Socioeconomic Disparities in School Resources: New Evidence from Within-Districts

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Abstract

Prior work on school resources has focused on disparities across school districts due to data availability; school-level resource measures have not been collected at a national level until very recently. In this study, we document socioeconomic disparities in three chief resources in K12 education – instructional spending, experienced teachers, and facility quality – using administrative and survey data from all districts and schools the State of Texas. Findings reveal that the host of equalization measures in place result in poor students experiencing greater levels of instructional spending than non-poor students across the state. However, large gaps in teacher experience and facility quality remain even among students in the same school district. Furthermore, within-district economic segregation magnifies these patterns. Thus, state-level equalization schemes may not be sufficient to narrow socioeconomic gaps if large within-district disparities continue to exist.

Key words: School funding; School facilities; School finance

I. Introduction

Large gaps in educational achievement and attainment have long existed between children from poor and non-poor families. For instance, test scores are lower for poor students and high school graduation and Bachelors' degree attainment rates are much higher for families from the top quintile of income distribution than those from the bottom (Bailey and Dynarski, 2011). Part of the explanation for this historically could be the large disparities in school resources and quality experienced by poorer students, particularly as it relates to racial differences (Coleman, 1966).

Faced with these inequalities in outcomes and resources, much of the policy response has been to equalize spending differences across school districts. Public schools in the U.S. are largely funded locally, so large differences in income and wealth (particularly property wealth) across districts will lead to large differences in school funding across districts. School finance reforms initiated by courts and legislatures in many states closed cross-district disparities and improved achievement and attainment of poor students (Card and Payne, 2002; Jackson, Johnson and Persico, 2016; LaFortune Rothstein Schanzenbach, 2016; Hyman, 2016). In the typical state today, school equalization systems have made it so that states and local districts both contribute substantially to funding for K12 schools. Though most states target additional funding to poorer districts, states vary in how progressive the resulting funding allocation ultimately is. Chingos (2017) found that poor students attend schools in districts with 2.5% more funding (from all sources), but states with very progressive school funding are rare. Furthermore, there are very large differences in funding levels across states (Baker et al, 2017).

Despite the spending equalization, large achievement gaps still persist. One explanation is that most of these reforms have focused on addressing disparities *across* school districts, but say nothing about how resources are allocated within districts. As a consequence, district-level reforms can only go so far in closing achievement gaps across students. For instance, the school finance reforms studied by LaFortune Rothstein Schanzenbach (2016) narrowed achievement gaps between high- and low-income school districts, but "did not have detectable effects on resource or achievement gaps between high- and low-income (or white and black) students." They concluded that district-level school finance reforms are not well-targeted because low-income students are dispersed across districts of different income levels and such reforms do not necessarily alter the allocation of resources within school districts. Furthermore, many other dimensions of school resources – effective teacher or facility quality, for instance – are not typically targeted by school finance reforms or equalization schemes.

Unfortunately, little is known about how districts allocate resources across schools and whether this magnifies or mitigates cross-district spending patterns. This paper helps fill this gap. Prior work that has examined allocations within-districts typically looks at single resource measure, a small number of districts, or a single point in time. A major barrier to within-district analysis has been a lack of systematic data on spending and other resources by schools over time. In this study, we use administrative data on spending by school for all districts in Texas since 1994. Furthermore, we augment this with measures of teacher experience and school facility quality that let us look at multiple resources simultaneously.

We present results in four parts. First, across the whole state, poor students are at schools that have higher levels of instructional spending, but less experienced teachers and older buildings in worse condition. This broad pattern is true for elementary and secondary schools and holds even after controlling for neighborhood poverty and whether students fall into categories associated with specific funding (limited English, special education, gifted/talented, vocational/CTE). These patterns generally have remained stable over time. The implication is that school finance reforms have equalized spending differences, but not so for other potentially important resources such as experienced teachers and facilities.

Second, we note that the above pattern also holds when we look within districts by including district-specific fixed effects. We use this as a jumping off point to document and investigate district-specific resource disparities for districts over time. While the modal poor student is in a district that is modestly progressive with regards to spending, there is wide variation across districts. In 2009, we estimate that 61% of districts had progressive funding for elementary schools, up from about half a decade earlier. Only 41% and 33% were progressive for average teacher experience and facility age, respectively. Third, we examine the correlates of within-district resource allocation. We find that both economic and racial segregation are positively correlated with the extent of progressive within-district funding, but that greater economic segregation is associated with a more regressive allocation of experienced teachers and new school facilities.

Finally, we conclude by putting our Texas results in context with other states using recent data from the Rutgers School Funding Fairness Data System and the Urban Institute. School-level staffing data from 2011 shows national patterns that mirror ours, with most states having progressive within-district spending but regressive teacher allocation. A comparison with Urban Institute data suggests that spending progressivity has a higher correlation with economic segregation at a state-level than it does at a district level within Texas: the dissimilarity index explains twice as much of the state-level variation in funding progressivity as it does at the district-level in Texas. Based on these findings, we conclude that state-level equalization schemes may not be sufficient to narrow socioeconomic gaps if large within-district disparities continue to exist in many districts and for important dimensions of school resources.

This paper proceeds as follows. The next section provides background about school finance in the U.S. and Texas specifically, along with a discussion of prior evidence on resource disparities. We then discuss our data sources. Texas is unique in tracking and publishing school-level spending data, so we also discuss the reliability of this data. Results on state-wide and district-specific resource disparities are presented in Sections IV and V, respectively. In Section VI we place our results into the national context using alternative data. Finally, Section VII concludes with a discussion of the implications and priorities for future work, especially in light of the novel school-level spending data that will become available under the ESSA

II. Background

A. Funding for Public Schools in the U.S. and Texas

Currently, the federal government provides just under 10% of total national funding while state and local governments split the remaining costs about equally (Chingos & Blagg, 2017). The largest component of federal spending is from Title I of the Elementary and Secondary Education Act of 1965 (Spatig-Amerikaner, 2012). Districts serving high proportions at-risk students receive Title I funds directly and are expected to allocate these dollars towards high-need schools in manners that "supplement not supplant" non-federal expenditure. Further, the program aims to promote equitable school funding by requiring comparable funding between Title I and non-Title I schools across all recipient districts.

Texas has a complex school finance system, the Foundation School Program (FSP), that aims to ensure that all districts (regardless of wealth) receive "substantially equal access to similar revenue per student at similar tax effort, considering all state and local tax revenues of districts after acknowledging all legitimate student and district cost differences." (Texas Education Agency, 2013). Though local property taxes account for roughly half of FSP funds, state formulas determine the entirety of district revenues through several different programs. [1] Tier I allocates basic district funding from the state, which is adjusted by several multipliers related to district tax rates, cost of education, district size, and student characteristics.[2] Tier II gives districts access to enrichment funds (which supplements Tier I funding) through additional taxation above their base (referred to as "compressed") tax rate. FSP caps this maximum rate and provides a guaranteed yield of revenue per penny of taxation. Tier III provides debt relief to supplement districts' facilities funding, which has experienced a six-fold increase in the last couple decades. (Texas Public Policy Foundation, 2016). Note that Tier I is roughly seven times larger than Tiers II and III combined (Smith, 2017).

Despite this system, resource disparities could still persist both between and within Texas districts for several reasons. First, FSP's determination of district adequacy may be insufficient, as education cost indices are not updated regularly and premiums for small districts may overcompensate diseconomies of scale (Smith, 2017). Second, districts exercise large discretion in allocating funds for specialized instruction across schools. Rather than following FSP's programmatic weights, most districts tend to allocate resources according to school academic needs (Barney, Hansen, Ikemoto, & Marsh, 2007) or allocate school staff according to staffing ratios across school programs, ignoring teacher salaries (Smith, 2017). This allows for systemic spending discrepancies within a district to the degree that the district's schools inequitably recruit and retain tenured, higher paid teachers. Houston ISD, the largest in the state, is a rare

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[1] We summarize here the key elements of the system as they relate to the current study. More exhaustive overviews of the system can be found in TTARA (2012), Texas Public Policy Foundation (2016), and Texas Education Agency (2013).

[2] First, this allotment is lowered for districts with small compressed tax rates. Second, it is increased according to a cost of education index and set of multipliers for small districts. Finally, FSP adjusts per-pupil allotments for students in specialized instructional programs with the following multipliers: Compensatory Education (1.2X), Special Education (1.1-5X), Bilingual Education (1.1X), Career and Technical Education (1.35X), Gifted and Talented Education (1.12X). High schools also generate a premium of $275 per student in district allotment.

exception in that it operates on a decentralized, weighted student funding system. Houston allocates programmatic instructional funds to schools based on student counts and program multipliers similarly to FSP. By allocating funds as opposed to staff, Houston principals are given more discretion as to how their schools budget their money.

B. Prior Evidence of Resource Disparities

Considerable research is devoted to measuring the "progressivity" of school funding, or the degree to which local, state, and federal funding formulas address student need. Chingos and Blagg (2017) report that local funding is regressive in nearly every US state, but that state and federal funding offset this to yield net progressive funding in all but three states. On average, states fund poor students slightly more than non-poor, a relationship that has changed little over the last two decades. Texas is the 13th least progressive state in the nation and the 10th lowest funded overall. The state funds non-poor students marginally more than poor students, though poor students ultimately receive slightly higher district-level funding via federal spending. Baker and Welner (2010) find a positive but declining association between per-pupil expenditure and median district income in the US over the period 1990-2005, excluding federal expenditure. Furthermore, Liu, Wiener, Pristoop, and Roza (2006) find that funding gaps between states are larger than within states with a gap as large as 50% between the top and bottom funded states

Most closely related to this paper is recent work documenting within-district resource disparities using national and district-specific data. Such within-district variation can be considerable (Spatig-Amerikaner, 2012; Guin, Gross, Deburgomaster, & Roza, 2007), but has received scant attention relative to across-state and across-district variation. In a recent national report, Heuer & Stullich (2011) find that one-third of higher-poverty schools had lower expenditure than low-poverty schools within the same district. Using new national school-level data on personnel expenditures, Shores and Ejdemyr (2017) find that poor students attend schools with slightly more resources (1%) than non-poor students in the same district, though a large minority of districts tend to underallocate resources to poorer students. Furthermore, districts with greater income segregation are more likely to allocate resources progressively. Baker (2009) examines progressivity across four large Texas districts. These districts vary in degrees of progressivity: Dallas is the least progressive, frequently funding low-need schools above projected costs and high-need schools below. Houston and Austin, by contrast, are more equitable. This variation across districts motivates an analysis that examines a large number of diverse districts. Baker (2012) finds that metropolitan areas surrounding the large districts of Austin, Dallas, Houston, Fort Worth, and San Antonio tend to be more progressive. What correlates with school-level resources? Ajwad (2006) finds that Texas schools with higher neighborhood income, education levels, special education and gifted and talented students, and black students receive more funding.

Earlier research also suggests that even progressive funding may not translate to equitable access to experienced teachers: within districts, poorer students tend to be at schools with more novice and fewer experienced teachers (Lankford, Loeb, and Wyckoff, 2002; Clotfelter, Ladd, and Vigdor, 2005; Rubenstein, Schwartz, Stiefel, & Amor, 2007). This is problematic since teacher quality is widely considered the school input that most determines student success and experience is a key correlate of teacher quality (Rockoff, 2004).

C. Our contribution

We contribute to this literature in numerous ways. Our main contribution is to use novel school-level resource measures to examine within-district resource allocation patterns. Few studies look within districts and most that do are not able to simultaneously examine patterns across districts.

Second, we examine multiple and diverse districts. Prior work has focused on urban and very large districts. Third, we examine three measures of resources simultaneously, including school facility quality. Most studies look only at spending or teachers and almost no studies examine school facilities. Fourth, we examine patterns over time (rather than just a cross-section), so we can assess how these patterns are evolving over time. The most comprehensive within-district analysis (e.g. Shores & Ejdemyr, 2017) has not been able to look at patterns over time. Finally, we examine correlates of within-district allocation practices, with a focus on district economic and racial segregation. Our panel data permits us to isolate the contribution of segregation netting out fixed differences across districts which may confound cross-sectional approaches.

While we do not directly test the consequences of these patterns for student outcomes, our study informs causal work that examines resource disparities (and the closing of these). Though early observational research found minimal effect of school expenditure (Hanushek 1986), later quasi-experimental studies report significant student gains associated with reforms that equalize spending between districts (Jackson, Johnson, and Persico, 2015; Hyman 2016; Lafortune, Rothstein, and Schanzenbach, 2016). Other studies consider the returns to capital inputs in education (Martorell, McFarlin, & Stange 2016; Cellini, Ferreira, & Rothstein, 2010; Neilson & Zimmerman, 2011; Hong and Zimmer, 2016; LaFortune, 2017). The extent of across- and within-district disparities in these multiple resource dimensions establishes how much opportunity for improvement remains.

III. Data and Sample

A. Data Sources and Measures

We combine several data sources to construct a panel dataset of all Texas public schools from 1994 to 2010. The Academic Excellence Indicator System (AEIS) from the Texas Education Agency forms the backbone for our dataset. For each separate campus in the state, AEIS contains spending per student by category (total operating, instructional, bilingual, gifted, spec education, vocational/CTE), grade span, enrollment (total, economically disadvantaged, by race, gifted, spec education, limited English proficient), and teacher counts by experience. Our indicator of "poor" is economically disadvantaged, which is primarily an indicator for eligibility for free or reduced-price lunch. We measure access to experienced teachers by average experience of teachers in the school, fraction of teachers that are new, and fraction that have 1-5 years of experience.

Measures of facility conditions are not systematically collected. We assemble measures of facility conditions at three time periods: 1991, 2006, and approximately 2015 from various sources. For 1991, we obtained and digitized a census of all school facilities in the state that contains information on the condition of each room, square footage, year built, condition of grounds, lighting, electrical, heating/cooling, labs, and computers. This is the most comprehensive source for school facility conditions in the state, though it is only available for this single year. For 2006, we obtained a facility survey of 300 districts including 3000 schools, which account for about half of the state's student population. This survey contains overall building condition (Poor, Fair, Good, Excellent), number of portables, square footage, capacity, year built, last renovation, and deferred maintenance per square foot. We use several of these directly, and also construct an index of the predicted likelihood of being in good condition as function of age, time since renovation, and deferred maintenance per square foot. Finally, for more recent years we assembled facility inventory and conditions assessment for 11 large districts containing 642 schools, which primarily measures deferred maintenance per square foot. In addition to these three years, we construct the age of each campus in each year based on the 1991 Census data (which provides the year of construction) and information on when new schools opened from the AEIS. Facility age is thus available for all campuses and years from 1994 onwards.

Lastly, we assemble socioeconomic characteristics for the census block group where each school is located from American Community Survey. The characteristic we primarily use is the fraction of residents in the census block group that are in poverty.

B. Sample

For cross-sectional analysis, we focus on elementary and high schools in 2006. We restrict our analysis to schools in the 302 districts that participated in the 2006 facilities survey. This ensures a consistent sample across different resource measures. Participating districts are quite similar to non-participating districts and results are similar if we include the full universe of schools instead of this restricted sample. We exclude districts with a single school of given type (and therefore no disparities across students). Our final cross-sectional analysis sample includes students in 1806 elementary schools and 301 high schools (sample is slightly smaller for facility condition variables due to missing data). To examine changes over time, we apply the same restricts to campuses in 1994 and 2010, resulting in 1528 and 1939 elementary schools in those two years, respectively. Our analysis of district-specific progressivity estimates uses a broader sample and all years, as we describe later.

Figure 1 depicts the distribution of school resources in the state across our sample, separately for elementary schools (Panel A) and high schools (Panel B). There is wide variation across schools on all three measures. The central questions of this paper is whether this variation is distributed equitably across schools that serve many versus few poor students, how this differs across districts, how these patterns have changed over time, and whether district allocation practices are correlated with socioeconomic and racial segregation.

C. School-level spending data quality

An important consideration is the quality of school-level spending information. Atchison et al. (2017) discusses implications for our usage of school-reported AEIS data. This study examines nine sites including four states and five school districts that use central systems to track school expenditures relying on school-uploaded data. By cross-checking these data systems with external sources, the paper attempts to quantify the comprehensiveness and consistency of expenditure data reported by school staff. This study reports that 77% of all operating expenditures were attributed to schools, ranging from 69% to 89% across studied sites. This value varied considerably based on expenditure category, with schools attributing personnel expenditures to schools more than non-personnel expenditures. Personnel expenditures were also more reliable across schools when compared to external data sources. The authors conclude that the nature of this discrepancy lies in difficulties associated with implementing expenditure tracking in schools. Studied sites listed standardization of reporting practices as a leading issue. This makes resources shared among schools or contracted-out at the district level such as support staff and transportation especially difficult to track symmetrically across sites. The low-stakes nature of the data and complications involving training school staff to upload the data are further sources of error.

This paper further addresses limitations in our dataset as it studies both Texas and Houston ISD as individual sites. On the matter of comprehensiveness of expenditure attribution, these sites fare at an average level within the nine-site sample. Texas and Houston attribute 77%

and 74% of operating expenditures, 85% and 78% of personnel expenditures, and 48% and 63% of non-personnel expenditures, respectively. Further, both sites demonstrated a high degree of consistency in salary data with external data sources. There was less consistency in non-personnel expenditures, but this was true across all nine sites. Finally, this study brings up an important data precaution regarding consistency in salary expenditures. While the difference in personnel salary between site-provided and state personnel database is 9% statewide in Texas, this value rises to 16% in Houston. In sum, this study instills a degree of confidence in our usage of AEIS data to accurately measure disparities in personnel expenditure across Texas districts and schools. However, we exercise caution in using AEIS data to analyze non-personnel expenditure overall.

IV. State-wide Estimates of Resource Progressivity

We document disparities in school resources using both graphical and regression-based approaches. While the graphical analysis is quite flexible, showing differences in the entire distribution of resources experienced by poor and non-poor students, the regression-based analysis is provides summary measures of progressivity and also is able to control for more confounders. In both approaches, we focus on a single cross-section that lies in the middle of our sample, the year 2006. We later show how regression-based results change over our sample period. We also compute separate estimates for elementary and high school students.

A. Graphical evidence

In our graphical analysis, we ask "How does the distribution of school-level resources differ between poor and non-poor students?" To quantify this distributional difference, we first compute the cumulative distribution function of instructional spending per student separately for poor and non-poor students throughout the state. This is done by weighting school-level spending by the number of poor and non-poor students at each school, respectively. Figure 2 shows the CDF of spending per student at elementary schools for all students, and separately for poor and nonpoor students. The horizontal difference reflects the difference in spending between the two groups at a given percentile. For instance, the median poor student is at a school with about $300 more instructional spending than the median nonpoor student. We instead focus on the vertical difference, which measures the difference in the fraction of students at schools with spending below a certain level.

Figure 3 plots this vertical difference for both elementary school students (Panel A) and high school students (Panel B). As measured by instructional spending, poor students are at better resourced schools throughout the distribution. Poor students are 16 percentage points more likely to be at an elementary school with at least $4500 of spending than non-poor students. Poor students and non-poor students are equally likely to be at a school with $7000 or more of spending, mostly because very few schools have that level of spending. For high schools, the gap is even larger. Poor students are 25 percentage points more likely to be at a school with at least $4500 of spending than non-poor students. Again, poor students and non-poor students are equally likely to be at a school with $7000 or more of spending. Since average spending differs across districts, these patterns may simply reflect differences in the socioeconomic make-up of students across districts. To address this, the second figure in each panel plots distributions relative to the district mean. The patterns are attenuated, but remain qualitatively similar: poor students attend schools with higher levels of spending, even when comparing students in the same school district. For elementary school students, poor students are 10 percentage points more likely to be at a school with at least average district spending than non-poor students. [3]

While instructional spending per student is progressive state-wide – meaning poor students experience greater levels of spending than non-poor students – this is not true for teacher experience and facility quality. Figure 4 shows the distributional difference for all three resource measures. Poor students are much more likely to be at schools with below-average teacher experience , both in elementary school and high school. They are also much more likely to be at schools whose facilities are in worse condition using our index of facility quality. This means they are at schools that are older, have not been recently renovated, and with greater levels of deferred maintenance (per square foot). This is true both for elementary and high schools and throughout the distribution of average teacher experience and facility quality. Though Figure 4 presents estimates that subtract off the district average, patterns are similar without this correction.[4] Figure 4 also demonstrates a strength of our approach of looking at multiple resources simultaneously. The picture of how progressive the resource allocation is really depends on which measure of resource one looks at.

B. Regression-based evidence

Since distributional differences can be difficult to interpret, we now turn to regression-based analysis to generate summary measures of progressivity. Specifically, how school-level funding per student varies with the fraction of students that are poor at the school. Regression analysis

[3] The patterns reported here are very similar if we use all operating expenditure per student instead of instructional expenditure, though slightly larger in magnitude. For instance, poor students are 20% more likely to be at schools with more than $6000 operating expenditures (the value with the largest gap) but 16% more likely to be at schools with more than $4500 in instructional expenditures (the value with the largest gap).
[4] The only exception is for teacher experience at high schools. Unadjusted for district averages, poor students are at high schools with slightly more experienced teachers. After adjusting for district averages, poor high school students are at schools with less experienced teachers, as shown in Figure 4.

also permits us to control for additional school-level characteristics to control for confounders and investigate mechanisms.

We present estimates of simple OLS models of the form:

$$Resource_{ij} = \beta_0 + \beta_1(\%PoorSchool_{ij}) + \beta_2(\%Poverty_{ij}) + \beta_z \boldsymbol{Z_{ij}} + \gamma_j + \varepsilon_{ij} \qquad (1)$$

Where $\%PoorSchool_{ij}$ is the fraction of students at school *i* in district *j* that are economically disadvantaged and $\%Poverty_{ij}$ is the poverty rate of the census block group where school i is located. The inclusion of neighborhood poverty rates lets us separate funding differences that target disadvantaged neighborhoods from disadvantaged students. In some specifications we include district fixed effects, γ_j , to isolate differences across schools within the same district. Finally, in some specifications we include the vector $\boldsymbol{Z_{ij}}$, which is the fraction of students at school i that are in five different special categories that have additional funding associated with them: limited English proficiency, special education, gifted or talented, bilingual, and vocational/CTE. The inclusion of this vector helps to inform funding mechanisms, as some of the funding patterns seen here could be mechanically driven by specific categorical funding streams.

The parameter of interest is β_1, which captures whether each resource is systematically higher ($\beta_1 > 0$) or lower ($\beta_1 < 0$) at schools serving more disadvantaged students. We do not view this parameter as causal, but rather capturing in a descriptive sense whether resource allocation is progressive or regressive, and by how much. Thus we do not include a large set of school-level characteristics as controls. Though our main emphasis is on resource differences at a point in time (2006), we also estimate the model separately by year to quantify the extent of change over time in the state's resource allocation patterns.

Table 1 shows estimates of equation (1), separately for elementary and high schools. The pattern of overall progressivity of instructional spending both for elementary and high school students seen in the graphical analysis also holds up in the regression analysis. Specifically, a 10 percentage point increase in the fraction of students that are disadvantaged is associated with a $44 increase in spending per student for elementary schools and a $121 increase for high schools. Funding appears to mostly target school-level disadvantage rather than neighborhood disadvantage when both factors are considered simultaneously. These patterns are strengthened when district-level differences in spending are held constant by the inclusion of district fixed effects (column 4). Interestingly, categorical enrollment explains very little of the cross-school difference in funding. Furthermore, including categorical enrollment (column 5) does not diminish the coefficient on the fraction poor in the school, suggesting that the overall level of progressivity of spending is not explained by categorical funding streams attached to these specific populations.

Table 2 shows estimates for several teacher experience outcomes: average teacher experience at the school and the fraction of teachers that are new or with fewer than five years experience. For both elementary and high schools schools, we find very large disparities in teacher experience within districts: a 10 percentage point increase in the fraction of students that are disadvantaged is associated with a 0.335 year lower average experience and a 1.55 percentage point increase in the fraction with 1-5 years of experience. For high schools, the magnitudes are even larger: 0.46 years and 1.55 percentage points, respectively. These gaps are much less severe in models without district fixed effects (column 1). This suggests that the non-random sorting of experienced teachers to more advantaged schools within districts is much more severe than the sorting across districts.

While instructional spending and experienced teachers are the key operating inputs into the production of quality education, facility quality is another potentially important input. Table 3 documents disparities in students' exposure to high-quality school facilities using the same specification. Like teacher experience, facility quality is also regressively distributed. A ten percentage point increase in the fraction of students that are disadvantaged is associated with a 3.7 percentage point reduction in the predicted likelihood that an elementary school is in at least good condition and a 2.6 percentage point reduction for high schools. Elementary schools with few poor students are almost all in at least good condition. In contrast to the regressivity of teachers, however, cross-district differences in facility quality are materially important. The inclusion of district fixed effects diminishes the disparities for both types of schools, eliminating it entirely for high schools (though admittedly estimates are imprecise for high schools).

Tables 4 and 5 assess how stable these patterns are over time for elementary schools. In Table 4, we examine both instructional spending and teacher experience in 1994, 2006, and 2010 (our most recent year available). For these operating inputs, the cross-sectional patterns from 2006 generally also hold in 1994 and 2010: poor students attend schools with higher levels of spending, but more inexperienced teachers. These patterns are true unconditionally across the state, but are strengthened when looking within districts using district fixed effects. There are no obvious patterns over time, which gives us some faith that these patterns may have persisted into more recent years beyond our data availability.

Examining time trends for school facility condition is more challenging, as there is no systematic source for information about facility condition over time. For our full sample (Panel A of Table 5), we can look at building age (a proxy for facility quality) and whether the schools is in good condition at two time points: 1994 and 2006.[5] Both measures of facility quality suggest that poor students attend schools in worse condition in both 1994 and 2006, particularly when we don't include district fixed effects. In fact, the disparities appear to have worsened over time. Unfortunately measures of facility condition do not exist state-wide in more recent years, so we are not able to say how this pattern changed since 2006. However, we were able to collect the amount of deferred maintenance per square foot for 15 districts for a more recent year around 2010. Results for this subset of districts is reported in Panel B. They exhibit the same general trend of worsening disparities in facility age and condition from 1994 to 2006, though disparities in deferred maintenance – poor students are at schools with greater repair needs – are stable between 2006 and 2010.

V. District-Specific Estimates of Funding Progressivity and Its Correlates

Our analysis up to now has demonstrated large differences in the school resources experienced by poor versus non-poor students across the state. Most of these differences also occur within districts, though prior research on educational resource disparities has mostly focused on cross-district differences. This begs the question of whether there are differences in how progressive or regressive specific districts are, how this has evolved over time, and what factors correlated with the progressivity or regressively of within-district resource allocations.

A. Methods

We use a two-stage process to analyze within-district resource progressivity. In the first stage, we construct measures of resource progressivity at the district-year level, similar to the state-level measures used by Chingos and Blagg (2017). We begin with school-level data, and we

[5] Our measures of facility age and quality in the earliest year actually come from 1991, but assign these measures to the same facilities in 1994.

separately regress instructional spending per student, average teacher experience, and facility age on indicator variables for school type (elementary, middle, or high school) and district. We then predict the regression residuals, giving us the difference from the district and school type mean values of instructional spending per student, teacher experience, and facility age. Next we calculate the average residual by district, school type, and year across schools, weighted by the number of poor students and the number of non-poor students in each school separately. Finally, we calculate the resource gaps between poor and non-poor students in each district by subtracting the non-poor weighted average residual from the poor weighted average residual. This results in a dataset at the school district - school type - year level containing variables that measure difference in resource levels for schools attended by poor vs. non-poor students. We interpret the resulting variables as indicators of how progressive or regressive a district's resource allocation is for each year and school type. For the instructional spending per student variable and the teacher experience variable, a positive gap indicates progressive resource allocation, whereas for the facility age variable, a positive gap indicates regressive resource allocation.

In the second stage, we explore variables that are correlated with the progressivity (or regressivity) of resource allocation within districts. For each of the resource variable we regress the poor minus non-poor resource gap (obtained in the first stage of our analysis) on number of schools in the district, number of students in the district, year fixed effects, indicator variables for school type, and the levels of racial and economic segregation within the district, as measured by dissimilarity indices. We run these regressions with and without district fixed effects. For district j in year t

$$Gap_{jt} = \beta_1 * RaceDiss_{jt} + \beta_2 * SESDiss_{jt} + \beta_3 * X_{jt} + \gamma_j + \gamma_t + \epsilon_{jt} \qquad (2)$$

Our variable for measuring racial segregation within the district, the index of racial dissimilarity, measures segregation between white and non-white students across schools within a district. It quantifies the percentage of the minority group that would need to move to a different school within the district for the minority group to be equally dispersed across the district. A value of zero indicates that the minority group is equally dispersed across schools within the district, while a value of one indicates that the minority group is entirely segregated. We calculate a separate index of dissimilarity measures for each district, year, and school type combination. The index of racial dissimilarity is given by $\frac{1}{2}\sum_{i=1}^{N}\left|\frac{w_i}{W}-\frac{nw_i}{NW}\right|$, where w_i is the white population in the i^{th} school, W is the total white population in the district, nw_i is the non-white population in the i^{th} school, and NW is the total non-white population in the district. Similarly, we construct a measure of the amount of income segregation within the district, interpreted as the percentage of students receiving free or reduced lunch that would need to move to a different school in order for that group to be equally dispersed across the district. The index of socioeconomic dissimilarity is $\frac{1}{2}\sum_{i=1}^{N}\left|\frac{p_i}{P}-\frac{np_i}{NP}\right|$, where p_i is the poor population in the i^{th} school, P is the total poor population in the district, np_i is the non-poor population in the i^{th} school, and NP is the total non-poor population in the district.

Our sample for this analysis starts with 9,167 elementary, middle, and high schools across 1,293 districts. After dropping schools that are the only school of that type in the district (for which disparity measures are not calculable), we are left with a dataset of 7,019 schools in 567 districts. Table A1 in the Appendix reports the number of district-year observations by school type and year. Across all school types, districts, and years, we estimate 13,556 disparity measures.

B. Results

Figure 5 summarizes our "first-stage" analysis. It graphs the percentage of districts that are progressive (meaning poor students experience more of the resource than non-poor students) in each of the resource categories, by school type over time.[6] We find that progressivity of resource allocation within districts varied over time, by school type, and by resource type. Instructional spending tended to be progressive in slightly more than half of districts, particularly for high schools. This share increased slightly over our sample period, exceeding two-thirds by the end of our sample period. This pattern sheds a bit more light on the aggregate disparities documented earlier: state-wide, poor students tend to be in higher-spending schools in part because the median district is progressive with regards to spending. Conversely, teacher experience is allocated regressively in more than half of the districts, with quite similar patterns for elementary and high schools and little change since 2000. Finally, around two-thirds of districts tended to concentrate poor students in older buildings, with no change since 2000.

To better understand the correlates of district-level resource allocation practices, we correlate these district-specific gaps with measures of racial and income segregation. Table 6 contains regression results for each of the resource disparities we measured. Districts with higher levels of racial and socioeconomic segregation have more progressive funding and less progressive allocation of teacher experience. This pattern holds both when the variation in segregation is coming from across districts (odd columns) and when we isolate segregation changes within districts over time (even columns, which include district fixed effects). This pattern is consistent with experienced teachers increasingly sorting across schools when districts are more segregated, but the district somewhat counteracting this with greater spending progressivity.

[6] We omit the lines for middle schools for clarity, though it generally tracks that of high schools.

The relationship between segregation and facility quality is consistent with the pattern for experienced teachers. In column (5), greater economic segregation is associated with a more regressive allocation of school building quality (poor students in older buildings). This pattern is only slightly muted when we exploit changes in segregation over time (column 6). On the other hand facility age is more progressive (i.e., more poor students in newer buildings) in districts that are more racially segregated, but this effect disappears when district fixed effects are included.

VI. How do Patterns in Texas Compare to Other States?

We conclude by putting our Texas results in a national context using recent data from other sources. Unfortunately rich school-level spending data does not exist historically for all states, so it is not possible to extend our full analysis to other states. Instead, we use school-level staffing and salary data from 2011 and 2013, assembled as part of the *Rutgers Graduate School of Education/Education Law Center: School Funding Fairness Data System*.[7] Though the data does not include all instructional and non-instructional expenditure or measures of facility conditions, it does permit us to compare our setting to other states in terms of salary per student (the largest component of instructional spending) and the use of novice teachers. Table 7 reports regressions that correlate salary per student and the share of novice teachers with the share of students that are economically disadvantaged (eligible for free school lunch). The inclusion of district fixed effects isolates the within-district variation, showing similar patterns in Texas and nationally. On average states have progressive within-district salary allocation but regressive allocation of novice teachers.[8] Since novice teachers tend to have lower salaries, these two patterns can be reconciled by the use of more instructional staff (whether teachers, aids, or others) at schools with more disadvantaged students, even if the teachers tend to be less experienced. Thus we think that the within-district patterns in Texas are likely to generalize to states more broadly.

[7] The database contains staffing and salaries per per-student at the school-level, as reported to the Civil Rights Data Collection. This has been merged with school characteristics from the NCES Common Core Public School Universe survey, including the share of students eligible for free or reduced-price lunch. Further details and data downloads are available at http://www.schoolfundingfairness.org/data-download.

[8] In fact, when we estimate models separately for each state we find that 40 have progressive within-district salary allocation, but only 3 do for the allocation of non-novice teachers.

Finally, we assess how our finding that within-district spending progressivity is magnified in districts that are more socioeconomically segregated compares to national patterns. Specifically, the Urban Institute recently released estimates of funding progressivity and segregation for each state. These estimates are based on district-level revenue differences between poor and non-poor students in each state, by source.[9] Chingos and Bragg (2017) find that almost all states are progressive, with poor students tending to live in districts with slightly more total funding per student than non-poor students (though the total masks differences by source, with local funding being very regressive and state and federal compensating). Furthermore, funding is more progressive in states that have more across-district economic segregation, which permits states to better target funding to students in poor districts. This basic pattern of greater economic segregation being associated with more progressive funding thus mirrors our within-district estimates for Texas. To compare these results quantitatively, we estimate simple bivariate cross-sectional regressions of progressivity on dissimilarity indices, using state and district-level data from Urban Institute and Texas, respectively. We find that spending progressivity has a higher correlation with economic segregation at a state-level than it does at a district level within Texas: the dissimilarity index explains nearly three times as much of the cross-state variation in funding progressivity as it does at the district-level in Texas.[10] While the state and district-level progressivity and segregation are not directly comparable, we view this analysis as suggestive evidence that states are able to better target resources to needy districts than districts are able to target needy schools.[11]

VII. Conclusions

[9] A summary of their findings, data description, and data download can be found here: http://apps.urban.org/features/school-funding-do-poor-kids-get-fair-share/

[10] Using 2013-14 state-level data from the Urban Institute we estimate Revdiff = - 253 + 2512*DissIndex with an $R^2 = 0.10$ (N = 49, excludes HI and DC). Using 2009 district-level data from Texas, we estimate Revdiff = - 10 + 376*DissIndex with an $R^2 = 0.033$ (N = 454 districts, elementary schools). Note that we use raw spending levels (not adjusted for cost differences), though the cost-adjusted estimates are similar (an $R^2 = 0.076$ for Urban Institute state-level data).

[11] Though the progressivity index is constructed in the same way in both sources, the state-level estimates use total revenue as the resource measure while the district-level estimate uses instructional spending. The segregation indices are also constructed similarly, though the state estimate uses population poverty rates while the district estimate uses the share of students that are eligible for free or reduced-price lunch.

Our analysis has documented substantial resource differences across schools. Poor students are at schools that have higher levels of instructional spending, but less experienced teachers and schools in worse physical condition. This broad pattern is true for elementary and secondary schools and holds even after controlling for neighborhood poverty and has remained stable over time. The implication is that school finance reforms have equalized spending differences, but not so for other potentially important resources such as experienced teachers and facilities. One reason is that a substantial amount of the variability occurs *within* districts. While the modal poor student is in a district that is modestly progressive with regards to spending, there is wide variation across districts. In 2009, we estimate that 61% of districts had progressive funding for elementary schools, up from about half a decade earlier. Only 41% and 33% were progressive for average teacher experience and facility quality, respectively. Both economic and racial segregation are positively correlated with the extent of progressive within-district funding, but greater economic segregation is associated with a more regressive allocation of experienced teachers and new school facilities.

Though the federal Title I program aims to eliminate such disparities by requiring districts to provide "comparable" services to all schools, districts can fulfill this requirement by merely reporting equitable teacher-student ratios or personnel spending using average district salaries (Spatig-Amerikaner, 2012). Through this "comparability loophole", disparities persist within districts due to unequal distribution of high-quality teachers and actual teacher salaries. Furthermore, the Title I program makes no such requirement for equitable access to quality school facilities.

This analysis has underscored that school finance reforms, which are predominately focused on spending across districts, do not much alter the allocation of teachers and capital investment across or within districts. What can be done? Teacher incentive schemes might encourage more equitable distribution of teachers and direct facility investment by the state or stronger incentives for districts to invest in school buildings might help alleviate disparities in facility quality.

Future work should more fully investigate mechanisms that equalize funding and other resources within districts. It would also be informative to investigate how districts decide where and how to invest in schools in the district, as these decisions are not governed by finance equalization considerations and are generally not tracked or observed, other than by district residents.

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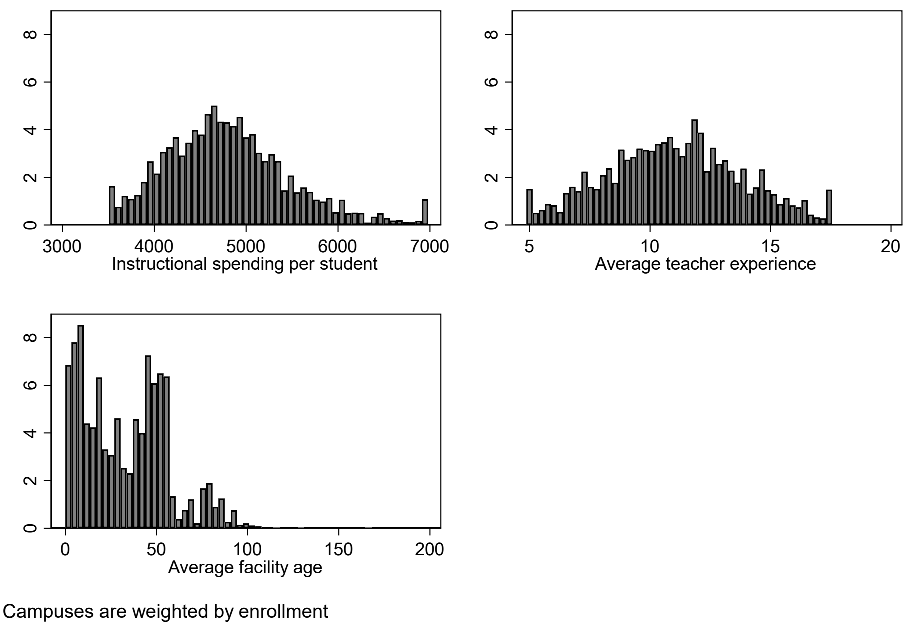
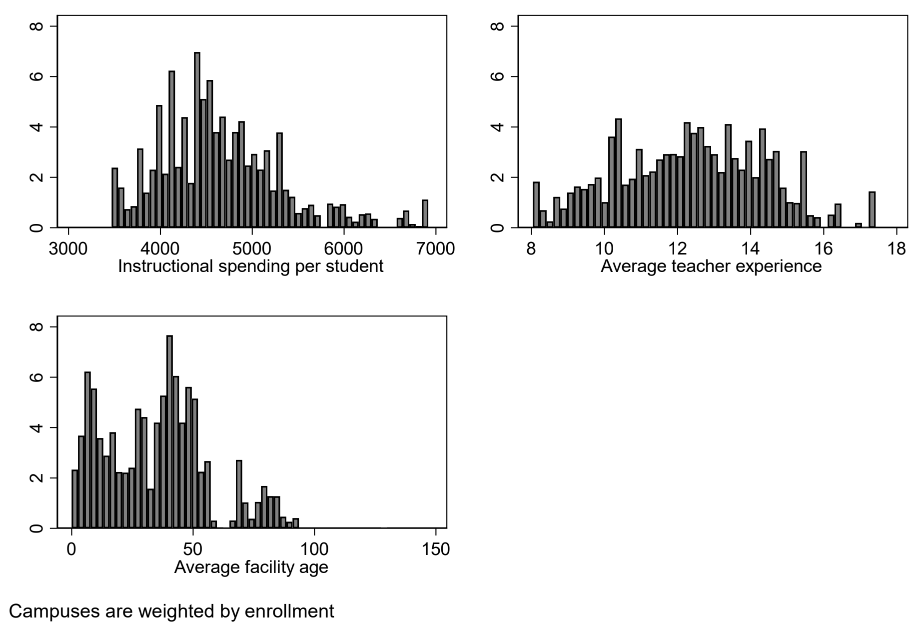
Figure 1. Distribution of Public School Resources in Texas, 2006

A. Elementary Schools



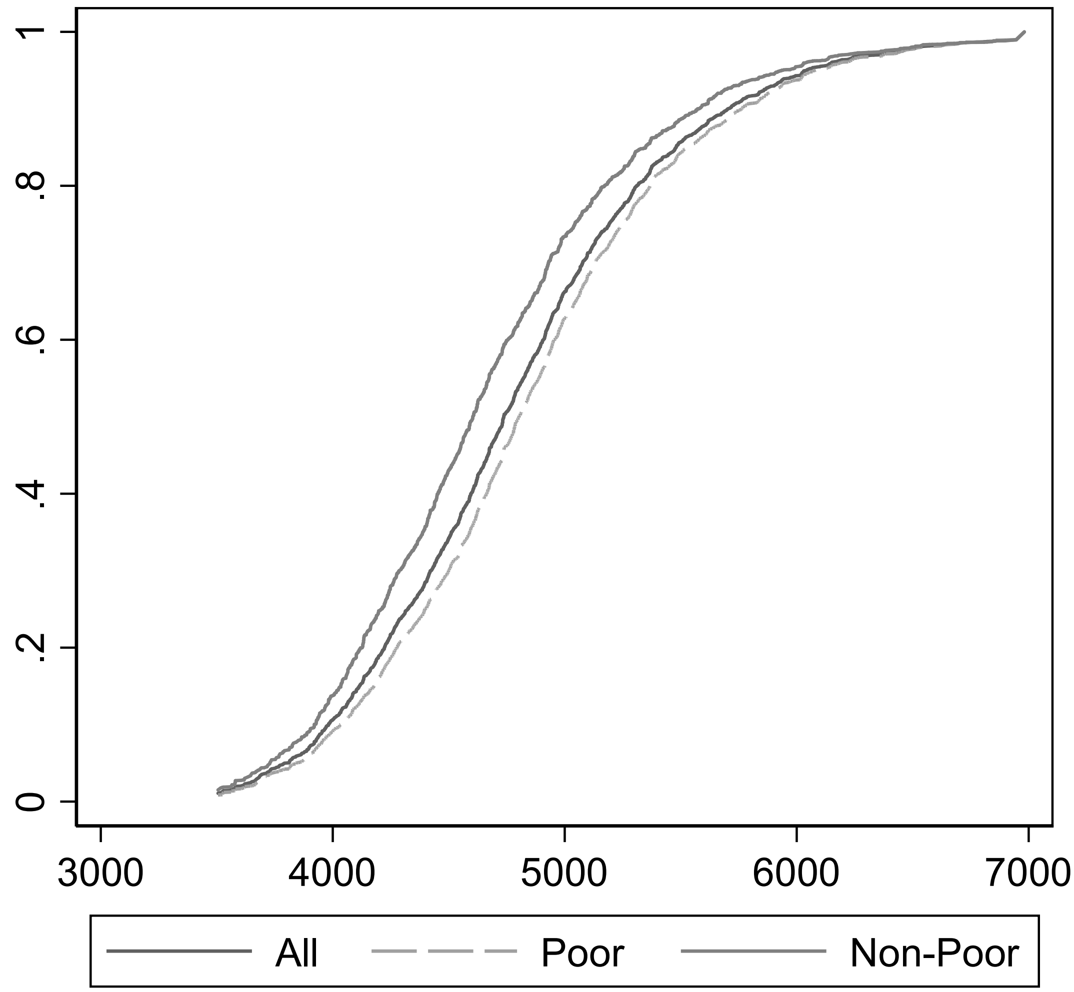
B. High Schools



Notes: Includes 1806 elementary Schools and 301 high schools in 302 districts in 2006.

Figure 2. CDF of Instructional Spending per Student, Elementary Schools in 2006

Separately by Poor and NonPoor Students

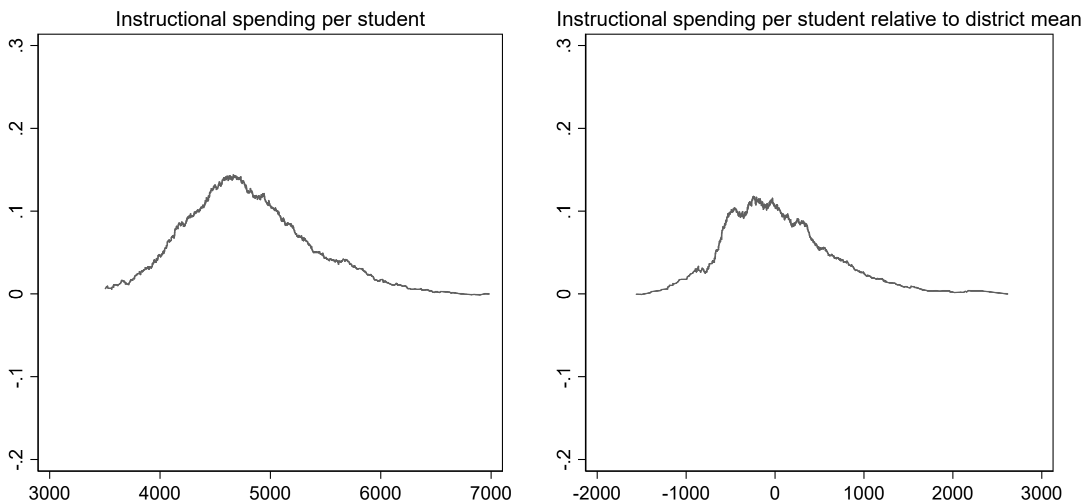


Note: Percentiles are defined within group. Horizontal distance represents the poor minus nonpoor spending difference of students at a given percentile. For instance, the spending difference between poor students at the 40th percentile vs. non-poor students at the 40th percentile. The vertical distance represents the difference in fraction of students at schools with spending below a certain level. Includes 1806 elementary schools in 302 districts in 2006. Expenditures are in 2016 dollars.

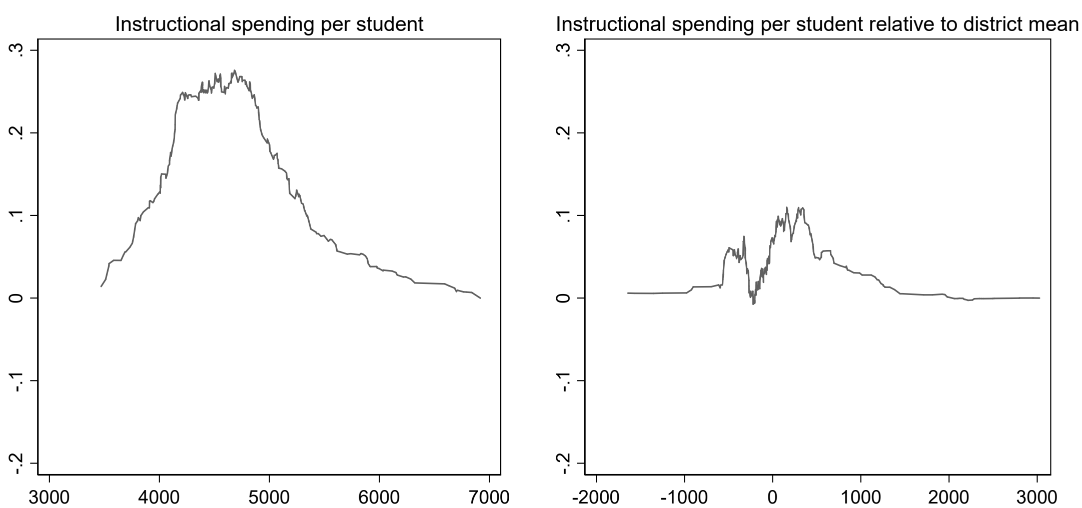
Figure 3. Difference in Poor vs. NonPoor Student Instructional Expenditure

With and without netting out district means

A. Elementary Schools



B. High Schools



Notes: Figures plot the difference in CDF of school-level instructional spending per student between poor and non-poor students. Positive values mean that a greater share of poor students attend schools with at least the given level of spending than non-poor students. Sample includes 1806 elementary schools and 301 high schools in 302 districts in Texas in 2006.

Figure 4. Difference in Resources Experienced by Poor vs. Non-Poor Students (relative to district means)

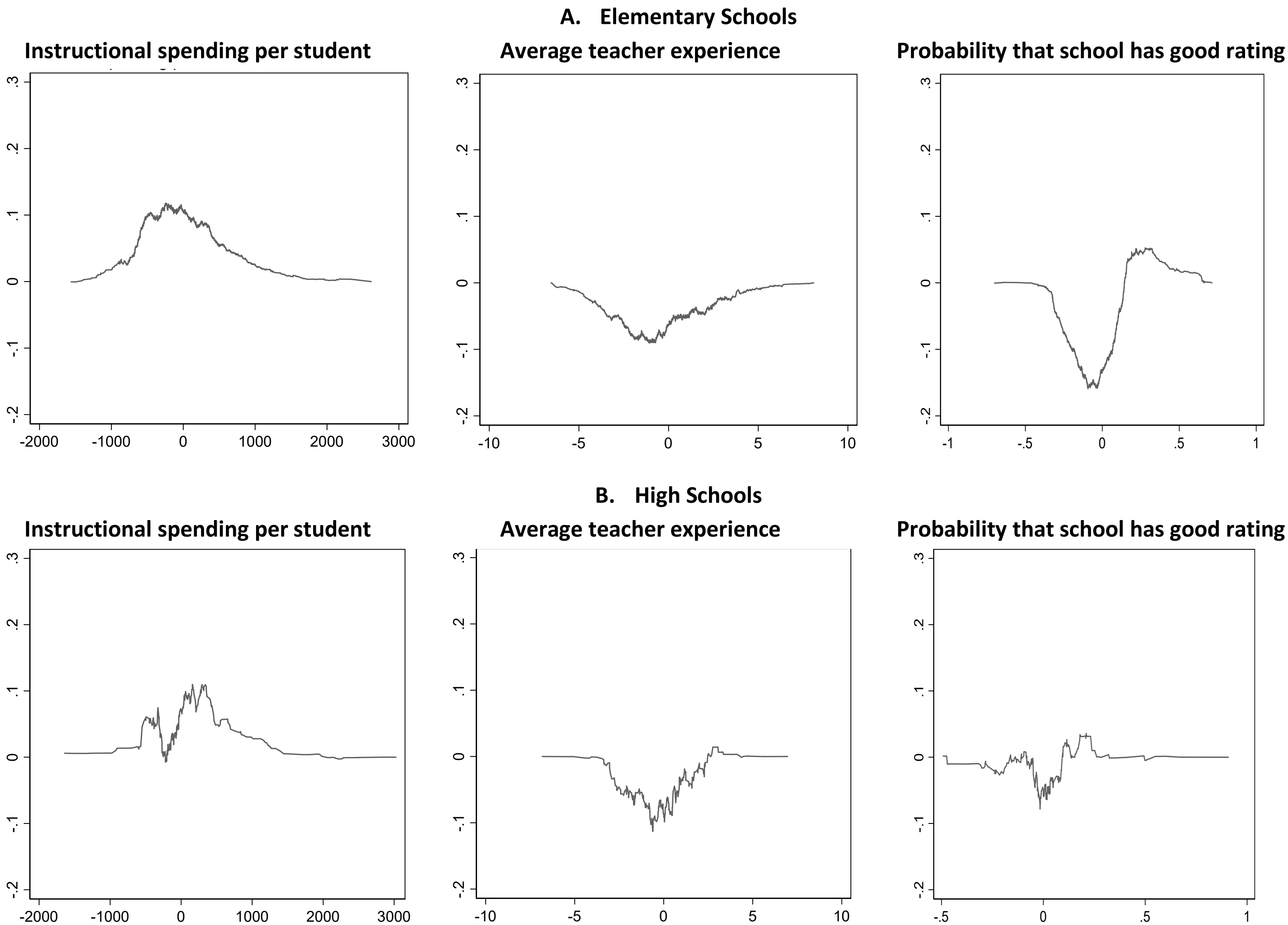
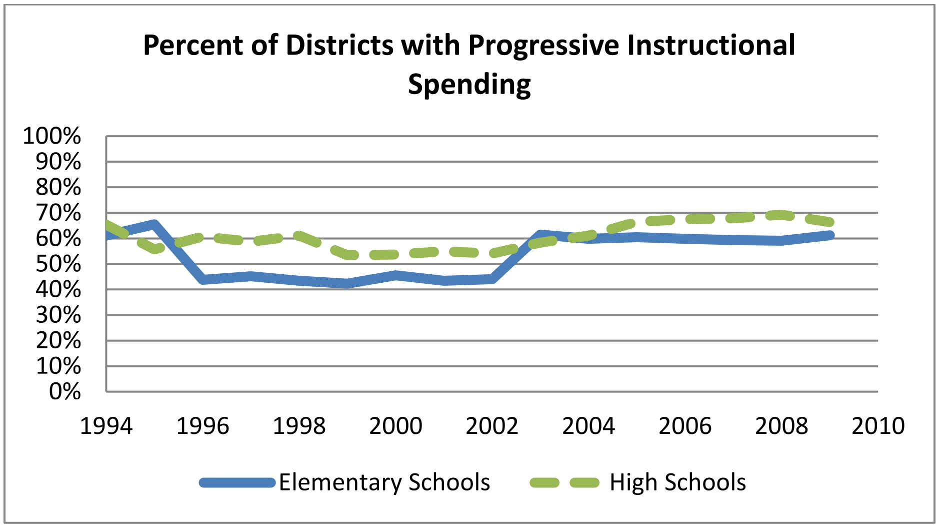
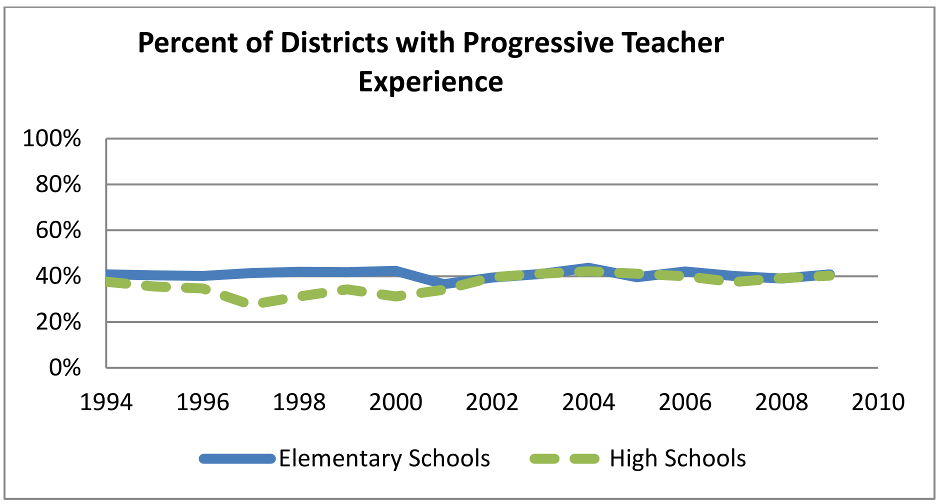


Figure 5. Fraction of Texas School Districts with Progressive Resource Allocation





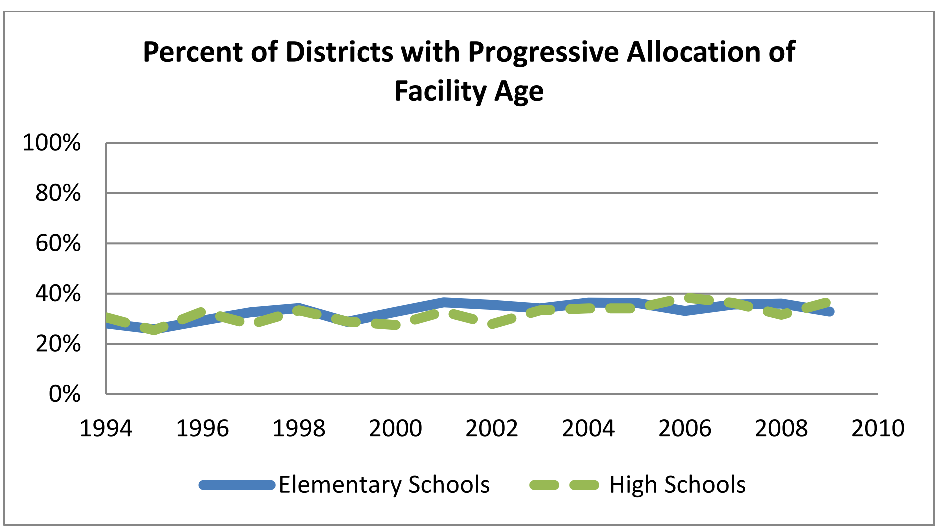


Table 1. Relationship between Instructional Spending Per Student and Economically Disadvantaged Students

	Outcome: Instructional Spending per Student				
	(1)	(2)	(3)	(4)	(5)
Panel A. Elementary Schools (n = 1806)					
% Disadvantaged (in school)	444.7***		355.4***	988.6***	1,386***
	(54.03)		(68.28)	(84.46)	(109.8)
% Poverty (in census block group)		692.5***	304.3**	380.6***	430.0***
		(98.97)	(124.6)	(124.9)	(114.2)
Constant	4,504***	4,676***	4,507***	4,063***	3,147***
	(39.15)	(24.95)	(39.20)	(53.19)	(132.1)
R-squared	0.037	0.026	0.041	0.407	0.496
Panel B. High Schools (n = 301)					
% Disadvantaged (in school)	1,205***		959.1***	1,430***	1,216***
	(114.7)		(127.2)	(292.0)	(398.1)
% Poverty (in census block group)		1,901***	896.8***	694.3**	429.7
		(308.7)	(333.8)	(311.7)	(296.7)
Constant	4,031***	4,359***	4,020***	3,809***	3,770***
	(65.66)	(57.82)	(66.59)	(154.7)	(465.9)
R-squared	0.244	0.155	0.267	0.610	0.637
District FE	no	no	no	yes	yes

Notes: Robust standard errors in parenthesis (*** p<0.01, ** p<0.05, * p<0.1).

Table 2. Relationship between Teacher Experience and Economically Disadvantaged Students

	Average teacher experience (mean = 11.05 years, 12.36)					% New (mean 0.067, 0.070)	% 1-5 year (mean 0.318, 0.270)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Panel A. Elementary Schools (n = 1806)							
% Disadvantaged (in school)	-0.790***		-0.821***	-3.350***	-1.636***	0.0393***	0.155***
	(0.225)		(0.272)	(0.379)	(0.522)	(0.00736)	(0.0152)
% Poverty (in census block group)		-0.818*	0.0786	-0.183	-0.178	0.0122	-0.0104
		(0.426)	(0.513)	(0.502)	(0.494)	(0.0104)	(0.0224)
Constant	11.54***	11.16***	11.55***	13.31***	11.75***	0.0385***	0.218***
	(0.164)	(0.104)	(0.164)	(0.252)	(0.401)	(0.00467)	(0.0101)
R-squared	0.007	0.002	0.007	0.370	0.390	0.288	0.350
Panel B. High Schools (n = 301)							
% Disadvantaged (in school)	0.838*		0.347	-4.629***	-5.723***	0.0592***	0.155***
	(0.456)		(0.545)	(0.896)	(1.199)	(0.0226)	(0.0338)
% Poverty (in census block group)		2.135***	1.772*	0.914	0.217	-0.00709	-0.00115
		(0.787)	(0.949)	(1.008)	(1.013)	(0.0224)	(0.0424)
Constant	11.93***	12.03***	11.91***	14.61***	12.66***	0.0413***	0.190***
	(0.275)	(0.194)	(0.275)	(0.440)	(0.957)	(0.0107)	(0.0177)
R-squared	0.013	0.022	0.023	0.476	0.529	0.453	0.472
District FE	no	no	no	yes	yes	yes	yes
Categorical student counts	no	no	no	no	yes	no	no

Notes: Robust standard errors in parenthesis (*** p<0.01, ** p<0.05, * p<0.1).

Table 3. Relationship between Facility Condition and Economically Disadvantaged Students

	Predicted Prob of Facility Being in Good Condition					Facility age
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A. Elementary Schools (n = 1676)						
% Disadvantaged (in school)	-0.367***		-0.421***	-0.239***	-0.386***	19.33***
	(0.0218)		(0.0279)	(0.0404)	(0.0494)	(3.321)
% Poverty (in census block group)		-0.285***	0.169***	-0.0263	-0.0281	0.403
		(0.0456)	(0.0561)	(0.0561)	(0.0556)	(4.944)
Constant	0.870***	0.673***	0.875***	0.788***	0.914***	20.07***
	(0.0141)	(0.0110)	(0.0143)	(0.0265)	(0.0351)	(2.116)
R-squared	0.133	0.023	0.139	0.472	0.484	0.345
Panel B. High Schools (n = 276)						
% Disadvantaged (in school)	-0.261***		-0.281***	-0.118	-0.0497	24.53**
	(0.0575)		(0.0689)	(0.138)	(0.149)	(11.07)
% Poverty (in census block group)		-0.222*	0.0834	-0.0226	0.0581	5.910
		(0.123)	(0.150)	(0.122)	(0.130)	(11.58)
Constant	0.817***	0.716***	0.815***	0.746***	1.031***	21.48***
	(0.0300)	(0.0264)	(0.0303)	(0.0790)	(0.159)	(5.907)
R-squared	0.082	0.015	0.082	0.619	0.655	0.512
District FE	no	no	no	yes	yes	yes
Categorial student counts	no	no	no	no	yes	no

Table 4. Relationship between Operating Resources and Economically Disadvantaged Students, Elementary Schools 1994-2010

	Instructional Spending per Student					
	1994		2006		2010	
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A. Instructional Spending per Student						
% Disadvantaged (in school)	595.4***	599.0***	348.9***	960.3***	595.8***	1,035***
	(74.34)	(96.79)	(69.18)	(87.42)	(64.20)	(76.60)
% Poverty (in census block group)	426.7***	310.6**	290.9**	352.9***	-137.7	115.6
	(139.6)	(142.7)	(124.7)	(125.5)	(113.5)	(103.8)
Constant	3,645***	3,666***	4,512***	4,085***	4,873***	4,521***
	(39.61)	(55.57)	(39.58)	(55.77)	(40.64)	(50.73)
R-squared	0.107	0.435	0.038	0.389	0.053	0.472
Observations	1,528	1,528	1,827	1,827	1,939	1,939
Panel B. New Teacher Share						
% Disadvantaged (in school)	0.0395***	0.0705***	0.0213***	0.0395***	0.0320***	0.0344***
	(0.00645)	(0.00886)	(0.00560)	(0.00732)	(0.00456)	(0.00595)
% Poverty (in census block group)	0.00490	0.00406	0.00173	0.0127	6.04e-05	-0.00220
	(0.0134)	(0.0122)	(0.0104)	(0.0103)	(0.0107)	(0.0103)
Constant	0.0422***	0.0239***	0.0526***	0.0382***	0.0280***	0.0267***
	(0.00314)	(0.00476)	(0.00326)	(0.00464)	(0.00242)	(0.00372)
R-squared	0.040	0.343	0.012	0.288	0.026	0.262
Observations	1,528	1,528	1,821	1,821	1,934	1,934
Panel C. Share of Teachers with 1-5 years Experience						
% Disadvantaged (in school)	0.0179	0.0905***	0.103***	0.157***	0.0924***	0.138***
	(0.0129)	(0.0186)	(0.0115)	(0.0152)	(0.0118)	(0.0153)
% Poverty (in census block group)	0.0367	0.0233	-0.00553	-0.00697	-0.0321	0.0358
	(0.0233)	(0.0239)	(0.0222)	(0.0223)	(0.0225)	(0.0234)
Constant	0.252***	0.211***	0.252***	0.216***	0.258***	0.214***
	(0.00663)	(0.0106)	(0.00698)	(0.0101)	(0.00693)	(0.0103)
R-squared	0.008	0.250	0.060	0.348	0.037	0.319
Observations	1,528	1,528	1,821	1,821	1,934	1,934
District FE	no	yes	no	yes	no	yes

Table 5. Relationship between Facility Quality and Economically Disadvantaged Students, Elementary Schools 1994-2010

	Building Age				At least good condition				Deferred Maintenance per Square Foot			
	1991(1994)		2006		1991(1994)		2006		2006		2010 and later	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Panel A. Full sample of 302 districts												
% Disadvantaged (in school)	15.80***	10.55***	28.73***	19.33***	-0.432***	-0.0818	-0.554***	-0.237***	31.56***	5.249		
	(1.606)	(2.462)	(2.170)	(3.322)	(0.0446)	(0.0648)	(0.0448)	(0.0602)	(3.326)	(4.552)		
% Poverty (in census block group)	-2.414	4.464	-6.895	0.403	0.0630	-0.0595	0.111	-0.0111	-18.97***	1.506		
	(2.899)	(2.996)	(4.518)	(4.945)	(0.0898)	(0.0824)	(0.0927)	(0.0865)	(6.197)	(5.225)		
Constant	17.29***	19.11***	15.04***	20.08***	0.827***	0.640***	0.961***	0.768***	0.981	15.09***		
	(0.830)	(1.407)	(1.126)	(2.117)	(0.0221)	(0.0360)	(0.0233)	(0.0392)	(1.528)	(3.070)		
Observations	1,362	1,362	1,804	1,804	1,398	1,398	1,827	1,827	1,677	1,677		
R-squared	0.100	0.337	0.112	0.345	0.087	0.406	0.098	0.438	0.060	0.506		
Panel B. Restricted sample of 15 districts												
% Disadvantaged (in school)	7.906*	-3.099	25.13***	1.586	-0.227*	0.347***	-0.752***	-0.279*	38.94***	11.97	37.90***	-2.373
	(4.413)	(4.799)	(5.678)	(8.871)	(0.126)	(0.121)	(0.0907)	(0.147)	(10.42)	(15.62)	(6.604)	(9.751)
% Poverty (in census block group)	9.397	11.02**	0.268	0.740	0.0286	-0.122	0.214	0.213	-16.57	-6.943	11.92	7.042
	(5.831)	(5.371)	(9.602)	(9.725)	(0.172)	(0.158)	(0.185)	(0.182)	(15.10)	(12.88)	(15.90)	(14.73)
Constant	22.37***	30.01***	20.21***	38.88***	0.563***	0.178**	1.000***	0.622***	6.676	26.60**	4.257	37.57***
	(2.932)	(3.129)	(4.226)	(6.674)	(0.0848)	(0.0801)	(0.0639)	(0.110)	(7.630)	(12.21)	(4.539)	(7.746)
Observations	331	331	405	405	331	331	419	419	400	400	380	380
R-squared	0.044	0.164	0.071	0.179	0.014	0.225	0.132	0.251	0.040	0.296	0.076	0.322
District FE	no	yes	no	yes	no	yes	no	yes	no	yes	no	yes

Table 6. Correlates of District-level Spending Gaps between Poor and NonPoor Students

	poor - nonpoor instructional spending		poor - nonpoor teacher experience		poor - nonpoor facility age	
	(1)	(2)	(3)	(4)	(5)	(6)
Index of dissimilarity: Race	46.97*	183.6***	-0.855***	-0.885***	-4.195***	0.332
	(25.33)	(30.09)	(0.05)	(0.07)	(0.58)	(0.72)
Index of dissimilarity: Poor	218.4***	173.5***	-0.921***	-0.672***	14.83***	8.968***
	(25.35)	(28.10)	(0.05)	(0.06)	(0.58)	(0.67)
Middle school	21.43***	12.80**	-0.0089	0.00961	-0.404***	-0.785***
	(6.09)	(6.10)	(0.01)	(0.01)	(0.15)	(0.15)
High school	3.1	35.35***	-0.0715***	-0.0456***	0.221	-0.469**
	(7.088)	(7.505)	(0.014)	(0.016)	(0.173)	(0.185)
Number of schools	-4.619***	1.33	-0.00964***	-0.0100***	-0.0458***	-0.0352*
	(0.733)	(0.892)	(0.001)	(0.002)	(0.016)	(0.019)
Number of students	0.00858***	-0.00447**	1.07e-05***	8.02e-06**	7.28e-05***	0.0000316
	(0.001)	(0.002)	(0.000)	(0.000)	(0.000)	(0.000)
Constant	-22.65***	24.74**	0.165***	0.125***	-0.728***	-0.0652
	(4.847)	(11.050)	(0.009)	(0.024)	(0.126)	(0.283)
Observations	13470	13470	13468	13468	5318	5318
R-squared	0.046	0.465	0.193	0.441	0.165	0.523
Year FE	X	X	X	X	X	X
District FE		X		X		X

Standard errors in parentheses, clustered by district
*** p<0.01, ** p<0.05, * p<0.1

Table 7. Within-District Resource Allocation, Texas vs. US
Elementary Schools

	Instructional salary per student				% New teachers	
	Texas	Exclude Texas	Texas	Exclude Texas	Texas	Exclude Texas
	(1)	(2)	(3)	(4)	(5)	(6)
% Disadvantaged (in school)	314***	-588***	206*	255***	0.048***	0.064***
	(60)	(42)	(109)	(40)	(0.011)	(0.005)
Constant	2,974***	3,765***	3,026***	3,422***	0.073***	0.067***
	(31)	(20)	(55)	(18)	(0.005)	(0.002)
Outcome mean	3,126	3,526	3,126	3,526	0.096	0.093
Observations	3,707	29,645	3,707	29,645	3,707	29,645
R-squared	0.008	0.201	0.585	0.813	0.654	0.589
Fixed effects	None	State	District	District	District	District

Notes: Sample includes all schools with no students in 6-12th grade, excluding schools with missing information about school-level salaries and teachers (which excludes all schools in Wisconsin). Sample pools observations from 2011-2012 and 2013-2014. Robust standard errors clustered by school in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table A1. Number of Districts used for District-Specific Estimates, by school grade

Year	Elementary Schools	Middle Schools	High Schools	Total district-type observations
1994	401	173	101	675
1995	407	181	124	712
1996	400	185	152	737
1997	403	187	161	751
1998	405	189	168	762
1999	403	197	161	761
2000	412	193	174	779
2001	420	203	176	799
2002	430	204	172	806
2003	426	206	180	812
2004	434	206	191	831
2005	444	211	186	841
2006	444	214	188	846
2007	449	218	187	854
2008	448	216	179	843
2009	456	228	192	876
2010	453	225	193	871
Total	7,235	3436	2885	13,556

Note: The number of unique districts is slightly higher than the number of elementary observations in each year.