintendents is associated with differences in student achievement scores would be taken as

We want to know the size of the school district slice of the pie that represents the total variation in student achievement.

evidence that the leadership style of district leaders is causally related to student outcomes. Of course, correlation is not causation. By and large the existing studies on school district effects draw conclusions that could be due to differences among districts in the characteristics of the students and families served or other economic and social factors having little to do with school districts themselves.

New analyses of district effects on student achievement

We address the influence of school districts on student achievement with new data and analyses, taking up four questions: First: *What is the influence of school districts on student achievement relative to the influence of schools, teachers, and individual differences among students?* We want to know the size of the school district slice of the pie that represents the total variation in student achievement. The answer to this question may have considerable relevance for public policy. If, for example, student outcomes vary considerably in association with the classroom/teacher to which students are assigned but very little based on the district in which students are schooled, it would suggest that federal or state policies directed at improvements in the quality of the teacher workforce might pay greater dividends than policies directed at improving the quality of district leaders or district management practices.

Assuming the district slice of the achievement pie is substantively greater than zero: *Are there differences among districts in their contribution to student achievement that are large enough to be relevant for policy?* If the answer to our first question is that districts account for a small but statistically significant amount of variation in student achievement, this implies that there are differences among districts that have an impact on student outcomes. However, it does not tell us whether the differences are large enough to be the focus of public policy. If, for example, the difference in student performance in districts in the upper vs. the lower tail of the state distribution of district performance were equivalent to a difference in schooling of a few days in a school year, policymakers might be wise to hesitate before investing significant resources to try to close the

district performance gap. In contrast, gaps in student achievement attributable to differences in school districts equivalent to several weeks of schooling might well be worth addressing by policies intended to strengthen lower performing districts.

Can districts be categorized based on patterns of influence on student academic achievement in ways that would inform efforts to improve district performance? This question presumes that we answer the first two questions in the affirmative, i.e., districts have statistically significant impacts on student achievement that are large enough to be of practical importance. Establishing policies intended to strengthen district performance requires predictability in the performance of districts over time in exactly the same way that building human resource policies around teacher evaluation data requires that teacher evaluation scores in one year predict their performance in subsequent years. In other words, one year of data won't do. Neither will multiple years of data that demonstrate a lack of predictability from year to year in terms of which districts are doing well and which are not. Ideally, we would want to be able to identify some districts as consistently high performers over time and others as the opposite, while yet other districts could be categorized as gainers or decliners.

Being able to address our fourth question (*What are the distinctive features of exceptional districts?*) depends on our ability to identify consistent patterns of district performance over time. If such distinctive patterns exist, we can ask, for example, whether higher performing districts are distinguishable from lower performing districts by characteristics of their superintendents, by the consistency of the performance of their schools, by their per-pupil expenditures, and so forth. And we can search for changes in policy and practice that are associated with districts showing gains and districts showing declines. We will address the fourth question in a subsequent report.

Ideally, we would want to be able to identify some districts as consistently high performers over time and others as the opposite.

Two caveats are in order before we present our findings and policy conclusions. First, we will frequently use terminology that suggests causal effects because alternate phrasing would be convoluted. However, our

methods are observational and do not support causal conclusions. When we write, for example, about "gaps in student achievement attributable to school districts" we might more accurately write about "associations among student test scores and the districts in which students are educated that remain after accounting for variation in student achievement within districts that is associated with teachers and schools, and with the inclusion of statistical controls for demographic characteristics of students."

The second caveat is that our approach can only identify possible district effects that result from differences among districts in their practices. We cannot identify district effects that result from practices that are common to all districts. For example, suppose that school districts have a positive impact on student outcomes by relieving those closer to instructional interactions, such as building principals, from tasks, such as handling staff payrolls and bus transportation, that take time away from instructionally relevant activities. This kind of effect would not appear in our analyses because all districts provide these services and thus all would improve student achievement by so doing. Note, however, that this model of why school districts might be important—to let educators at the building level focus on education—is very different from a model in which districts compete for great leaders to drive education reform and enhance student achievement.

Methods

We use K-12 student-level administrative data from the states of Florida and North Carolina spanning the decade from 2000-2001 to 2009-2010. Every student in both states who was in grades 4 and 5 in this decade and participated in the state assessments of reading or mathematics is represented in our data, as are the classrooms, schools, and districts those students attended. There are roughly a half million student observations for each year of data (200,000 for NC and 300,000 for FL), which leads to about 5 million student data points in our dataset for the decade.

Our analytic approach employs a rich set of demographic data to account for differences among classrooms, schools, and districts.

We measure how much student achievement varies across districts in the context of variation in student achievement at the school, classroom, and student levels. We conduct our most intensive analysis with one year of data from the 2009-10 school year. We extend our analysis across the decade of data to identify individual districts that show exceptional patterns of association with student achievement. Our analyses are multi-level, using a technique called Hierarchical Linear Modeling, or HLM. The use of HLM allows us to simultaneously consider differences at the student, classroom, school, and district levels that take into account the lack of independence in the observations within these levels.

Our analytic approach employs a rich set of demographic data to account for differences among classrooms, schools, and districts that arise because students go to the schools that are close to their place of residence, and residential neighborhoods vary substantially within and between districts in their demographics. To the extent that we have valid measures of demographic differences and control statistically for their uneven distribution across districts, schools, and classrooms, the more assurance we have that any differences that remain are due to the impact of teachers, schools, and districts on student achievement. Our analyses include controls for student age, race/ethnicity, cognitive disability status, free and reduced lunch program status (FRPL), limited English proficiency status, and, for Florida only, whether the parent/student are native English speakers and whether the student was born in the U.S.[2]

We limit our analyses to reading and math scores on the state assessments for students in grades 4-5 because students in these grades are nearly always in a single classroom for which classroom effects can be estimated whereas students in later grades are in multiple classrooms and students in earlier grades do not have the requisite achievement test results. Being able to estimate teacher effects is important to our goal of comparing the contribution of districts to student achievement relative to the contribution of schools and classrooms.[3]

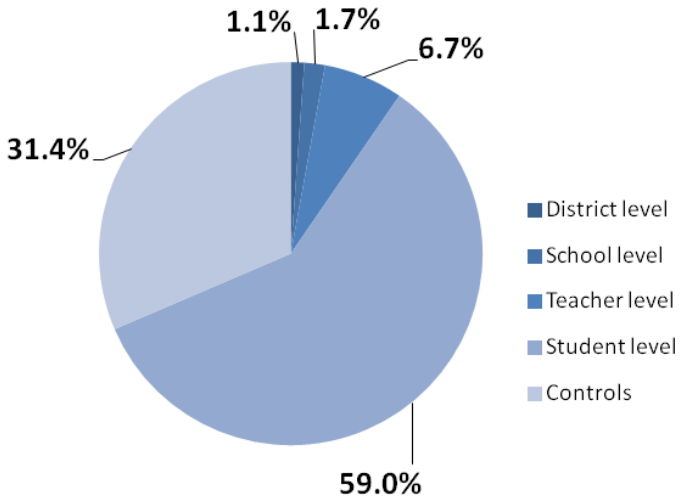
The methodology we employ is described in greater detail in a technical paper that accompanies this report, titled "School Districts and Student Achievement."

Findings

Q1: *What is the influence of school districts on student achievement relative to the influence of schools, teachers, and individual differences among students?*

The short answer to the question is: Not much. Figure 1 displays a summary of the variance decomposition results from Florida and North Carolina. The summary represents the mean values from separate analyses for each state of reading and mathematics achievement scores in grades 4 and 5 for the 2009-2010 academic year.

Figure 1: Variance in Student Achievement Associated with Differences Among Teachers/Classrooms, Schools, Districts, and Students



As indicated in the figure, only about 1% of the differences in student achievement (i.e., the variance) is located at the school district level. Student level differences, which represent everything including measurement error that is not accounted for by teachers, schools, districts, and demographic controls, account for 59% of the variability. The demographic controls account for another 31%. This leaves about 10% of the total variance to divide among the institutional components: teachers,

District level differences account for about 1% of the variability in student achievement.

schools, and districts. Teachers get the bulk of this, followed by schools, and then districts. The variance decomposition represented in Figure 1 differs somewhat by state and by subject matter. The strongest result for the district component occurs for mathematics in North Carolina where the district contribution rises to about 2%.

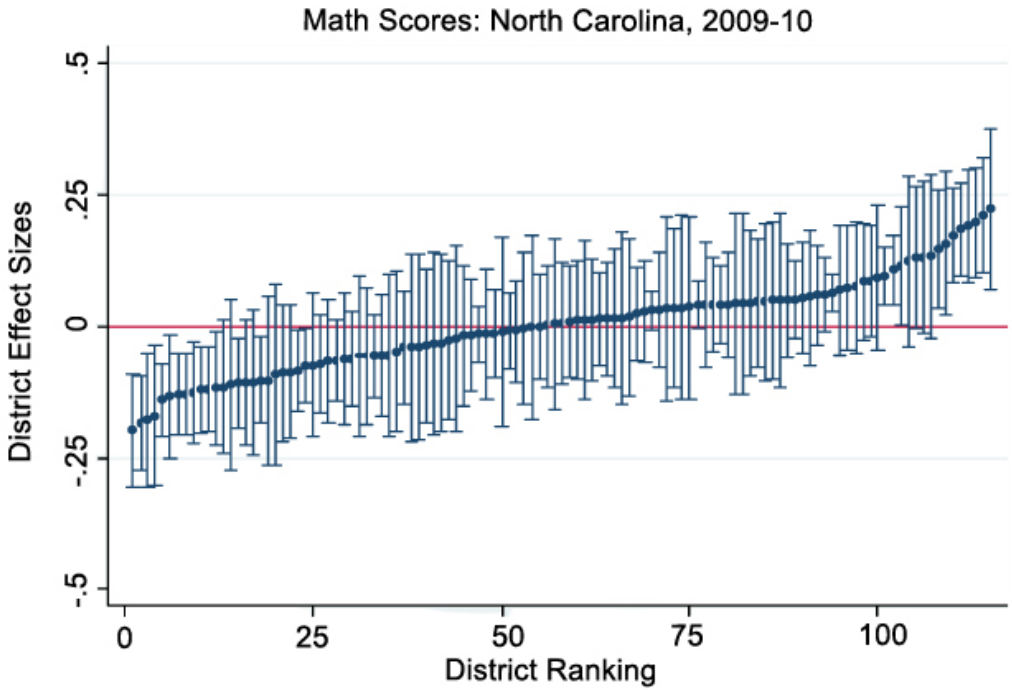
Q2: *Are there differences among districts in their contribution to student achievement that are large enough to be relevant for policy?*

It may appear from the variance decomposition represented in Figure 1 that school districts have such a small role to play in affecting student achievement that districts should be ignored by education reformers. Clearly the differences between districts that influence student achievement are smaller than differences between teachers and schools within districts that affect student achievement, whereas all three of these institutional components are swamped by differences among students and demographics.

But consider the 6.7% contribution by teachers that is pictured in Figure 1. That too seems small when compared to the 90% of variance that is controlled by demographic covariates and differences among students within classrooms. However, we know from a large body of econometric research that a standard deviation in teacher effectiveness, e.g., the difference between teachers who are roughly at the 30th vs. the 70th percentiles of teacher performance, is associated with between 0.10 and 0.25 student-level standard deviations on academic tests.[4] In our data, a standard deviation in teacher effectiveness is associated with 0.16 student standard deviations. This is equivalent to 36% of a school year.[5] In other words, a student with a teacher at the 69th percentile of effectiveness (0.50 standard deviations above the mean for all teachers) would experience the equivalent of 13 more weeks of school in a single year compared to a student with a teacher at the 31st percentile of effectiveness (0.50 standard deviations below the mean).[6] Of course, differences in teachers more extreme than 1 standard deviation would have even larger impacts. Thus,

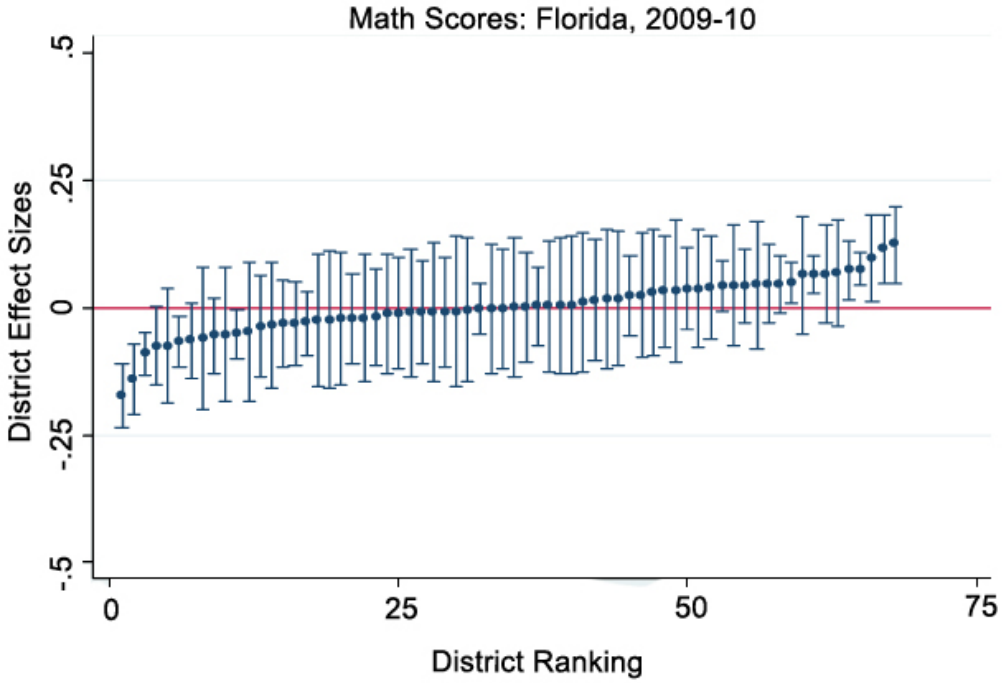
a variable that accounts for a relatively small piece of the total student achievement pie can still be important.

Figure 2: Estimates of Effects on Student Achievement of Individual School Districts in North Carolina



Figures 2 and 3 suggest that at least at the extremes there are school districts in both Florida and North Carolina that have impacts on student achievement that are important to understand and incorporate into policies and practices that are intended to enhance student achievement. Each data point in Figures 2 and 3 represents an estimate of the impact of a single school district in the state on math scores in 2009-10 using the same model and data that generated the results depicted in Figure 1. The error bars around each data point represent the 95% confidence limits for that district's estimate. Recall that the model we employ is multi-level and includes a rich set of demographic controls. Thus estimates for individual districts control for differences in students across districts.

Figure 3: Estimates of Effects on Student Achievement of Individual School Districts in Florida



There are several notable findings. First, there are a number of districts in both states that perform at levels that are above or below the average for districts in the state by a statistically significant margin. In Florida, 10% of districts are statistically above average and 7% are statistically below average. The comparable numbers in North Carolina are 10% above and 14% below. This means there are districts that are over- or under-performing on student achievement relative to what might be expected of them given the characteristics of their students: they add or subtract value.

Second, the difference in performance between districts is quite large at the extremes: 0.30 student standard deviations separate the highest and lowest performing district in the Florida data whereas the difference is 0.42 standard deviations for North Carolina. Normatively a year's growth in math performance for students in 4th and 5th grades is approximately 0.50 standard deviations. This means that the average 4th and 5th grader in the top-performing district in Florida in 2009-2010 was

In Florida, 10% of districts are statistically above average and 7% are statistically below average.

60% of a school year ahead of the average 4th and 5th grader in the lowest performing district in Florida, controlling for other factors that could impact student achievement included in our model. The comparable difference in North Carolina was even larger, at over 80% of a school year.

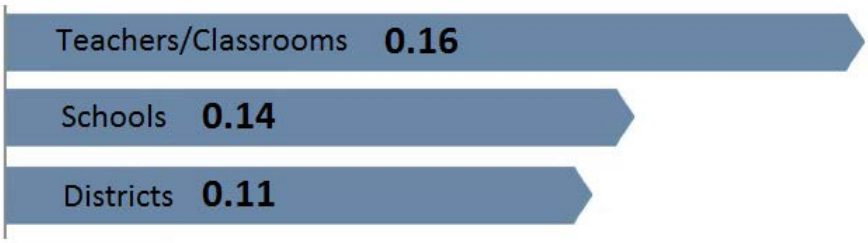
Of course, comparison of the two districts that differ the most in the overall distribution of performance can generate a misleading guide to the potential for improving district performance because any policies intended to raise student performance in the state by improving the performance of less effective districts would have to involve many districts, not just the one that happens to be the low performer in a given year. Further, the two districts that happen to be the lowest and highest performers in a given year can hold these ranks due to chance (values in the tails of a distribution are much less stable than values closer to the mean).

A more realistic view of the practical importance of district differences comes from looking at district effects in exactly the same way that we described teacher effects. We described a standard deviation of teacher effectiveness as associated with 0.16 standard deviations of difference in student achievement averaged across reading and math, which corresponds to about 13 weeks of additional learning for a student with a teacher 0.50 standard deviations above the mean of teachers compared to a student with a teacher 0.50 standard deviations below the mean for teachers. The corresponding relationship for districts is that a one standard deviation difference in district effectiveness equals 0.11 standard deviations in student achievement. This means that a student in a district 0.50 standard deviations above the average of all districts would experience the equivalent of roughly 9 more weeks of learning time by the end of 4th and 5th grade compared to a student in a district 0.50 standard deviations below the average of all districts. This is about a quarter of a school year. We suggest that a variable that can potentially increase education productivity by 25% is important.[7]

The relationship between the magnitude of district, school, and teacher effects on student achievement is seen in Figure 4.

Figure 4: Comparison of One Standard Deviation of Teacher/Classroom, School, and District Differences on Student Achievement*

(0.10 student standard deviations = roughly 25% of a school year of learning)*



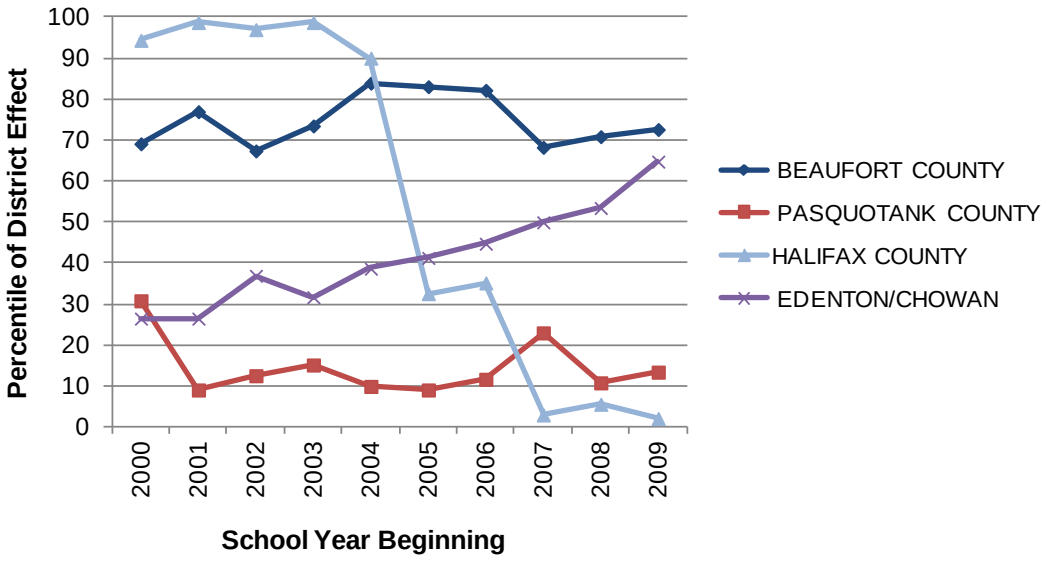
Q3: *Can districts be categorized based on patterns of influence on student academic achievement in ways that would inform efforts to improve district performance?*

We have heretofore presented findings from one school year (2009-2010) that indicate that even though districts account for only a small fraction of the overall variance in student achievement on state tests, there are nonetheless differences among districts in their performance that suggest the importance of improving district policies and practice. But district reform is nearly always a multi-year endeavor that would need to be informed by more than one year of data on student performance. A district targeted for improvement should be one that is chronically underperforming or is in decline. Similarly, a district to be singled out for its excellence and pointed to as a model for others to use for improvement should be one that is either persistently high performing or has shown a clear pattern of improvement. Are there such identifiable patterns of performance among school districts in Florida and North Carolina?

A district targeted for improvement should be one that is chronically underperforming or is in decline.

Figure 5 displays data from four districts in North Carolina with exceptional patterns of performance over the decade from 2000-2001 to 2009-2010. The horizontal axis is the school year. The vertical axis displays the percentile score of each district for each year on math performance relative to other districts, with individual district effect sizes adjusted for demographic covariates and the multi-level nature of our analysis using the same model that generated the data in Figure 1.

Figure 5: Four North Carolina School Districts with Distinctive Patterns of Student Achievement over a Decade

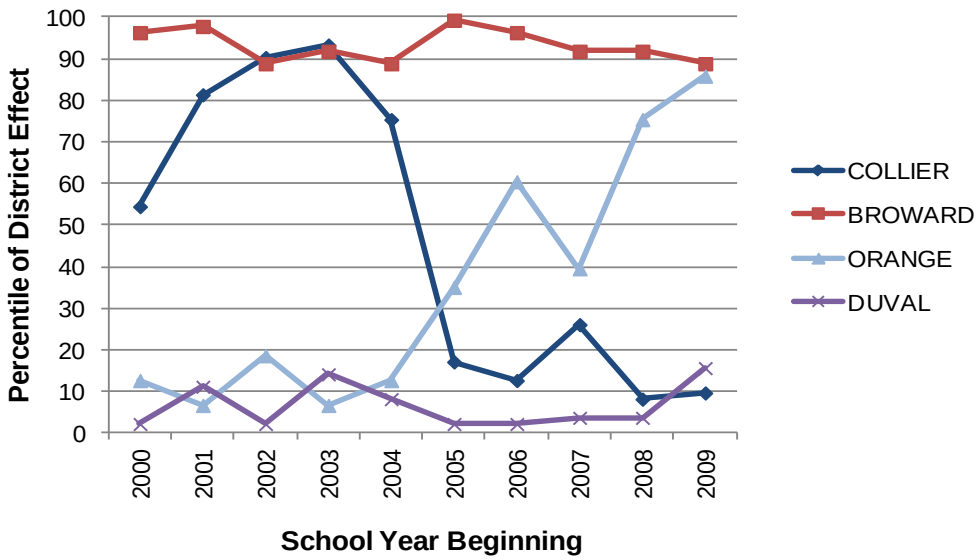


Beaufort County is a consistently above average performer, with a mean at the 76th percentile over the decade, i.e., it was better than ¾ of the districts in the state on a covariate-adjusted basis. Pasquotank County is the mirror image of Beaufort, scoring at a consistently low level, with an average of the 14th percentile over the decade. Halifax County is a dramatic decliner, having moved from one of the top to one of the lowest performing districts in the state over the decade. In contrast, Edenton/Chowan is a notable gainer, having moved from the 18th to the 65th percentile in 10 years. These four districts are similar in most dimensions other than academic performance. For example, they are each districts in largely rural counties from the northeastern section of the state with relatively small student populations. They have high proportions of students eligible for free and reduced price lunch, high concentrations of minority students, and similar levels of per-pupil expenditure.

Figure 6 presents data from four Florida districts that fall into the same pattern categories that we described for the North Carolina districts. Broward is a consistently high performer whereas Duval is the opposite.

Orange County is a notable gainer. In contrast, Collier has shown large declines.

Figure 6: Four Florida School Districts with Distinctive Patterns of Student Achievement over a Decade



There are some important caveats with respect to the school districts we have highlighted: First, they are exemplars of patterns of performance that are shown by many districts in each state. These particular districts from each state were chosen because they displayed one of the patterns of performance that are of interest to us and because they are grossly similar in the demographics of the student populations they serve. They were not chosen because they were the highest performing or lowest performing or showed the most improvement or the greatest declines. Second, our data are from 4th and 5th graders—patterns of district performance for these and other districts might well look different for other grades. Third, the data and graphs are based on performance that has been adjusted for the demographic covariates in our model. Thus the graphs might be thought of as representing the extent to which districts over- or under-performed each year relative to their demographic odds. The graphs do not represent district performance relative to an absolute standard such as the percentage of students meeting proficiency standards on state tests. For example, Beaufort

County, which averaged in the top quartile of North Carolina districts in our covariate-adjusted model, was slightly below average based on the raw scores of its 4th and 5th graders. Thus the district did very well relative to the rest of the state given its high minority, high poverty student population but many of its students did not reach proficiency standards on state tests and the majority of its schools failed to make adequate yearly progress under No Child Left Behind.

Summary and conclusions

Very little of the total variation in student achievement, only about 1% to 2%, lies at the level of the school district. Despite that, differences between school districts in effectiveness are large enough at the extremes to represent more than a half-year difference in schooling. In other words, if students educated in the least effective school district in North Carolina or Florida had been educated instead in the most effective district, the evidence suggests that their academic performance at the end of 4th and 5th grade would be higher by an amount equivalent to having attended school for at least a half-year more. Even the difference between a district that lies at the 31st percentile and one at the 69th percentile (a 1 standard deviation difference in district effectiveness) is equivalent to more than two months of schooling. These are differences that are large enough to warrant policy attention.

Further, individual districts within the states of Florida and North Carolina display patterns of effectiveness over many years that cry out for explanation and understanding. Some districts show patterns of continuous improvement that move them from very low performing to substantially above average. Other districts show precipitous declines. Still other districts manage to beat their demographic odds year after year, whereas others are consistently low performers. If we found such differential patterns of effectiveness in the context of industrial production or sports team win/loss records or chain store sales or hospital readmission rates we would think that surely it would be possible to find out what accounts for them. And we would reasonably assume that

Individual districts display patterns of effectiveness over many years that cry out for explanation and understanding.

knowledge of why one plant or team or store or hospital does better than others would lead to interventions that would successfully bring up the low performers. The same logic model applies to differences in the effectiveness of school districts.

There is no reason to expect that a particular intervention intended to improve district level performance such as hiring a superstar superintendent or providing more autonomy to school leaders or changing teacher compensation packages would come close to achieving outcomes as large as the naturally occurring differences in district effectiveness found in our analysis. In that sense, our estimates are upper bounds on what might be expected from policies intended to improve lower performing districts. But our finding of large differences in performance over time between the upper and lower echelon districts as well as the existence of transformative districts that have shown substantial improvement or deterioration in their performance suggests a tantalizing fruit for education researchers and reformers.

Endnotes

[1] New York State Education Department, *Administrative Compensation Information for 2011-2012* (New York City: New York State Education Department, 2011). http://www.p12.nysed.gov/mgtserv/admincomp/docs/2011-12_AdminSalDisc_5_11_11_Post_r.xls

[2] We do not use in the present report a student growth model that measures district effectiveness by the gains that students experience on state tests from one year to the next. It is possible and probably likely that districts that have an impact on student achievement do so in all or most grades. If we measured district effectiveness only by the gains generated for students between grades 4 and 5 we would penalize districts that impacted student outcomes in earlier grades.

[3] We use a student growth model in a technical paper that accompanies this report and in future work on districts using the same dataset. We limit our analysis in the present report to 4th and 5th graders for whom the growth model can be calculated rather than also including 3rd graders in order to retain comparability with results from these other, related papers.

[4] Thomas J, Kane, Eric S. Taylor, John H. Tyler, and Amy L. Wooten, *Identifying Effective Classroom Practices Using Student Achievement Data*, Working Paper 15803 (Cambridge: National Bureau of Economic Research, 2010).

[5] This calculation is based on a normal year's average growth in reading and math in grades 4 and 5 of 0.42 standard deviations, as reported in Carolyn J. Hill, Howard S. Bloom, Alison Rebeck Black, and Mark W. Lipsey, *Empirical Benchmarks for Interpreting Effect Sizes in Research*, MDRC Working Papers on Research Methodology (New York: MDRC, 2007).

[6] This conversion is based on a 180-day school year, equivalent to 36 full weeks of instruction.

[7] Teacher and district effects as we measure them accrue over different time spans. Teacher effects can be attributed to the teachers students experienced in grades 4 and 5. District effects, in contrast, are a result of school experiences that cumulate from kindergarten. This may make it seem that the district effects should be adjusted downward by dividing them by the years of schooling on which they are estimated if they are to be compared to teacher effects. However, whereas district effects represent the net boost to student achievement that result from going to school in a particular school district for a given number of years, teacher effects over the same time span within the same district would average zero unless there were improvements over time in the overall quality of the teacher workforce. This is because children on average would experience both good and bad teachers in equal numbers as they move through the grades with effects that would cancel out each other.

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