Regressive Illinois:
School funding, District-level Performance, and its Implications for Revenue and Spending Policies

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EXECUTIVE SUMMARY

While equitable funding of K-12 public school has become an acute issue in many states, Illinois ranks among the most inequitable in its mechanisms for dispersing revenues to school districts. Illinois property taxes are the primary means for financing schools. However, due to very low state general aid, many property owners pay very high property taxes to support their schools. Consequently, the need for increased state support comes at a time when legislators have repeatedly proposed to freeze property taxes permanently, or for two to four years. Additionally, statewide bills have been introduced since 2012 that would shift pension costs, currently picked up by the state (excluding Chicago), to school districts.

This research report from the Project for Middle Class Renewal in the School of Labor and Employment Relations at the University of Illinois, Urbana-Champaign examines the relationship between school revenue and achievement levels in Illinois.

We first examine data on local school districts from 2011-2012 to 2016-2017 to explore and illustrate how revenue and expenditures vary by rates of low-income students and other key indicators.

Second, we use several regression models to assess the degree to which local funding (excluding the City of Chicago due to its exceptional size and characteristics) is associated with basic indicators of student achievement. This strategy attempts to control for both observed and unobserved characteristics of school districts that could affect outcomes.

Our analysis illustrates that:

- Although there is substantial variation from district to district, educational resources and student achievement levels remain sharply patterned according to the degree of socio-economic disadvantage in a given school district. Districts with high property values and few low-income students tend to have higher levels of revenue per pupil than most Illinois school districts. This pattern is only partially offset by federal and state resources and only for school districts with the highest degree of socio-economic disadvantage and thus the highest need. Between these two extremes, school districts are largely still dependent on local property tax revenue to cover instructional expenses and other core costs.
- Income levels are strongly associated with achievements gaps both across districts with varying resource levels and within districts (between low-income and non-low-income students).
- However, at the district level, higher instructional spending is associated with a modest but statistically significant improvement in aggregate student proficiency levels, after controlling for disadvantage and other characteristics at the district level. $1,000 of instructional expenditures per pupil is associated with a roughly 1.5 percentage point increase in the percentage of all students who met or exceeded expectations in ELA and Math, at all grade levels and regardless of the testing method.
- One standard deviation in instructional spending ($1,768.91) is associated with a 2.7 percent difference in proficiency levels. This positive relationship generally parallels the findings of recent studies that have concluded that money does in fact matter for education.

These findings are consistent with recent findings from the most advanced contemporary studies that examine the link between financial resources and achievement outcomes at the state, district, school, and student levels. Taken together, these findings suggest that concerns over the distribution of property tax burden and equality of access to resources in K-12 education are delicately intertwined.

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INTRODUCTION

While equitable funding of K-12 public school has become an acute issue in many states, Illinois holds the dubious rank of being among the most inequitable in its mechanisms for dispersing revenues to school districts. In an effort to level the resource landscape of its public schools, the Illinois legislature recently passed a new Evidence Based Funding Model (ISBE, 2017). The law comes with a 10-year commitment to spend annually an additional $350 million above the roughly $7 billion it currently spends on 852 public school districts. Illinois property taxes are the primary means for financing schools. However, due to very low state general aide, many property owners pay very high property taxes to support their schools. Consequently, the need for increased state support comes at a time when legislators have repeatedly proposed to freeze property taxes, either on a permanent basis or for a period of two to four years.[1] Additionally, statewide bills have been introduced since 2012 that would shift pension costs, currently picked up by the state (excluding Chicago), to school districts. Superintendents, the Illinois Municipal League and Illinois Association of School Business Officials have opposed a property tax freeze and pension cost shift.

The financial realities of Illinois school funding foregrounds the question that motivates this research: How does school revenue and spending impact academic achievement? More precisely, what is the relationship between local funding and student achievement? If school districts cannot raise additional local funds and increased state funds are not forthcoming, what is the predicted outcome on academic performance?

The following report by the Project for Middle Class Renewal at the School of Labor and Employment Relations at the University of Illinois, Urbana-Champaign, investigates the relationship between per pupil spending and student outcomes. Following a short review of research examining the link between financial resources and educational outcomes, the second section describes the data and methodology. The third section presents descriptive data on the distribution of school district revenues and expenditures in Illinois, and the fourth section examines the connection to student outcomes. Our analysis is designed to estimate the student achievement impact of school spending with the aim of better understanding funding inequities. The report concludes with a discussion of policy implications.

Educational inequality: A national problem

As outlined in a recent report from the US Commission on Civil Rights (2018), the severity and pervasiveness of funding inequalities in our nation's public-school systems frequently render quality education inaccessible for low-income students and students of color simply on the basis of where they live. These inequities hinder the development of students' skills and future prospects in a competitive labor market, compounding the population-level effects of spatial segregation and disadvantage by race and class-based levels of wealth and income. This stubborn empirical reality contradicts the spirit and intent of the Supreme Court's Brown vs Board of Education decision in 1954 as well as the vision for equal opportunity shared by countless policy-makers, reformers, educators, and parents.

[1] A number of state assembly representatives have also endorsed a 1% annual increase cap on property taxes. Additionally, the Evidence-Based Funding law includes a provision called the Property Tax Relief Pool fund, which enables the neediest school districts to lower their property tax levy with no loss of revenue (see, "How the Property Tax Relief Pool Fund Drives Equity," *Advance Illinois*, 2018).

While these issues have been well-known for decades, their underlying causes and most appropriate solutions remain subject to debate in research and policy circles, with wide-ranging implications for the political and fiscal dimensions of the US intergovernmental system and the distribution of opportunity across geography and social groups. Historically, these debates have often hinged on the question of whether funding matters for improving educational outcomes and closing gaps in achievement.

At a time when school segregation had emerged as a focal point of the Civil Rights movement, the Coleman Report, an influential piece of research associated with the Civil Rights Act in 1964, set the tone for much of the subsequent research. The report's key innovation was to frame the link between student performance and the characteristics of their school environments. Coleman found that schools mattered far less for student achievement than family resources and, to a lesser extent, peer networks. If schools did not matter very much, then by implication, neither did money. More recent analysis has challenged Coleman's findings, which relied on a far more limited set of data and statistical techniques than those available to more contemporary researchers (Baker, 2016, 2017). Nonetheless, the Coleman Report's implications continue to be influential.

Twenty years later, Hanushek's meta-analysis concluded that no strong, significant link exists between school expenditures and student performance, solidifying the implications of the earlier report. Based on these findings, Hanushek (1989) and others have argued that "money doesn't matter" for education, a theme that has since reverberated through legislative chambers and courthouses at the local, state, and federal levels. Like the earlier Coleman report, many of the studies reviewed by Hanushek took place in the 1960s and 70s and had substantial methodological shortcomings by contemporary standards (Greenwald, Hedges, and Laine, 1996). However, methods have come a long way, and other more recent studies have taken issue with the findings reviewed by Hanushek on the basis of their original limitations and more recent evidence.

Literature linking school revenues and spending to achievement

A large and varied body of research grapples with the broad question of the degree to which financial resources translate into academic achievement. In addition, the use of standardized tests as a singular and legitimate measure of student learning is itself highly contested by educational experts (Kohn, 2000: Koretz, 2017). This literature ranges considerably in the specific focal question under examination, as well as the reliance on a guiding conceptual mechanism, methodological strategy, use of available data, and scale of analysis. As a whole, the literature offers a considerable challenge to the notion that money does not matter for education, and this conclusion can be illustrated with the findings from specific studies.

A study by Baker (2012) that reviewed decades of research on school spending and student academic achievement found on average, aggregate measures of per-pupil spending are positively associated with improved or higher student outcomes. In some studies, the size of this effect is larger than in others and, in some cases, funding appears to matter more for some students than others. There are other factors that may moderate the influence of funding on student outcomes, such as how that money is spent. But, on balance, in direct tests of the relationship between financial resources and student outcomes, money matters.

Using more than 20 years of revenue and expenditure data for schools, Baker et al. (2015) found that increasing investments in schools generally is associated with greater access to resources as measured by staffing ratios, class

sizes, and the competitiveness of teacher wages. Kern (2015) examined data from 50 states to analyze the relationship between per student spending and academic achievement. On eight academic outcomes he found that students attending schools that are well resourced and have highly qualified teachers and staff have significant academic advantages. Flaherty (2013) examined spending impacts on Pennsylvania schools and reported that, on average, aggregate measures of per-pupil spending are positively associated with higher or improved levels of student outcomes.

Greenwald et al. (2016) conducted a meta-analysis of previous studies and found mixed results on the relationship between school spending and student achievement. Specifically pertaining to aggregate per-pupil spending measures, the authors found that, among statistically significant findings, the vast majority of past study findings were positive and that most of the analyses that did not find a statistically discernible relationship between spending and outcomes still found a positive association. The authors concluded: "Global resource variables such as PPE [per-pupil expenditures] show strong and consistent relations with achievement. In addition, resource variables that attempt to describe the quality of teachers (teacher ability, teacher education, and teacher experience) show very strong relations with student achievement." They also investigated the relationship between a variety of resources and student outcome measures and concluded the following: "… a broad range of resources were positively related to student outcomes, with 'effect sizes' large enough to suggest that moderate increases in spending may be associated with significant increases in achievement."

These associations are not merely limited to student achievement. Using a longitudinal data that links childhood conditions with outcomes into adulthood, Jackson et al (2014) examined the effect of school finance reforms that began in the early 1970s and accelerated in the 1980s. By framing these reforms as exogenous shocks to school spending unrelated to family, neighborhood, or school characteristics, the study analyzed their effects on the level and distribution of school district spending, as well as their effects on subsequent educational and economic outcomes. The report revealed that a 20 percent increase in per-pupil spending each year for all 12 years of public school for children from poor families leads to about 0.9 more completed years of education, 25 percent higher earnings, and a 20 percentage point reduction in the annual incidence of adult poverty; they found no effect for children from non-poor families.

On balance, the post-Coleman research concludes that school spending matters. This research finding resonates with recent experience, as superintendents, school boards and teachers in Arizona, West Virginia, Oklahoma, Kentucky and Colorado have publicly stated their schools are underfunded (Fernandez- Campbell, 2018; Bach, 2018; Will, 2018; Grinberg and Weisfeldt, 2018). The contemporary research and the recent mass teacher demonstrations appear to concur with Baker (2012) that, "The things that cost money benefit students." Importantly, based on the research and practice there is scarce evidence that there are more cost-effective alternatives to achieve high student academic outcomes.

Local taxes, school district finances, and inequitable outcomes in Illinois

In 1973, the Supreme Court of the United States ruled in *San Antonio Independent School District v. Rodriguez* that there is no fundamental right to education in the Constitution of the United States (Oyez, 1973). The ruling placed the burden for providing a system and method of financing public education on the states. Illinois' constitutional education provision language requires that the state provide for "[a]n efficient system of high-quality public educational

institutions and services." Moreover, it establishes that "[t]he State has the primary responsibility for financing the system of public education."[2] The devolution of educational responsibility to the states further shifted the obligation of paying for public schools to local communities.

Local taxes, particularly property taxes, are the main source of revenue for public education programs throughout the United States. However, schools in Illinois are the most highly dependent on the collection of property taxes for revenue generation (Mangan et al. 2010). In 2014, local taxes and school fees comprised 67 percent of all elementary and secondary education revenue. Another 25 percent came from the state and the federal government invested 8 percent (Rado, 2016). In contrast, the national average for state sources of school funding is 45 percent, although this rate varies extensively across as well as within states. In Vermont for example, 90 percent of public school revenues come from the state. According to the National Center for Education Statistics, the U.S. average of only property tax revenues (no other local funds) to total school revenues is 36 percent. Illinois is at 59 percent; the highest in the nation (NCES, 2018).

Illinois' steep dependence on local sources to fund a quality education means property taxes are high in Illinois compared to the rest of the nation. According to the conservative-leaning Tax Foundation, Illinois has the 10th-highest relative property tax burden in the nation. The average property tax as a percentage of annual personal income is 4.3 percent in Illinois, lower than only Connecticut, Maine, New Hampshire, New Jersey, New York, Rhode Island, Vermont, Wisconsin, and the District of Columbia (Walczak et al., 2016). Additionally, other reports find that the median household in Illinois has a property tax rate that is 1.36 percentage points higher than the median property tax rate in the United States (Lalisse, 2016).

Furthermore, the state's reliance on property tax revenue to fund school districts means that Illinois has one of the most regressive education funding systems in the country. When a county or district is poorer, less revenue is collected from property taxes. Students in wealthier districts are more likely to have more experienced teachers, well-resourced and comprehensive after-school programs, and cutting-edge learning technologies that improve student outcomes. In fact, data on school districts reveal a stark difference in funding for wealthy school districts compared to poorer school districts in Illinois. According to *Funding Gaps 2018* by The Education Trust, only 81 cents are spent on schools and students in poorer districts for every dollar spent on schools and students in wealthier districts. "The largest gap by far," the Trust reports "continues to be Illinois, where the highest poverty districts receive 22 percent less in state and local funding than the lowest poverty districts" (Morgan and Amerikaner, 2018). Property tax revenue disparities in Illinois are responsible for about 92 percent of local revenue disparities. During the 2010-11 school year, more than a quarter of Illinois' students attended fiscally disadvantaged districts (Baker, 2014). As a result of these compounding sources of local funding disparities and the low level of offsetting state funding, an *Urban Institute* report ranked Illinois dead last among 49 states in combined progressivity of state and local funding in 2013-2014 (Chingos and Blagg, 2017).[3]

Inequities in the distribution of state school funding are more severe because investment in K-12 schools has declined dramatically in a number of states over the last decade. Most states responded to the recession hit by cutting school funding, and it took years for states to restore their

2 Constitution of the State of Illinois is available at http://www.ilga.gov/commission/lrb/con10.htm.

3 The authors exclude Hawaii from their analysis of funding progressivity within states. The state comprises a single school district, so no comparison is possible.

funding to pre-recession levels. In 2015, according to the Center for Budget and Policy Priorities, "29 states were still providing less total school funding per student than they were in 2008" (Leachman et al, 2017). As of the 2017-18 school year a dozen states cut "general" funding by 7 percent or more per student over the last decade. The share of funding for K-12 education provided by the state of Illinois declined from 29 percent in 2001 to 25 percent. Since fiscal year 2010, Illinois has cumulatively lost roughly $3.8 billion in education funding compared to its 2009 funding levels. In 2017, 59 percent of school district budgets in Illinois reflected deficit spending, which is a direct result of the reductions to state revenues since fiscal year 2009 (ISBE, 2016).

At the same time, local ability to supplement the loss of state aid was seriously hampered by declining property values. After the 2007 recession, "property tax revenue growth nationally averaged only about 1.7 percent above inflation annually through 2016" (Leachman et al, 2017). The increase was not sufficient to make up for declining state support and rising student enrollment. Consequently, states had to scale back spending in other critical areas. Between 2008-15, capital spending on K-12 buildings was slashed by $23 billion or 31%. In Illinois, the two-year capital needs for K-12 education facilities in fiscal year 2017 were $7.5 billion, averaging approximately $18.5 million per district (Craighead, 2018).

Reduced revenues suppress a school district's ability to spend in many important areas. Teacher pay and recruitment are foremost. In 39 states the average teacher's salary declined relative to inflation between the 2010 and 2016 school years. When controlling for level of education, teachers nationally earn an average of 61 percent of that of private-sector employees. In Illinois the wage penalty is a bit less at 79 percent (Maciag, 2018; Allegreto and Mishel, 2016).

Low teacher pay further impacts the ability of school districts to reduce the teacher-student ratio. Educational research suggests that reducing class sizes is associated with higher academic achievement (Schanzenbach, 2014; Chingos and Whitehurst, 2011). However, maintaining small class sizes while cutting spending and increasing enrollment is impossible. The United States has approximately 1,419,000 more K-12 students this school year than in 2008 but 135,000 fewer teachers and other school workers (NCES, 2016).

METHODS AND DATA

The remainder of this report responds to two questions. First, what explains the disparity in the funding situation experienced by Illinois school districts? Second, how is funding variation related to student performance? To answer these questions, we adopt an empirical strategy that adapts general principles from the large body of literature engaged with the challenge of connecting school funding with performance and outcomes, whether measured at the student, school, or district level. Taken as a whole, this literature employs a range of methods on its way to offering varying conclusions, and these choices depend on the specific mechanisms and relationships under analysis and the availability of data.

These issues are further compounded by the abilities of families, especially high-income families with broad housing options, to sort themselves into districts based on their preferences and their ability to afford different segments of the housing market. Because families make residential decisions based on property values, tax rates, and good schools, it is difficult to separate correlation from causation in the relationship between funding and achievement levels.

Our main data source is the extensive battery of indicators used to compile the Illinois Report

Card, as made publicly available on the Illinois State Board of Education website. This data set, which covers every school and every school district in the state, has the advantage of comprehensiveness. Along with a variety of aggregate test results broken down by grade levels and student subgroups, this data also contains a rich set of administrative and financial indicators. The main shortcoming of the data set for our purposes is that its format has experienced minor changes from year to year, which hinders full comparability across time. In addition, the data does not include the full set of indicators for every school and district across every year observed in the data set. For this study, we combined district-level data for every school year from the 2011-2012 school year to the 2016-2017 school year into a single data set for analysis. Since our research question is primarily concerned with the school district and not with individual schools *per se* and since many of the administrative and financial indicators are available only at the district level, we selected school districts as our unit of analysis.[4]

In the analysis presented, we focus on describing relationships between relevant data points and on regression models that control for the effect of multiple variables on student outcomes. With the availability of year-over-year data, three general types of regression models are offered. First, an ordinary least squares model is used on a basic cross section of 2016-2017 data, the most recent available year. Second, a pooled regression model is used to enlarge the sample size by including multiple years of data at the same time. These models include year dummy variables to control for changes over time in the outcome variable. These year effects are also intended to account for large structural differences in test scores from year to year due solely to changes in the method of testing, such as the switch from the Illinois Standards Achievement Tests (ISAT) to the Partnership for Assessment of Readiness for College and Careers (PARCC) tests that would otherwise make the data incomparable. Third, we use a "two-way" fixed effect model to control both for time effects and for unmeasured characteristics of school districts that could have an effect on test scores. All else equal, the fixed effect models provide the most conservative and preferred approach. Additional details on our methodological approach is in the appendix.

Our basic model specification is that academic outcomes – in this case, the percentage of a district's students that have achieved a level of proficient or better in standardized tests – may be considered to be a function of different kinds of expenditure, demographic characteristics and other indicators of relative advantage and disadvantage, and categorical variables for the type of district (outcome levels and tests vary for elementary, high school, and unified districts). The pooled models add year dummies to this basic specification. The fixed effect models add district and year intercepts and remove the categories for the type of district, which are time-invariant and thus unsuitable for a fixed effect approach.[5]

Each year of data includes testing results and administrative indicators for the current year. In general, financial indicators, such as the amount of local, state, and federal revenue and different categories of expenditure, are drawn from the previous year in each cross-section of the Illinois Report Card data set. In the regression models, this essentially functions as a one-year lag, which is reasonable since the effects of funding changes are unlikely to make an immediate impact. Indicators related to property tax revenue, specifically equalized assessed property value and property tax rates, are incorporated into each

[4] Under the federal Every Student Succeeds Act (ESSA) educational expenditures are now required to be reported at the individual school level.

[5] It is, however, reasonable to expect that the fixed effect itself will capture much of the effect determined by whether a given district is elementary, high school, or unified.

cross-section of the data set with a three-year lag (e.g., 2016-2017 data contains property tax rates from 2013-2014). All cases of dollar value comparisons presented below have been adjusted for inflation to reflect constant or "real" 2017 dollars using the consumer price index published by the Bureau of Labor Statistics.

The descriptive data presented below include the City of Chicago. However, the regression models do not, since Chicago Public Schools is, by a very large degree, the largest school district in the state and subject to many idiosyncrasies due to its unique size and history. Other districts are dropped from the analysis on an ad hoc basis but only due to incomplete data.

WHAT DETERMINES SCHOOL DISTRICT FUNDING IN ILLINOIS?

This section focuses on the two sides of the money equation for public school districts: revenues and expenditures. The major categories of revenues are federal, state, and local sources. As discussed above and illustrated below, the majority of funding for most school districts is local in origin and primarily generated from property tax assessments. Every school district also receives state and federal funding, although the most disadvantaged districts tend to receive more, since they also qualify for additional sources of categorical funding. Conversely, the most disadvantaged districts also tend to have lower property values and, as a result, have less capacity to generate revenue through the property tax mechanism.[6]

On the other side of the equation, expenditures track what school districts do with their revenue. Examining expenditures provides a window into the costs of operating schools. As the largest expenditure category, instructional spending includes activities dealing with teaching or with interactions between students and teachers or any others who aid in the instruction process. Schools also spend money on general administration, support services, retiring the principal on bonds and other debts, community services, capital outlays, and non-programmed charges.

Sources of funding: federal, state, and local

Before unpacking the variation in school district funding and expenditures, a look at statewide totals provides context. Figure 1, which shows the

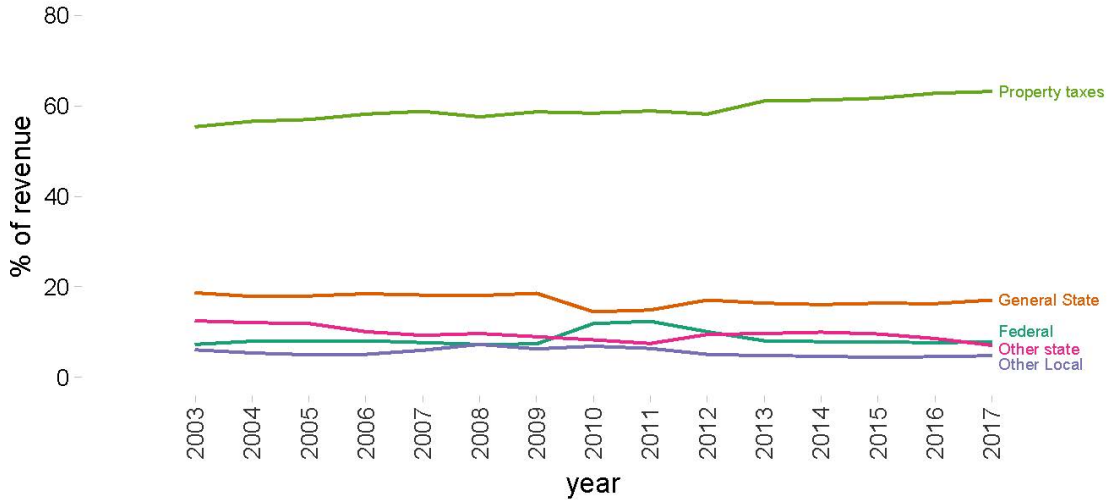

Figure 1: Changing mix of revenues by source, statewide totals

[6] This analysis examines school funding prior to the state's adoption of the Evidence Based Funding model in 2018-19.

changing mix of major sources of school funding over the past 15 years, illustrates two initial points. First, the local share of funding has been and continues to be the source of the majority of school funding. As previously noted state and federal funding account for about 25 percent and 8 percent respectively. At this level Illinois contributes the smallest percentage of education funding of any state in the country. Second, the share of total revenue accounted for by local property taxes has increased from about 55 percent in 2003 to 63 percent in 2017. This increase, however, is offset by declines at the state level. With the exception of a temporary increase in funding as a component of the American Recovery and Reinvestment Act (ARRA) during 2010 and 2011, federal support has been flat.

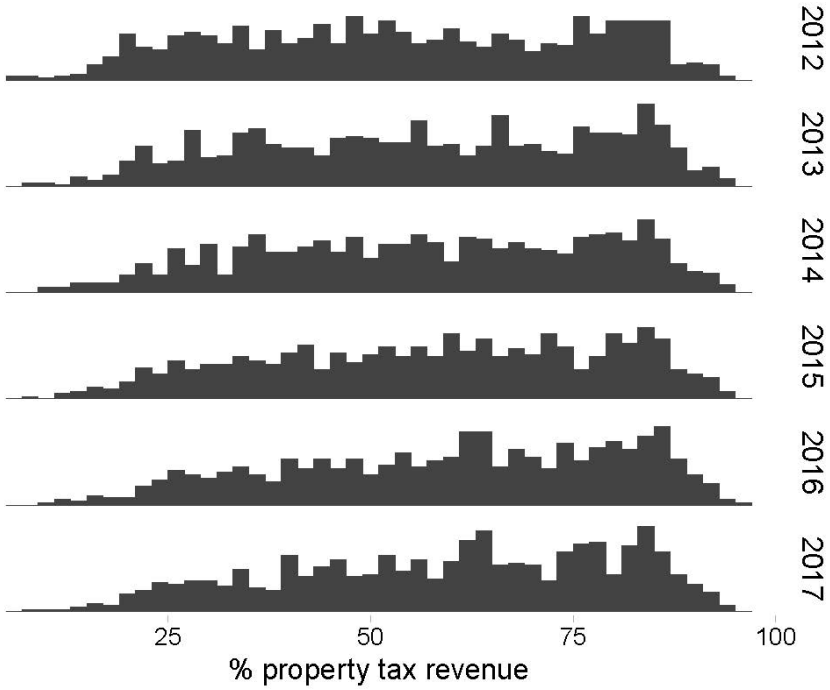

Figure 2: Distribution of property tax revenues (previous year)

Looking at district-level data reveals the extensive degree of local variation behind statewide averages. Figure 2 shows the share of local property tax funding received in the previous year for every district between 2011 and 2016. Like the statewide total, the general trend has indeed been an increase on average, as indicated by the skew toward higher percentages in more recent years. However, there remains considerable variation from district to district. Table 1 illustrates how this variation is related to a district's income levels. In 2016,[7] the average property tax funding share for every school district was 60 percent and the median was 62 percent. However, the district at the 10th percentile received just above 30 percent of its funding from local property taxes on average, while this share was just under 85 percent for the district at the 90th percentile. This indicates considerable spread in the degree to which Illinois schools districts rely on local property taxes.

Figure 3 shows the association between local funding and income levels. In general, high income school districts derive a majority of their funding from local sources, while low income districts depend more on state funding. Given

Table 1: Variation in local funding percentage, 2016

10th percentile	30.3%
25th percentile	44.2%
50th percentile	62.0%
75th percentile	77.0%
90th percentile	84.7%
Average	59.7%

7 Revenue and expenditure data is listed for the previous year. Thus, the 2017 data set, which is the most recent year, shows revenue and expenditures for the previous year, 2016.

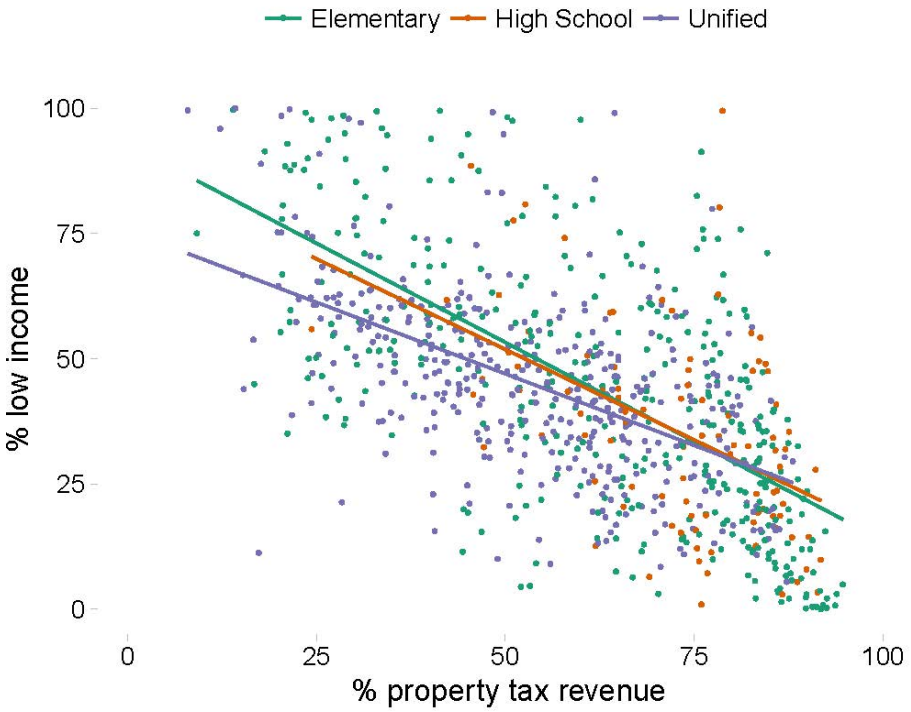

Figure 3: Property tax revenue as a percentage of total district revenue and percentage of low-income students, 2017

Illinois' extreme degree of reliance on local funding sources, this creates the condition for disparities by income level, as lower-income districts are less able to generate funding for education.

Taxes and local funding

To a large extent, local revenue depends on two numbers: the equalized assessed value (EAV) of properties in the district and the district's tax rate for schools. In a rough sense, the EAV may be thought of as an indicator of the district's property wealth, while the total school tax rate per $100 approximates the rate at which that wealth is taxed to generate revenue for operating schools.[8] However, these two indicators are not necessarily correlated with each other, as illustrated by the variation in figure 4. In general tax rates are lower for districts with high property values. According to Advance Illinois average tax rates of districts with above average property wealth is 4.7%, while districts with below average property wealth assess on average a 5.7% rate (2018). Some districts however have rates twice as high. Districts with a large base of taxable property wealth simply do not need to tax at a high rate to generate sufficient local revenues. On the other end of the spectrum, districts with lower property values exhibit varying rates of school

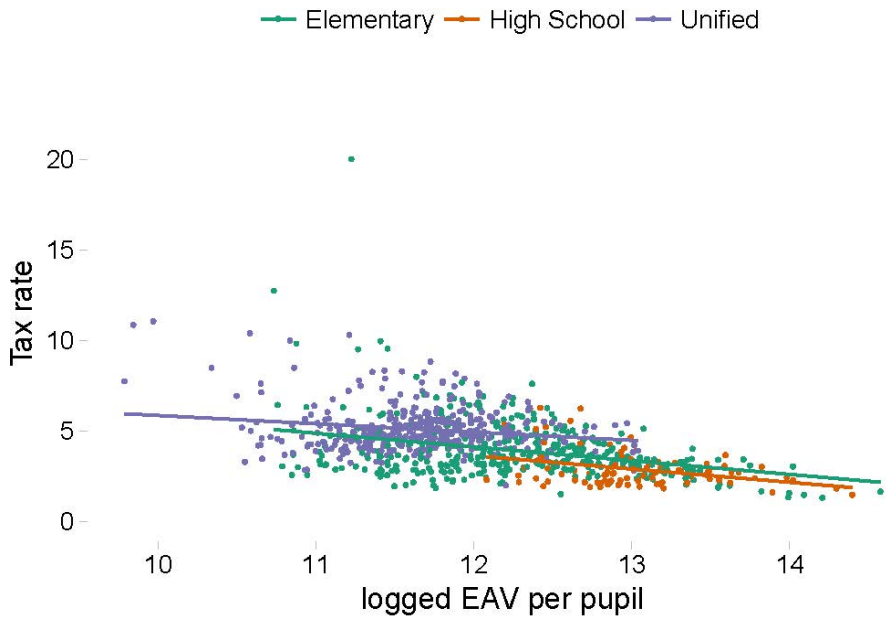

Figure 4: Total school tax rates and equalized assessed value (EAV, logged)

8 Documentation for the Illinois Report Card data refers to equalized assessed value and total school tax rate per $100 as indicators of a district's ability to pay and effective willingness to pay, respectively.

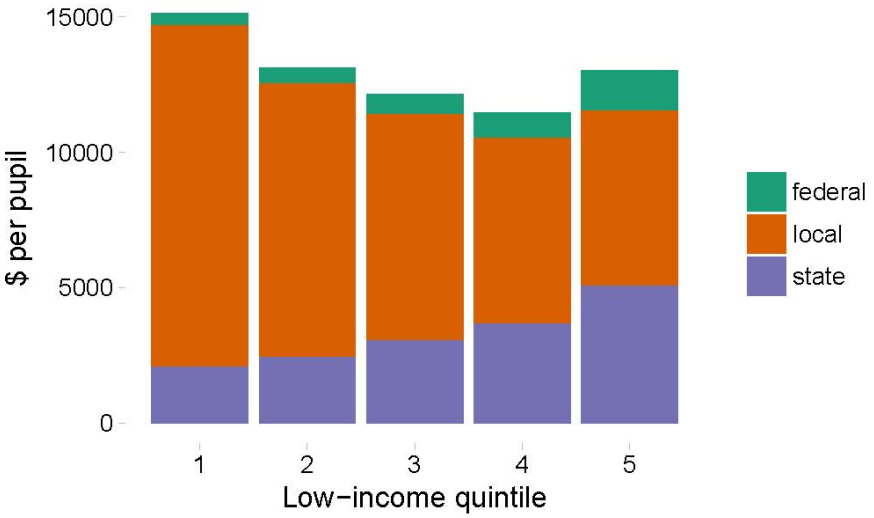

Figure 5: Average revenue by low-income quintile, 2017 (highest quintile has highest rate of low-income students)

taxation: many are below 5 percent while others approach 10 percent or higher. For example, some economically depressed districts in the south suburbs of Chicago rank among the highest in property tax rates, while wealthier districts in the north suburbs have among the lowest rates in the region.

Due to the relationship between the local tax base and local revenue, the makeup of the revenue sources is strongly associated with the degree of disadvantage among a district's student population. To illustrate, figure 5 divides school districts into five quintiles based on their percentage of low-income students and illustrates the average revenues by source for each group. Districts with a smaller percentage of low-income students have both higher total spending and higher local spending. As an exception to this pattern, the lowest-income districts receive more funding from state and federal sources, on average, which compensates for lower local revenue.

On average, 4 percent of the property tax bill in each district went to schools; and while there is some variation in this rate, the vast majority fall under 7 percent.[9] In 2016, the average district spent more than it collected in revenue, and about 56 percent of districts operated at a deficit in per pupil levels of revenue and spending. However, there is substantial variation, and deficits are not correlated with the percentage of low-income students.

Where does the money go?

The largest portion of expenditures are spent on instruction. Lower-income districts tend to spend a higher percentage of total per pupil operational dollars on instructional expenditures, and this relationship is strongest for high school districts. Figure 6 shows different levels of per pupil expenditure for each low-income quintile. Supporting services expenditures are highest for

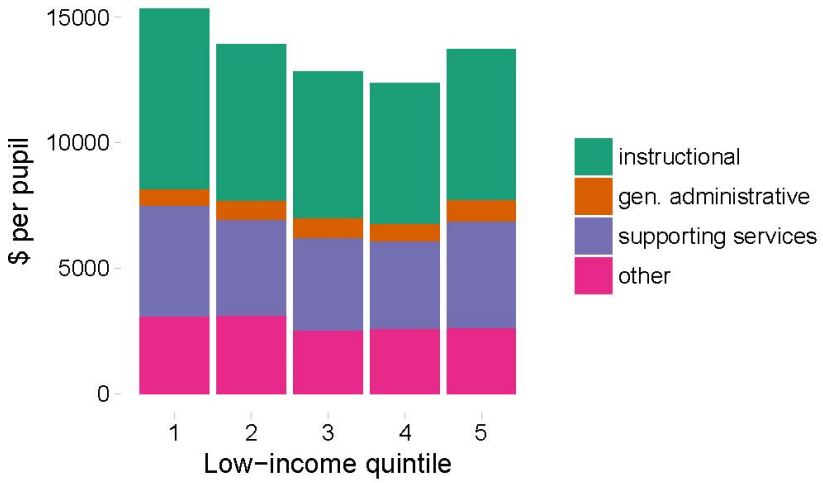

Figure 6: Average expenditures by low-income quintile, 2017

9 The standard deviation is 1.61, though the handful of districts with a rate higher than 9 could be considered as outliers.

districts with the lowest and highest rates of low-income students.

The major component of instructional expenditures is devoted to paying teachers. However, this component can vary both with the number of teachers per student and the overall rate at which teachers are paid. Figure 7, which depicts the relationship between average teacher salaries and class sizes, illustrates the relationship between proxy indicators of quality and quantity of teachers. In general, as average class sizes get larger, teachers tend to earn more. This is even true for high school districts, where class sizes tend to be larger and subject to less variation from district to district. However, as figure 8 shows, districts with more lower-income students and with lower shares of their property taxes coming from local sources also tend to have lower-paid teachers on average, though this relationship is subject to some variation.

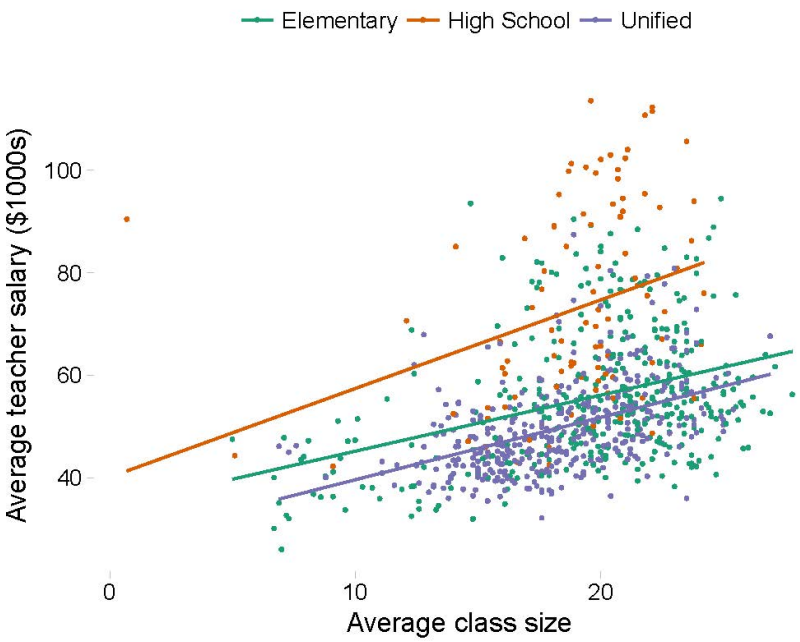

Figure 7: Average teacher salaries and class sizes, 2017

Taken as a whole, aggregate indicators are clearly *suggestive* of an association between economic disadvantage, resources, and test scores. Table 2 sorts each school district into five quintiles according to their percentage of low-income students, and provides averages for key indicators of financial resources and achievement levels. School districts with a high portion of low-income students have substantially lower proficiency levels than those with low portions of low-income students. Lower-income districts also tend to have lower levels of taxable property wealth, and despite higher rates of property taxation, low-income districts tend to rely to a lesser extent on property tax. Even with offsetting state payments, revenues and spending are, on average, about $2,000 lower per pupil in the lowest quintile than in the highest quintile, although there

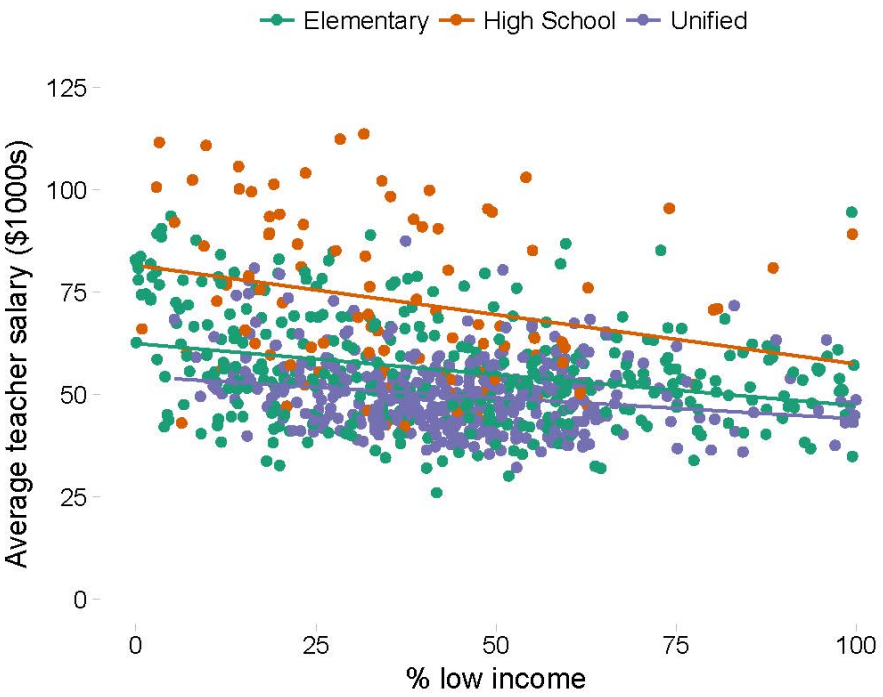

Figure 8: Average salaries and percentage low-income, 2017

Table 2: Average resource and proficiency indicators by low-income quintile, 2017

Quintile	1	2	3	4	5
low-income %	<18	18-35	35-50	50-67	>67
EAV	443,175	314,364	250,428	164,296	149,332
Tax rate	3.5	3.5	3.7	4.2	4.9
Instructional spend %	48	48	47	48	45
Total spending $	15,859	12,866	13,777	12,139	13,800
Local revenue %	81	73	62	52	43
Total revenue $	15,358	12,784	12,679	12,182	13,365
Average PARCC proficiency	58	46	35	27	20

Averages of key resources and outcome indicators by low-income quintile, 2017

is also substantial variation in revenue and funding levels within each quintile.[10] While the general pattern to this point is one that associates a community's wealth, its financial resources, and the outcomes of its students, the next section dives more deeply into the factors that drive this pattern.

HOW IS DISTRICT SPENDING RELATED TO ACADEMIC PERFORMANCE?

What is the effect of funding on indicators of achievement levels in school districts?

In order to examine the effect of spending on achievement, we model student proficiency levels as determined by standardized test scores as a function of spending and several control variables that could plausibly explain variation across districts. For our dependent variable, we adopt the broadest indicator of student achievement available in the Illinois Report Card data – the percentage of students who are proficient in English Language Arts and Math across all tests in the current year. This choice is primarily driven by the indicator's broad applicability, as it includes both high school and elementary school students, and by the fact that missing data was less likely to be an issue relative to other potential dependent variables.[11]

Table 3 summarizes the district-level variables that are used in the regression models. These variables are defined as follows, with an "expected sign" listed for each independent variable to indicate a hypothesized direction (+ or –) of its association with composite proficiency levels, the primary outcome of interest:

- *Proficiency* – The main dependent variables is the overall percentage of state test scores categorized as meeting or exceeding the PARCC expectations, SAT standards, or Dynamic Learning Maps Alternate Assessment (DLM) standards for the current school year. A secondary analysis is conducted on the percentage point gap in proficiency levels between students who are low-income and students who are not low-income.[12]

10 The coefficient of variation (the ratio of the standard deviation to the average) is about 37% for the first quintile (low low-income) and about 32% for the last quintile (high low-income).

11 For example, in examining changes to spending, it could be more plausible to assume that the effects would be greatest for elementary school students. Thus, test scores would be most comparable by examining the same tests for the same grades, e.g., grades 4 and 8. However, this choice would have tradeoffs in removing high schools and decreasing the number of observations.

12 The state of Illinois has indicated that it will phase out the PARCC test and devise a new test for academic year 2019-2020. It is expected that the new test will be normed so that longitudinal comparisons of performance will be possible.

- *Enrollment* – Total school district enrollment in the Fall of the school year (expected sign: + or –).
- *Instruction $* – Per pupil expenditures (in constant 2017 dollars) dealing with the teaching of pupils or interactions between teachers and pupils, regardless of the location or means of interaction (including activities or aides, assistance, graders, etc.) (expected sign: +).
- *Admin $* – Per pupil expenditures (in constant 2017 dollars) dealing with general administration (expected sign: +).
- *Supporting Services $* – Per pupil expenditures (in constant 2017 dollars) related to administrative, technical, and logistical support services to facilitate and enhance instruction (expected sign: +).
- *Other $* – Per pupil expenditures (in constant 2017 dollars) dealing with retiring the principal on bonds, other debts, community services, capital outlay, and non-programmed charges (expected sign: +).
- *LEP %* – The percentage of total enrollment eligible for bilingual education, reflecting limited English proficiency (expected sign: –).
- *Parental involvement %* – percentage of students whose parents or guardians have had personal contacts with teachers during the school year concerning the students' education (expected sign: +).
- *Mobility %* – The percentage of students moving in and out of the district, reflecting turnover during the school year (expected sign: –).
- *White %* – The percentage of students that are identified as white (expected sign: +).
- *Elementary* – A dummy variable, where a value of 1 indicates an elementary school district.[13]
- *High* – A dummy variable, where a value of 1 indicates a high school district.
- *Low income %* –The percentage of students who qualify to receive free or reduced-price meals; live in households receiving public

Table 3: Descriptive statistics for regression models

Statistic	N	Mean	St. Dev.	Min	Max
Proficiency %	5,106	49.476	22.474	3.400	99.100
Enrollment	5,136	1,927.669	3,229.727	33	40,687
Instruction $	5,111	6,140.044	1,768.911	3,094.672	19,035.190
Admin $	5,111	728.326	489.065	71.263	8,502.577
Supporting Services $	5,111	3,894.020	1,412.674	879.710	19,723.990
Other $	5,111	2,601.871	2,687.244	0.000	60,132.060
LEP %	5,136	4.276	7.748	0.000	58.800
Parental involvement %	5,136	84.018	32.277	0.700	100.000
Mobility %	4,752	10.551	7.611	0.000	82.800
White %	5,136	74.442	27.101	0.000	100.000
Low income %	5,136	42.839	22.044	0.000	100.000

Note: The unit of analysis is the district, and the data set includes six years. *N* is the total number of observations for each variable. Because not every variable is observed for every district in every year, the number of observations vary.

13 For both "elementary" and "high" dummy variables, a zero indicates a unified school district.

assistance (SNAP or TANF); or are classified as homeless, migrant, runaway, Head Start, or foster children (expected sign: –).

Table 4 summarizes a regression that pools data for every year from 2011-2012 to 2016-2017, giving a general interpretation of how each regressor is associated with test scores net of other factors. The regression also includes year dummies to address changes in the test scores and a district type dummy to address differences for elementary, high school, and unified districts. Overall, the pooled model explains 83 percent of the variation in test scores. For comparison, the table also includes data drawn solely from the 2016-2017 year, the most recent cross-section in the data set.

When controlling for other factors, expenditure appears to have a significant relationship with levels of proficiency. Specifically, per pupil spending on instruction and "other" expenses are positively associated with higher levels of proficiency. The pooled estimate (panel 2) suggests that an additional $1,000 of instructional expenditures per pupil is associated with a roughly 1.5 percentage point increase in the percentage of all students who met or exceeded expectations in ELA and Math, at all grade levels and regardless of the testing method. One standard deviation in instructional spending ($1,768.91) is associated with a 2.7 percent difference in proficiency levels. This positive relationship generally parallels the findings of recent studies that have concluded that money

Table 4: OLS models, 2017 and pooled 2012-2017, with full set of controls

	2017	2012-2017 pooled
	(1)	(2)
Constant	9.950(8.612)	77.748(1.302)***
Enrollment	0.00032(0.00011)***	0.00022(0.000044)***
Instruction $	0.0016(0.00026)***	0.0015(0.00011)***
Admin $	–0.0026(0.0007)***	–0.0018(0.0003)***
Supporting Services $	0.00041(0.00036)	–0.0001(0.00014)
Other $	0.00017(0.0001)*	0.000095(0.000048)**
LEP %	–0.0598(0.0536)	–0.011(0.023)
Parental Involvement %	0.264(0.082)***	0.130(0.033)***
Mobility %	–0.719(0.106)***	–0.196(0.024)***
White %	0.078(0.019)***	0.047(0.008)***
High	0.823(1.135)	–9.364(0.454)***
Elementary	6.024(0.765)***	4.396(0.327)***
Low income %	–0.332(0.022)***	–0.401(0.009)***
Year dummies	*No*	*Yes*
Observations	844	4,703
R^2	0.676	0.834

Note: ** p<0.1; ** p<0.05; *** p<0.01*
Standard errors are in parentheses

does in fact matter for education. While per pupil spending on supporting services also has a positive sign, the effect is much smaller. In contrast, general administrative expenditures have a negative sign. While it would be counter-intuitive to infer that more administrative spending harms student outcomes, these results simply indicate that districts that spend a higher portion of their total expenditures on administration relative to instruction tend to have lower levels of student performance.

With the exception of limited English proficiency, the remaining control variables were significant in the pooled model and perform as expected. Higher rates of mobility and low-income students have a negative effect on outcomes, while districts with higher rates of parental involvement tend to have higher scores. The positive coefficient on the "White %" variable indicates that districts with a higher portion of students of color tend to have lower composite proficiency scores, even after controlling for spending and low-income levels.

Caution should be used when interpreting the models presented in table 4. In addition to the possibility of endogeneity due to the sorting of students into districts, both models mask a potential for unobserved variables. To address this issue, we also present alternative versions of the same model by using fixed effects to account for unobserved characteristics at the district level. These models use a more restricted set of control variables for three reasons. First, a fixed effect model does not allow for the inclusion of variables that do not change, like a district's grade level type (elementary, high, or unified). Second, since many potential variables are missing, we use a more restricted set of controls to limit the degree to which the panel is unbalanced.

Table 5 summarizes the fixed-effect model results, which control for district and year fixed effects. This approach is both preferred over the pooled and cross-sectional approaches and expected to yield more conservative estimates by controlling for unmeasured characteristics of school districts. Table 5 includes pooled models solely for comparison; but the pooled models do not control for different proficiency levels observed for elementary, high school, and unified districts as in the pooled estimates reported in table 4. While these differences cannot be explicitly modeled in the fixed effect regressions, their effects should be swept into the district fixed effect terms.

Unlike a pooled or cross-sectional model, the fixed-effects regression approach examines changes over time in a manner that controls for unobserved characteristics of each district, which could include difficult-to-measure characteristics like administrative effectiveness, environmental factors, or district-level variation in household characteristics besides low income. The choice to use a simplified set of regressors was driven by minimizing issues associated with missing data. The results, again, show that instructional expenditures are significantly and positively associated with student proficiency levels. While controlling for fixed effects and other covariates (panel 3), a $1000 increase in instructional expenditures is associated with a 1.645 percentage point increase in aggregate levels of proficiency. Unlike in the pooled models, the effects of general administrative, supporting services, and other expenditures are not significant. The magnitude of the effect of the rate of low-income students greatly decreases in the fixed effect models, presumably because the fixed effect term captures other unobserved district characteristics that are correlated with low-income levels.

The finding that increasing spending by $1000 buys an additional 1.645 percentage points in proficiency levels may appear to be a small effect. Indeed, the variation in the degree of disadvantage across districts also drives much of the difference in observed proficiency levels. It is important to consider that proficiency levels apply most directly to the students at the margin between

Table 5 Fixed effects and pooled models

	Fixed effects (1)	Pooled (2)	Fixed effect (3)	Pooled (4)
Enrollment	−0.0024**	0.000069	−0.0022**	0.00022***
	(0.0011)	(0.000091)	(0.0011)	(0.000044)
Instruction $	0.0016***	0.0014***	0.0016***	0.0015***
	(0.00023)	(0.00024)	(0.00024)	(0.00011)
Admin $	−0.00029	−0.00087	−0.001	−0.0018***
	(0.0007)	(0.00063)	(0.0064)	(0.0003)
Supporting Services $	−0.000077	−0.002***	0.000024	−0.00011
	(0.00018)	(0.0003)	(0.00018)	(0.00014)
Other $	0.000055	−0.00023**	0.000062	0.000095**
	(0.000044)	(0.0001)	(0.000043)	(0.000048)
Low income %	−0.053 *	−0.488***	−0.034*	−0.401***
	(0.018)	(0.013)	(0.018)	(0.009)
LEP %			0.108	−0.011
			(0.101)	(0.023)
Parental involvement %			0.171***	0.130***
			(0.032)	(0.033)
Mobility %			−0.044*	−0.196***
			(0.025)	(0.024)
White %			−0.209***	0.047***
			(0.055)	(0.008)
Constant		68.702***		77.748***
		(1.262)		(1.302)
Observations	5,072	5,082	4,703	4,703
R^2	0.017	0.260	0.034	0.834

Note: ** p<0.1; ** p<0.05; *** p<0.01*
Standard errors are in parentheses

barely approaching expectations and just meeting them, and considerable variation also exists within each school district among both higher- and lower-achieving students. In addition, this composite indicator of proficiency is also closely associated with other, more specific student outcomes, which we have not analyzed as deeply since these indicators are less complete in all years of the dataset. For the most part, these indicators tend to be highly correlated, although these correlations are the highest among PARCC scores, which determine the largest component of aggregate proficiency levels. Figure 9 shows that a clear pattern of association exists between

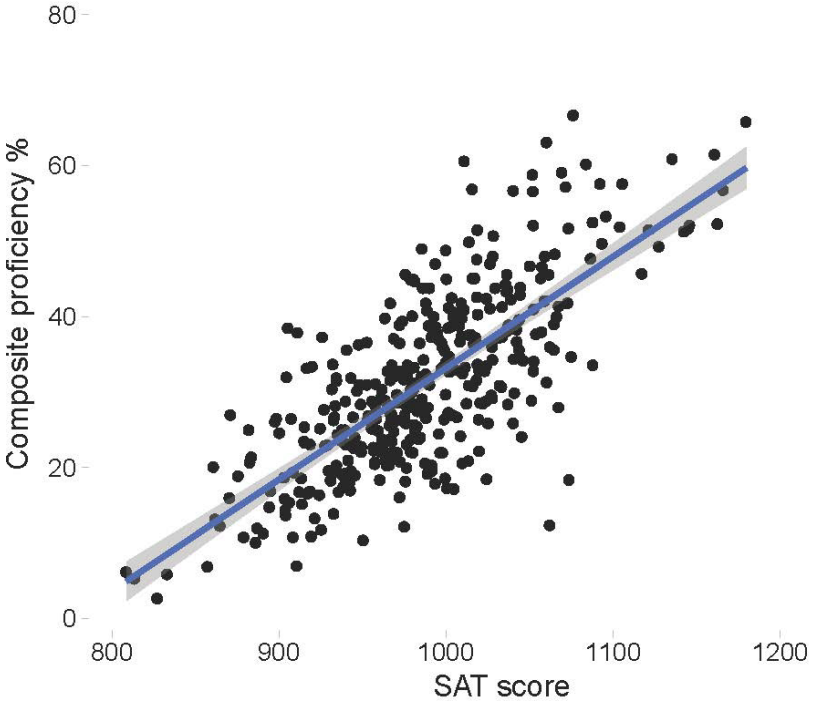

Figure 9: PARCC scores and SAT scores in unified school districts, 2017

PARCC scores, the primary means of determining proficiency among elementary school students, and SAT scores, which determine proficiency for high-school students in unified districts. However, there is some variation in the tightness of the association.

The composite indicator is also strongly correlated with test results for individual grades and with other non-tested student outcomes (e.g., drop-out rates), albeit to a lesser extent. These relationships are illustrated in the Appendix. A final consideration that could moderate the effect size of spending changes on our composite indicator is that spending changes could have different larger effects for some students. For example, one plausible possibility is that spending changes would have a more pronounced effect on younger, more impressionable children in lower grade levels, whereas measures of high school student achievement may be less sensitive to a change in resource levels.

The effect of spending on achievement gaps

Obviously, relative disadvantage not only shapes student achievement differences across districts but also affects achievement gaps within districts. Regardless of the income or spending characteristics of a given district, low-income students tend to exhibit lower levels of proficiency. Figure 10 illustrates this relationship by showing how the average percentage point gap in proficiency levels for ELA and Math scores for all students in 2017 varies depending on the percentage of low-income students within a district.[14] As a general pattern, the percentage-point achievement gap is smaller for districts with a higher percentage of low-income students. In other words, even students who are not low-income but who attend schools in districts with a high share of low-income students tend to exhibit lower levels of performance on average than students who are not low-income and who attend schools in districts with few low-income students.

Several potential factors may drive this relationship. On one hand, students who are not low-income in disadvantaged districts may tend to be *lower*-income (or more likely to experience other unmeasured forms of disadvantage) than students who are not low-income in wealthy districts. If the relationship between test scores and income is linear, this would be a major contributor to narrower performance gaps in low-

14 Aggregate proficiency levels are only provided in data for years 2014-2015 through 2016-2017. Although the "achievement gap" measure is not provided in the original data, its generation only requires a simple calculation, since the percentage of proficiency for "non-low-income" students may be derived from the percentage of low-income students within a district, the percentage of proficiency for low-income students, and the percentage of proficiency for all students.

income districts. On the other hand, if the major penalty for income-based disadvantage is non-linear or occurs around the threshold of low-income determination (in most cases, qualifying for free or reduced lunch), the relationship may be partly driven by an effect of resource gaps and concentrated disadvantage on students who are not themselves putatively disadvantaged. However, without examining student-level data, these underlying factors are, to this point, purely speculative.

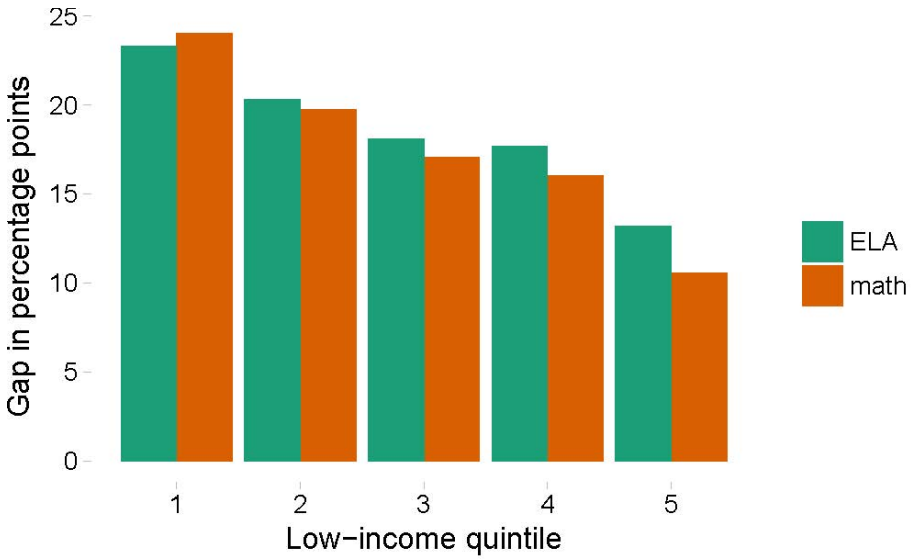

Figure 10: Average within-district gaps in proficiency levels between low-income and non-low-income students by low-income quantile, 2017

While they are beyond the scope of this report, this pattern points to areas for future analysis. First, the smaller gap suggests that lower-income, lower-resourced districts may leave behind even students with higher family resources. Second, even within middle- and higher-income districts, resources may be failing to meet the needs of low-income and other disadvantaged students within their schools. High-income students do better in high-income districts, but enrollment in a high-income district is not alone sufficient to close the proficiency gap for low-income students.

IMPLICATIONS

This analysis is not without limitations. With the complexity of questions surrounding school financing and outcomes and the availability of data for answering them, estimation strategies vary considerably. Since the characteristics of particular school districts are shaped by political processes at the state and local levels and through the equally complex mechanism of residential housing market sorting, local taxation policies are not isolated from other underlying sources of advantage that are highly correlated with school achievement. In other words, school finances and aggregate academic performance are likely to act as both cause and effect of the composition of school districts. Such endogeneity issues are common in research linking disadvantage, school financing research, and outcomes. However, using multiple years of data, our findings are generally consistent with previous studies. Resources – and specifically, *local* money and instructional expenditures – matter for schools in Illinois.

Despite these challenges, this study has illustrated how the capacity to generate resources varies highly across school districts and likely impacts student outcomes. Property value contributes greatly to local revenue sources and by extension to the amount of money available for instruction and other categories of expenditures. Symptoms of this variation leave school districts with difficult tradeoffs between paying for high-quality teachers and maintaining small class sizes. In general, lower income districts tend to have lower instructional spending, lower paid teachers, and lower achievement levels. Some districts with very low property values per student have among the highest tax rates. Although there remains considerable variation, this illustrates the trap

faced by schools that are fiscally dependent on the property tax mechanism.

Every state provides funding to local school districts as a means to equalize the fiscal disparities associated with strict property tax dependence. In Illinois, the portion of revenue from state sources is exceptionally low. The state's recent commitment to expand funding to disadvantaged school districts is a welcome step. However, it is likely that the majority of school districts will remain dependent on local revenues.

Funding for public education varies widely across the state, and this variation likely contributes to disparities in student outcomes. This report's finding that Illinois exhibits dramatic disparities in funding for public education is not a new one. While the mix of state and local funding varies from state to state, many states partially level off these disparities with higher contributions of state funding. Illinois, however, contains an unusually large number of school districts, widely ranging levels of property wealth available for taxation, and historically limited support from state level revenues to ensure an equitable distribution of resources. As a result, local revenue sources determine funding and expenditure disparities in Illinois to a relatively extreme extent. These findings suggest that a child's exposure to quality schooling environments, high-quality teachers and appropriate class sizes, adequate resources, and all of the opportunities that they entail is largely dictated simply by where that child happens to live. Suffice it to say, recent state-level reforms to create a more equitable, evidence-based funding formula should work to reduce resource disparities. A patient approach to monitoring its effect on school financing and student outcomes should proceed any proposal to restructure local public finance that could have unforeseen, potentially chaotic interactions with the new formula or its effects.

Higher per-pupil instructional spending is associated with improvements in student outcomes at the district level. Echoing the findings of previous studies, we find a clear association between local revenue and factors that affect the quality of public education, such as the degree of per pupil spending, the concentration of economic disadvantage, and experienced, well-paid teachers. After controlling for other relevant factors, both observed and unobserved, our models suggest that higher levels of local instruction spending also appear to contribute modestly but consistently to higher composite levels of academic achievement. To put this finding in the simplest terms, money does in fact matter to Illinois school districts. This finding resembles those of several of the most prominent recent national and state-level studies and lends a cautious optimism to recent Illinois school finance reforms. However, it also illustrates a difficult tradeoff. In many Illinois communities, large portions of which are already struggling economically, property taxes present a difficult burden. Yet without other means to generate revenue, schools are bound to under-perform. Over time, this situation could deteriorate further as property values fail to capitalize the value of quality education and as large segments of the next generation of workers emerge from primary and secondary education under-skilled for the workplace and under-prepared for college. In 2016 only 38% of Illinois high school graduates scored as "college ready" (Advance Illinois, 2016). This figure was the same proportion as in 2012. Despite the complexities of these problems, addressing widespread dependence on property taxes should not come at the cost of limiting resources for education.

Recommendations

Hitching educational outcomes to locally generated funding is not an optimal scenario for ensuring that all children have access to high-quality public education or for mitigating the generational and geographical dimensions of

disadvantage. Determining the best strategy for ameliorating these issues depends on how the problem is approached. In one view, high property taxes burden communities with the cost of maintaining public education. If one believes that money matters little for education, he or she is not likely to see much benefit in high taxes. A different view is to frame the underlying problem as the inequitable distribution of resources for public education and its correlation with other patterns of socio-economic disadvantage. From this perspective, the best remediation involves alternative funding mechanisms to ensure the adequacy of resources for all school districts. Short of a radical infusion of state funding to offset the unevenness of local capacity to generate revenue through property taxes, reducing the capacity of local governments to generate such revenues is more likely to exacerbate the problem than to fix it. The preceding analysis instead favors the following general recommendations.

Ensure that the mix of state and local sources provides adequate funding for all school districts. Recent reforms to the evidence-based model funding formula are designed to create a more equitable structure for funding public school in Illinois. With the relatively high degree of regressivity that characterizes Illinois' public education funding, this is a much-needed step. This development should be monitored and analyzed in a manner that accounts for the complexity of the relationship between school finances and student outcomes.[15]

Restricting revenue does not equate to revenue parity. Restricting the ability of school districts to generate revenue is likely to lead to uneven reductions in instructional and supporting services expenditures and suboptimal tradeoffs between class sizes and high-quality teachers, among other difficult decisions by school administrators and their boards. Such restrictions are most likely to impact middle-income districts with a decent share of low-income students and modest levels of taxable property wealth. These districts do not generally qualify for higher levels of non-local revenue, as in extremely low-income districts, or generate ample local revenue with modest tax rates as in high-income districts.

Increasing spending can help students, but such increases should be designed in ways to close the achievement gap within as well as across districts. Our evidence suggests that – both within and across school districts – low-income levels are a significant determinant of achievement levels and of responsiveness to different kinds of spending. Revenue and spending models should be designed with the objective of reducing the penalty of socio-economic disadvantage at all levels. Districts typically attempt to equalize local revenue resources across schools regardless of the subgroup composition of students. However, schools with a high percentage of free-and-reduced or LEP students (e.g., Title I schools) would likely benefit from additional spending. The school-level budgeting reports required under ESSA provide incentives for districts to assess how specific expenditures are impacting student well being. Targeting instructional spending on the students who need the most help in order to prevent a possible "creaming" effect would be the best way to maximize additional funding. In other words, closing the performance-gap may require more than more money.

Conclusion

The complex interaction of family incomes, spatial housing choices, property taxes, equalized assessed value, school district levies and student academic outcomes presents an intricate story of how Illinois meets its Constitutional obligation to every school child. It's not a narrative that easily

[15] It is important to note that while the EBF law anticipates additional spending in instructional areas, nothing in the act prevents school districts from applying the new state dollars as it sees fit.

lends itself to statistical correlations. The impact of much, if not most of what educators do cannot be definitively quantified. The number of variables that may confound any association between a classroom or school-level practice and student test scores are numerous. Additionally, the mechanics of how inequality happens within well-to-poorly resourced districts based on family income, race, language proficiency and disability needs to be further untangled.

Tests scores moreover are the low-hanging fruit of outcomes. Political leaders, state superintendents, local school boards and parents rightfully demand feedback on student learning. Standardized tests are convenient tools because they can reduce learning to a proficiency or growth score. They also enable students to be numerically compared and ranked. Nonetheless, as even critics of standardized tests have noted, tests have their place. They can help teachers identify the progress students are making toward mastering a rigorous academic standard. However, the personal capacities that parents wish for their children's development, like curiosity, creativity, tenacity, willingness to take risks, problem solving skills, ability to work in groups, adaptability, self-restraint, motivation, strong interpersonal skills, kindness, and empathy are not reducible to a percentile grade (Dintersmith, 2018). A large body of research has found that "noncognitive" skills not captured by standardized tests, are key determinants of adult outcomes (Jackson, 2016).

School districts are spending tax dollars to help children grow into their best future-self. By any level of analysis, money matters. Our report finds that increases in per-pupil instructional spending are associated with improvements in student outcomes at the district level. Therefore, efforts to reduce or cap spending because of Illinois' past regressive approach to funding education before finding alternative revenue sources is highly likely to produce negative outcomes for school children. Nonetheless, what we can find evidence of is limited by what the data allow us to measure. Whether nationally normed test scores are the outcomes we should be measuring the impact of expenditures on behalf of our children against, remains a decidedly open question.

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APPENDIX

Additional description of the regression modeling approach

This analysis uses a panel data set that combines multiple cross sections of Illinois Report Card records at the school district level. This choice presents several distinct advantages as well as challenges. In this instance, the Illinois Report Card provides an incredibly rich source of information, and this report only scratches the surface of the variation that exists across the state's schools and school districts. However, the Illinois Report Card's format exhibits slight changes from year to year during the period of study, and the level of completeness also varies across districts and within individual districts over time. The primary outcome of these limitations is that our panel was unbalanced in the actual regression models (i.e., not every district is observed for every year), and some variables of interest (e.g., teacher salaries and class sizes) were removed from the models because their tendency to be missing exacerbated the degree to which the panel was unbalanced.

The use of panel models also necessitate that various choices must be made on the basis of the appropriateness of different alternatives, e.g., choosing between fixed and random effect estimators or the validity of simpler pooled models. As described in the body of the report, we deemed a fixed effect approach to be most appropriate, though we also presented results from pooled and cross-sectional models.

Several robustness and diagnostic tests were run on the versions of the regression models presented in the main body of the report. Some of the most important are the following:

- The results of an F test comparing the two-way fixed effect and pooling model confirms the preference for the fixed effect model.
- A Hausman test was used to compare fixed effect and random effect estimators, using the basic set of expenditures, low income percentage, and total enrollment as predictors for proficiency levels. This test rejected the null hypothesis, which indicates a preference for the fixed effect model.
- A test for serial correlation in panel models indicated the presence of serial autocorrelation in the error terms. A procedure for estimating a robust covariance matrix with panel models yielded slightly increased standard errors and decreased p-values, but did not substantively alter the interpretations of the original models. For the sake of simplicity, non-robust standard errors and significance levels are reported above.

One of the many reasons that school funding presents a difficult empirical question is the potential for endogeneity arising from the fact that, in education, the causal arrow between financial resources and measures of student outcomes can go both ways. In other words, does high performance generate greater access to financial resources, or does more money foster conditions for higher performing school districts? In a sense, students "self-select" themselves into school districts, since families might make housing decisions based on the quality of schools and might pay more for better schools, either by paying higher property values or by accepting higher tax rates. Other students might in effect sort themselves out of high performing school districts if limited family resources confine them to residential locations that have lower property values and thus less access to generating resources through the property tax mechanism. For this reason, some analysts rely on instrumental variables to address endogeneity issues. Unfortunately, we were unable to identify suitable instruments for this report.

Additional Outcomes

Figure 11 illustrates the relationship between aggregate proficiency levels and ELA and math proficiency levels in the PARCC test for grades 4 and 8 in 2017. These measures suggest that the composite proficiency indicator used in the regressions generally captures much of the year-to-year variation that might be analyzed, for example, by adopting a narrower, grade- or cohort-specific measure as the dependent variable. Figure 12 shows similar relationships between the dependent variable and other high school outcome indicators: four-year graduation rates, college enrollment within 16 months of graduation, freshmen on track, eighth-grade rates of passing algebra I, readiness for college coursework, and SAT proficiency levels. Because these outcomes – with the exception of SAT proficiency – are not captured in the dependent variable, they display more varied relationships with composite proficiency levels. However, a pattern of positive association remains evident for each outcome.

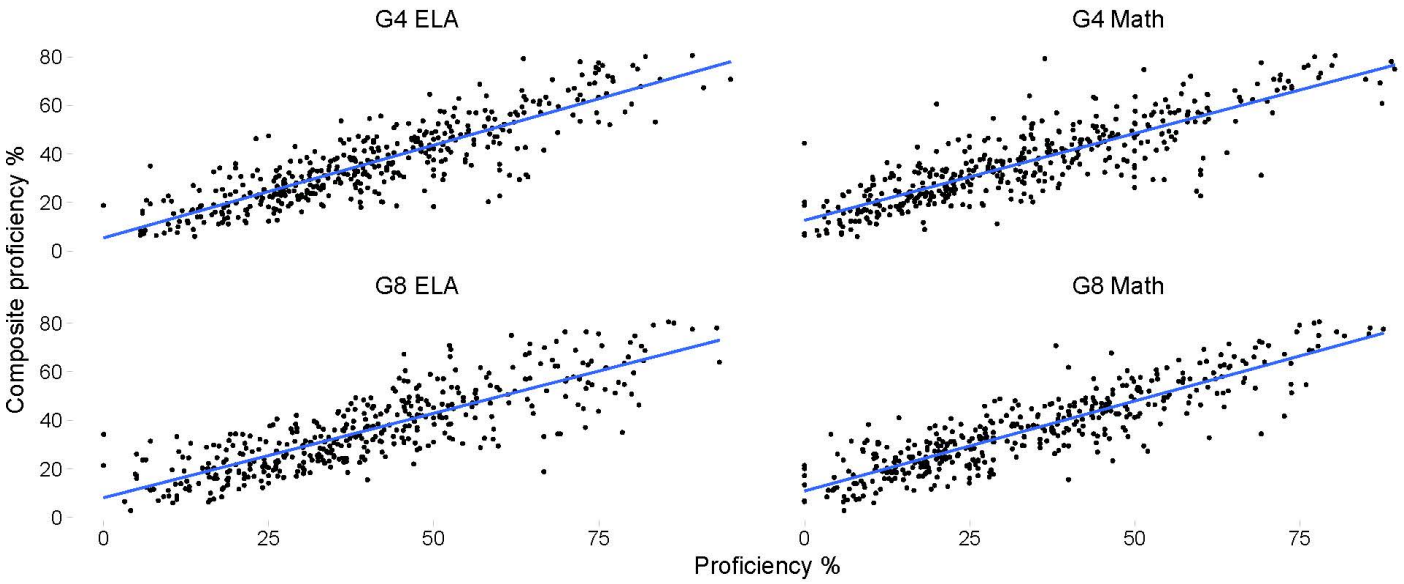

Figure 11: Composite proficiency levels and selected grade school PARCC scores

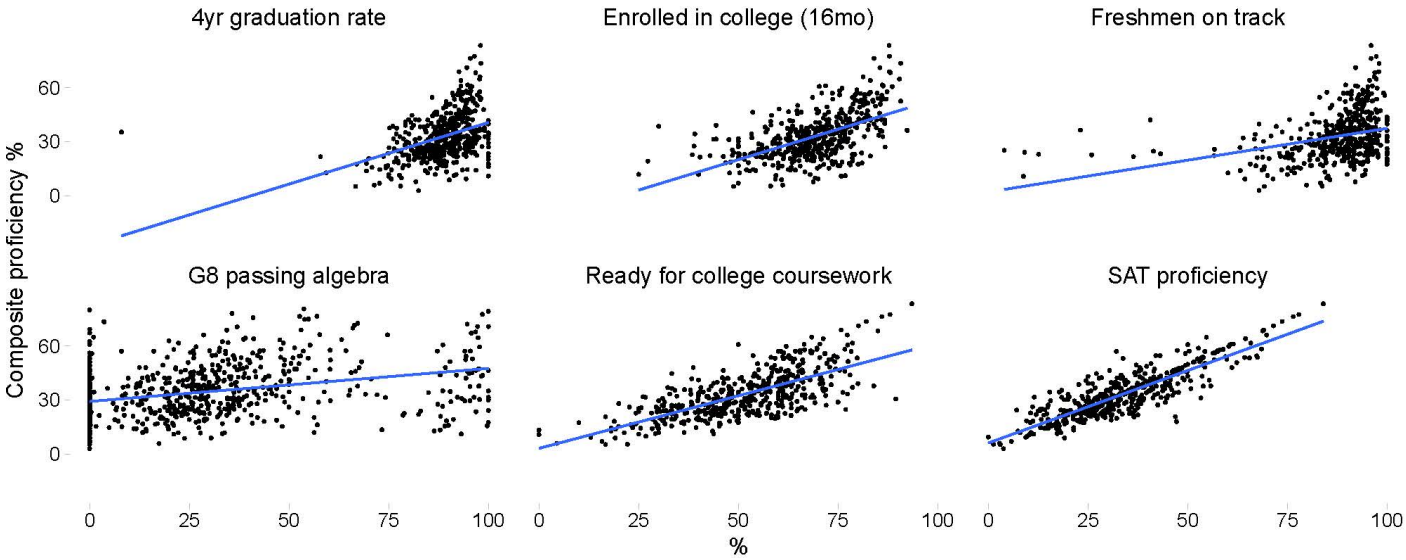

Figure 12: Composite proficiency levels and selected high school outcomes