School vs. District Level Views of School Spending Inequality and Progressivity: Evidence from Florida and Illinois*

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Abstract

How much does spending vary across U.S. public schools, and how much do the schools that low-income students attend spend compared to schools attended by their more advantaged peers? Students are educated in *schools*, which are frequently segregated by race and socioeconomic status, and spending can vary across schools within the same district. But this variation is invisible in revenue and expenditure data reported and analyzed at the *district* level, rather than school level, as has typically been done in the school finance literature to date (because of data limitations). Because the scope for within-district spending inequality is greater in larger districts that have many schools, differences in the number of schools per district may distort comparisons across states. To illustrate this phenomenon we analyze two states, Florida, which has 67 regular school districts, and Illinois, which enrolls fewer students in total but has nearly 900 regular school districts. We construct measures of inequality and progressivity using school-level and district-level data. We show that across-school, within-district inequality is indeed higher in Florida than in Illinois. As expected, comparisons of inequality and progressivity based on district-level averages exaggerate the differences between the two states.

Equality and Progressivity in School-level Spending: Evidence from Florida and Illinois

A long research literature and considerable policymaking activity have focused on the question of how to achieve a fair distribution of funding for elementary and secondary education. Implicitly, researchers and policymakers are interested in how access to education funding varies for different *students*, and whether low-income students get enough resources. But we typically do not observe resources available to particular students; consequently, most research has used data on spending per pupil in school *districts*, which can include tens or even hundreds of thousands of students, who do not all receive access to the same resources. The Every Student Succeeds Act (ESSA) of 2015[1] required states to compile and make public data on spending at the *school* level, allowing for a much more granular look at how school education spending varies. Although different students in the same school may experience different levels of educational resources—they might have different teachers, be in smaller or larger classes, or receive supplemental services—school-level spending is likely to give a better indication of the resources students actually have access to than district-level spending.

Advocates, policymakers, and researchers are all interested in comparing how equal or progressive school funding is in different states because states play a key role in determining the allocation of funding across districts and potentially across schools. Indeed, researchers have long been interested in identifying features of state policies that are associated with a more equal or progressive allocation of funding. To the extent that these comparisons or rankings—to date, based on district- rather than school-level data—have consequences for state policy, the measurement of progressivity and inequality is important.

[1] Every Student Succeeds Act, S.1177, § 1111(h)(1)(C)(x), 1111(h)(2)(C) (2015).

We use the term "equality" to mean that per-pupil spending is the same in every school (or district); "inequality" refers to deviations from such a uniform distribution. Throughout the paper, we use the term "progressivity" to denote a positive correlation between student economic disadvantage and spending (poorer schools spend more). The measures of inequality in the literature and this paper do not distinguish between inequality due to progressive (in favor of economically disadvantaged students) or regressive (the opposite) spending patterns. Advocates often emphasize a need for "equity" in a way that is linked to empirical measures of progressivity. For example, Mann (2014) wrote, "…let's make equity synonymous with 'more for those who need it.'" Measures of inequality, not just progressivity, remain salient for policy and research, so we include them here as well.

The extent to which district-level averages, as have been used in most prior research on school finance, mask differences in students' school-level experiences depends on how much spending varies across schools within the same district. All else equal, there is more opportunity for spending to vary across schools when there are more schools per district. Intuitively, if all schools within a district spend the same amount, or if there is only one school per district, district- and school-level data will tell the same story. But if districts have multiple schools, and spending varies across schools, district-level averages will provide an incomplete picture. There is more opportunity for "missed variation" in district-level data as the number of schools per district increases, all else equal.

In this paper, we describe and estimate some popular measures of inequality (the extent to which per-pupil spending differs across schools) and progressivity (the extent to which higher-poverty schools spend more per-pupil than lower-poverty schools). To understand how the level at which we observe spending influences how we characterize the school finance systems of

individual states (and comparisons across states), we calculate these measures across all schools, between school districts, and across schools within districts. The analysis across all schools provides the most accurate picture of which states have more equal or equitable distributions of education funding; this analysis will differ more or less from what the district analysis suggests for states depending on how many schools the typical district has. In this paper, we illustrate this point using newly available school-level spending data for two states, Illinois and Florida, which have vastly different school district sizes. We demonstrate how the choice between school-level and district-level data affects our understanding of inequality and progressivity in each state and, critically, the comparison across states.

Our goal is to note the potential for the level at which data are observed to matter in calculating measures of inequality and progressivity; it is helpful to use data from more than one state to illustrate the point. Though nearly all states have complied with the mandate to report school-level spending data at this point, not all states report in a common format, and the analysis requires careful attention to validate the data and identify state-specific anomalies, so we limit our attention to just two states for this exercise. We choose Florida and Illinois in part because they have similar total enrollments and shares of students who are economically disadvantaged, but different school district sizes; they were also relatively early reporters of school-level spending data. We focus on the role of the number of schools per district in this paper, but other factors—notably the level of within- and between-district segregation—can also influence the extent to which measures of inequality and progressivity differ when calculated at the school versus district level. Just how equal or progressive states appear can vary based on whether data are observed at the school or district level; the magnitude of the differences we show here should be interpreted as specific to these two states.

School-level Resource Allocation and Measurement

In this section, we review how school districts allocate local, state, and federal resources to the school level, how staff seniority and pay can vary across schools within districts, and how the school-level spending data are constructed.

The school-based spending data mandated under ESSA were not easy for districts to generate, in part because most school districts do not allocate all resources to the school level in the form of dollars. Instead, districts allocate staff positions, or full-time equivalents (FTEs). In traditional staffing models, districts allocate FTEs to schools based on enrollment, potentially varying FTEs depending on the characteristics of students at a school. In a weighted student funding (WSF) model, these characteristics could include student characteristics such as grade level, free or reduced-price lunch eligibility (FRPLE), disability status, English language proficiency, and more.

If a school district implicitly weighted all students equally, assigning FTEs solely based on how many students attend each school, each school within a district would have the same number of FTEs per pupil. They would not necessarily—or even likely—have the same expenditure per pupil based on the salaries and benefits for those FTEs. Roza and Hill (2004) looked at teacher salary data for four large school districts and found that higher-poverty schools had lower teacher salaries than average; Roza (2006) found the same pattern in another study of nine different large districts. Because salaries typically increase with seniority, high-poverty schools use fewer dollars to pay the same number of teachers. This dynamic alone raises substantial concerns about fairness within school districts, and has driven support among some advocates for use of WSFs.

Meanwhile, additional federal and sometimes state resources flow to schools serving students with disabilities, English language learners, or free or reduced-price lunch eligible students —these resources flow in dollars, not FTEs (Chingos et al., 2017; Smith et al., 2013). That is, a school with $100,000 of federal Title I funds could choose to hire one person whose salary and benefits cost $100,000, or two full-time staff who cost $50,000 each. Depending on the amount, these resources could partially, completely, or more than fully offset the impact of seniority-based pay and higher turnover in higher-poverty schools.[2]

In the absence until quite recently of national data on school-level spending, research on the magnitude of spending differences across schools and how it relates to demographics was sparse. The Civil Rights Data Collection has been the largest national data source which asked about school-level spending in a national sample, but many districts were ill-equipped to report it accurately. Using these data, Amerikaner (2012) found that about 60 percent of school-level spending differences within states were due to differences across districts, with the remaining 40 percent due to differences across schools within the same district. Roza (2006) examined finances of nine large school districts using their internal records, and identified spending gaps between higher- and lower-poverty schools. Her data show these gaps come from differences in average teacher salaries across schools, as well as from districts disproportionately assigning unrestricted funds to lower-poverty schools.

The new data afford new opportunities to understand the progressivity of within-district spending in more districts in a more recent time period than the bulk of the school finance literature, which takes a between-district approach. Lee, Shores, and Williams in this issue are

[2] Some schools have parent organizations that raise funds to supplement the regular school program. This spending will not be captured in these measures, unless it is used to hire school personnel, so this is a potential source of unmeasured inequality at the school level.

the first (to our knowledge) to use the newly required school-level spending data to assess this question with a national sample. They draw on the total spending per-pupil measure mandated by ESSA as well as staffing measures reported in the Civil Rights Data Collection: within districts, they estimate that per-pupil spending on free lunch eligible students exceeds that for their peers by $355. Free lunch eligible students also have more teachers per pupil, and are exposed to a greater share of novice teachers. They do not show these estimates at the state level, so we do not compare our findings to theirs.

These types of studies have fueled policy interest in how school districts distribute state and local resources to schools within *districts* and likely contributed to the ESSA school-level reporting requirement. In this paper, we ask how patterns of school spending within *states* compare when measured with school- versus district-level data. The fact that other studies have established non-uniform spending across schools within districts supports the relevance of our question.

Conceptual Framework

We consider how the level at which we observe the data—that is, at the school level, or the school district level—affects comparisons across states for measures of both inequality and progressivity. We compute three measures of inequality—the 90/10 ratio, the Gini coefficient, and the coefficient of variation—to explore how equal spending levels are across schools. To examine progressivity, we calculate how much schools attended by free or reduced-price lunch eligible (FRPLE) students spend compared to schools attended by their non-FRPLE peers. FRPLE extends to students in families with incomes up to 185 percent of the poverty line; at times we refer to FRPLE students as “economically disadvantaged” for expositional ease. It is common in the existing literature to construct these types of measures for individual states using

district-level school finance data (reported in the F-33); such state measures capture patterns across districts in a state. Now that we can observe spending at the school level, we can examine how spending is distributed across all schools in a state, between school districts in a state, and across schools within school districts.

To illustrate how the level at which we observe the data can lead to different conclusions, consider the extreme case of Hawaii, which in 2018-19 had 292 public schools in one statewide school district. When we observe data only at the district level, we cannot observe any inequality in spending, nor can we see any relationship between school spending and enrollment of economically disadvantaged students. All we know is that statewide (and districtwide), average spending was $16,105 per pupil, and about half of students in Hawaii were economically disadvantaged (*ELSI - Elementary and Secondary Information System*, n.d.).

If instead we observe spending at the school level, as mandated under ESSA, we can investigate inequality in school-level spending. For example, we can rank schools by per-pupil spending to see that the school at the tenth percentile in Hawaii spent $14,589, and the school at the 90th spent $19,040—about 1.3 times as much. While this 90/10 ratio reveals that spending is not equal across Hawaiian schools, it alone cannot tell us if the distribution of spending across schools is desirable, or even redistributive.

To understand whether lower-income students experience higher school spending than higher-income students, we can use school-level Hawaiian spending data alongside enrollment data. To look at the progressivity of school spending, we weight school-level per-pupil spending by the number of FRPLE students in the school, and see that the average FRPLE student attended a school that spent $16,455 per pupil, compared to $15,809 for the average non-FRPLE student. In other words, economically disadvantaged students' schools spent about 4 percent

more per pupil. With school-level data, we can see that the system is moderately progressive, distributing more funds to schools that serve more economically disadvantaged students. But with only the district-level data (for the single district in the state), we would not be able to observe this. Indeed, Hawaii, the District of Columbia, and Puerto Rico all are treated as if they have achieved maximum equity for the purposes of the Title I Education Finance Incentive Grant, because each of these areas has just one regular school district.

The Hawaiian arrangement of a single statewide district is unique among the fifty states. In some states, school districts are large geographically and in terms of enrollment (e.g., at the county level), while in others they are smaller (e.g., at the township level). School districts in sparsely populated areas will tend to have low enrollment and relatively few schools.

Because neighborhoods tend to be segregated by income and students typically attend schools relatively near their homes, schools are also segregated by income. The larger districts are, the more likely it is that schools serving both lower- and higher-income students are in the *same district*, even if they are not in the same neighborhoods or schools. Now assume that schools attended by economically disadvantaged students spend systematically different amounts compared to their more advantaged counterparts. Whether lower-income students are in schools that spend less on average, as in the districts Roza (2006) studied, or more on average, as in the more recent Hawaiian data, school-level spending differences will be invisible in district-level data when districts have many schools.

The size of school districts may also directly influence levels of residential and school segregation. Smaller school districts create more opportunities for families to sort based on their ability to pay, and their preferences for school and peer characteristics. Indeed, some argue that larger districts would promote more equitable funding. But the measurement issue described

above is present even if families do *not* sort into school districts based on their preferences and ability to pay for schooling. States with larger districts might appear more equal, even if they are not, simply because we cannot see the inequality in district-level data.

To explore these dynamics, we conduct our analyses separately for two states, Florida and Illinois, which we selected based on their very different school district scales. Both states are large—in fall of 2018, there were 4,004 public schools serving 2,846,444 students in Florida and 4,261 schools serving 1,982,327 students in Illinois. Yet these schools and students are spread over just 67 districts in Florida, versus 892 districts in Illinois. The average district in Illinois enrolled 2,200 students, compared to an average of more than 44,000 in Florida. Appendix Table 1 shows how Florida and Illinois compare to all U.S. states on measures of economic segregation, schools per district, and students per school. Across measures, the U.S. average falls between that for Florida and Illinois. The larger scale of districts in Florida creates more scope for within-district segregation, compared to Illinois, and the data reflect this; relatedly, Illinois has more potential for, and observed, between-district segregation than Florida.

Data

To construct the measures of inequality and progressivity, we use school-level data on per-pupil expenditure, grade span, and the share of students eligible for free or reduced-price lunch for the 2018-19 school year as reported by the state departments of education in Florida and Illinois (Florida Department of Education, 2020a; Florida Department of Education, 2020b; *Illinois Report Card*, n.d.).[3] The data collection for school-level spending is relatively new. We

[3] Researchers seeking commonly formatted data for multiple states can find them, with documentation, at https://edunomicslab.org/nerds/ (Edunomics Lab, 2021).

recommend researchers using these ESSA-mandated data examine them for state-specific anomalies.

Sample selection

Summary statistics for all schools in Florida and Illinois are reported in the first two columns of Table 1. Total spending per-pupil in Florida (about $8,500 for the average school) was significantly less than in Illinois (about $13,000).

In column 3, and in all subsequent analyses, we drop some districts in Illinois based on funding patterns that lead us to suspect considerable reporting error. These patterns relate to the share of each school's spending that is reported as associated with costs specific to the individual school site, versus from its share of centralized (district-level) spending.[4] Most districts allocate centralized costs to their schools proportional to enrollment. That is, centralized per-pupil expenditure does not vary across schools in the same district, so when these expenditures are larger on average, the within-district component of inequality will decline and the between-district component will increase if these expenditures vary across districts. In the extreme case where all school-level funding is centralized funding allocated based on enrollment, the school-level spending would not vary within a district; this would run counter to the intent of the mandate. To the extent that centralized spending does not benefit all schools equally, we will tend to underestimate within-district inequality if districts fail to attribute funding to sites accurately and instead simply allocate central funding on a per-pupil basis.

Many districts in Illinois reported high shares of expenditure as centralized (sometimes 90 percent or more). Because the site-based spending is supposed to reflect salaries of site-based

[4] States also are required to report spending from federal funds and spending from state or local funds separately.

employees (e.g., teachers), and given the importance of site-based expenditures in overall budgets, we find it implausible that a sizable majority of spending would be centralized. Column 2 of Table 1 reports descriptive statistics for all districts in Illinois; column 3 reflects the sample we use going forward, where we somewhat arbitrarily limit the sample to districts where more than 70 percent of reported expenditure was associated with school sites (rather than central). Fortunately, this limitation yields a sample of Illinois districts with similar characteristics, in terms of average spending and student characteristics, to the full sample, as revealed in the two columns; it did not cause us to drop any districts in Florida. Even after dropping these districts, however, 95 percent of total spending in Florida schools is reported as site-based, compared with 79 percent in Illinois. In addition, the data for Jefferson County school district in Florida (which only has three schools) are inconsistent with district aggregates reported elsewhere, so we exclude it from all analyses as well as the descriptive statistics in Table 1.

Because the inequality measures we calculate (excluding the 90/10 ratio) can be quite sensitive to outliers, we trim the top and bottom one percent of schools ranked by per-pupil spending within each state, weighted by enrollment.[5] For the district-level measures, we aggregate the trimmed school-level data and do not trim again at the district level.[6] For a useful discussion of outliers in the school-level spending data in multiple states, we refer readers to Lee, Shores, and Williams in this issue.

Measuring economic disadvantage

[5] Measured school-level inequality is significantly higher in Florida in the untrimmed data according to the Gini coefficient and coefficient of variation, but trimming 3 percent instead of 1 percent does not substantially affect the results.

[6] If instead we aggregate to the district level and then trim, which may be more comparable to what is done in the existing literature using district-level data, the estimates of inequality are somewhat lower for Florida and similar for Illinois, but the pattern of results is unchanged.

To calculate our measures of progressivity, we must incorporate school-level measures of student economic disadvantage. We rely here on free or reduced-price lunch eligibility (FRPLE) rates, the only measure of student economic disadvantage available at the school level nationally.[7] Based on these school-level data, weighted by enrollment, 58 percent of Florida students and 49 percent of Illinois students (52 percent in the restricted sample) were eligible for free or reduced-price lunch (Table 1).

Students can qualify for free or reduced-price lunch in several ways. A student is deemed "categorically" eligible if their family receives means-tested benefits.[8] Students may also qualify based on parental-reported family income. Students in families earning 130 percent or less of the federal poverty level qualify for free meals, and students in families earning 131 percent to 185 percent of the federal poverty level qualify for reduced-price meals ("Special Nutrition Program Operations Study: State and School Food Authority Policies and Practices for School Meals Programs School Year 2011-12," 2014). One limitation of the data is that when income-eligible families don't participate in programs that would qualify the students automatically (such as SNAP), and do not report their income to opt in to FRPL, those students are excluded from FRPLE counts (Greenberg, Blagg, and Rainer 2019). Some schools or districts offer universal free meals through the Community Eligibility Provision or other programs; in these schools, all

[7] The NCES EDGE School Neighborhood Poverty Estimates use geographic data on the location of school buildings and the economic data from the Census Bureau's American Community Survey to generate an income-to-poverty ratio for the neighborhoods encompassing school buildings. This poverty measure reflects the economic condition of the school's neighborhood, but public school enrollment is not always representative of the neighborhood.

[8] In practice, the bulk of categorical eligibility comes from participation in the Supplemental Nutrition Assistance Program. In some states, students may qualify based on family income on record for Medicaid participation. ("Special Nutrition Program Operations Study: State and School Food Authority Policies and Practices for School Meals Programs School Year 2011-12," 2014).

students are able to receive free meals, even if they do not meet these criteria. Reassuringly, relatively few schools report 100 percent FRPLE in our data.

Results

We show how observing per-pupil spending data at the school, instead of district, level affects not only the level of measured inequality and progressivity, but the comparisons across states.

Inequality

Figure 1 shows the distribution of per-pupil spending, weighted by enrollment, for the analytic sample described above. The panels on the left show the distribution of school-level spending. The red represents elementary and middle schools, and the blue represents high schools (we come back to this distinction below; for now, the discussion focuses on the total height of the stacked bars). The top row shows Florida data, the middle shows Illinois, and the bottom shows Illinois excluding Chicago.

Overall, the distribution of spending appears somewhat more unequal in Illinois than in Florida: the tails are longer and the overall distribution of schools is more spread out over different spending levels. For the panels on the right, we aggregate the school-level spending and enrollment data represented in the panels on the left to the district level, comparable to what has traditionally been studied in the school finance literature. For Illinois, per-pupil spending at the district level is highly variable. In the middle row, we see a large spike around $12,500 per pupil, corresponding to Chicago Public Schools, which accounts for almost a third of students and schools in the sample. The school-level distribution is more compressed when aggregated to the district level in Florida, compared to Illinois.

The bottom row of Figure 1 shows the same data as the middle row for Illinois, but excluding all schools in Chicago to make it easier to see the distribution for the rest of the state. The school- and district-level panels for Illinois *without* Chicago (in the bottom row) look quite similar to one another, but not when we include Chicago (in the middle row). This suggests that most of the school-level variation in Illinois that is obscured when we examine district-level data comes from schools in Chicago, by far the largest district in Illinois. This makes sense because most Illinois districts have far fewer schools, and therefore less scope for within-district variation in spending, than Chicago.

Put differently, because Illinois has smaller districts with fewer schools per district than Florida, we can observe much more of the *school*-level variation in per-pupil spending in Illinois when we look at district-level data than we do in Florida. That is, when districts are large, district averages can mask considerable within-district variation. Illinois still appears to have less equal school spending than Florida does—but the difference between the two states is not as large as the district-level aggregates would suggest.

In Table 2, we report three different measures of spending inequality: the 90/10 ratio, the Gini coefficient, and the coefficient of variation. See Appendix A for further discussion of these measures. For each state, we report these measures including all schools (columns 1 and 2 for Florida and Illinois respectively), for all elementary and middle schools (columns 3 and 4), and for all high schools (columns 5 and 6). We exclude schools that only offer early childhood education. The "high schools" category in practice includes any schools that include 12th grade, even if they also include grades below 9th grade.

We are interested in examining inequality in spending *across schools, regardless of which district they are in.* Conceptually, inequality at the school level has two components:

inequality *between* districts and inequality across schools *within* districts. Some inequality measures allow for a formal decomposition of total (in our case school-level) inequality into the within- and between-district components.[9] The measures we report have intuitive interpretations and are commonly used in the literature, but they do not have this feature. That is, the between- and within-district measures do not sum to the school-level measure.

We calculate three versions of each inequality measure corresponding to the following three concepts. (1) *Inequality across all schools* is calculated using data on all schools in the state, without regard for district boundaries. (2) *Between-district* inequality is the inequality in school district average spending (calculated from the school-level data, weighted by enrollment); this is the measure used in most prior research.[10] (3) For *within-district* inequality across schools, we calculate the measure separately for each school district and then report the average across school districts in each state, weighted by enrollment.

All three measures—the 90/10 ratio, Gini coefficient, and coefficient of variation—show a similar pattern: inequality measured at the school level (the "across all schools" rows) is more similar in the two states than one would think based on district-level data (the "between district" rows). Compared to Illinois, Florida has more inequality across schools *within* districts (which have many schools) and less inequality *between* districts. The magnitude of these differences varies somewhat depending on the measure of inequality and whether we focus only on elementary and middle schools, but the general pattern is present across all measures and for all schools together or separately by level.

[9] For example, the Theil index can be decomposed, but it is difficult to interpret the magnitude and it is even more sensitive to outliers than the measures used here, so we do not use it.

[10] The district-level measures of inequality we report in Table 3 using this method are similar to those yielded by the F-33 finance data only reported at the district level (estimates not shown).

For example, the *total* Gini coefficient suggests inequality in spending across all schools in Illinois is somewhat higher than in Florida (13 versus 10.5; the Gini coefficient ranges from zero, to 100, with zero indicating complete equality); if we relied on aggregated data, we would think the difference was much larger, as the *between-district* Gini coefficients for Florida and Illinois are 6.6 and 15.1, respectively. The *within-district* values show that the average district in Florida (weighted by enrollment) has a within-district Gini coefficient of 9.4, reflecting more inequality than the average district in Illinois where the enrollment-weighted mean is 6.0. Again, this makes sense because districts in Florida are larger and have more schools than in Illinois. Across all the measures (90/10 ratio, Gini coefficient, and coefficient of variation), Illinois shows higher *between-district* inequality than Florida, but these differences are much smaller when looking at *total* school-level inequality. This is because within-district inequality is higher in Florida than in Illinois.

The school-level data in columns 3 through 6 of Table 2 also show differences between the two states in how high schools are funded relative to elementary and middle schools. In Florida, high schools are lower-spending compared to elementary and middle schools, whereas in Illinois, high schools are higher-spending compared to elementary and middle schools. The school-level spending data are relatively new and have not been widely used, so it is possible that this pattern reflects differences in how data are reported in the two states rather than more fundamental resource allocation differences. Nevertheless, when schools serving different grade spans are mixed within unified districts, these types of differences are by definition invisible in district-level data. If these two states have indeed made different decisions about how to divide resources between high schools and other schools, rather than set different reporting protocols, future work could examine the causes and consequences of these differences.

Progressivity

Inequality measures indicate whether some schools spend more than other schools, but understanding *which* schools spend more is relevant for policy. Inequality could be high because high-poverty schools spend more than low-poverty schools, perhaps due to progressive state finance systems. Inequality could also be high if low-poverty schools spend more than high-poverty schools, due to a reliance on local property tax finance. These two situations could yield identical measures of equality, but with very different implications for progressivity.

Figure 2 shows the relationship between the share of students who are economically disadvantaged and per-pupil spending. As with Figure 1, we show this relationship at the school level (2a for Florida and 2c for Illinois on the left) and using the same data aggregated to the district level (2b and 2d on the right); for the district-level data, the size of the bubble is proportional to district enrollment. In Florida, the relationship between student economic disadvantage and per-pupil spending is positive—that is, progressive, as schools with higher shares of FRPLE students spend more per pupil on average. In Illinois, the relationship is U-shaped: most of the highest-spending schools enroll small shares of FRPLE students, but schools with the highest shares of FRPLE students spend more on average than those with moderate shares. The modest positive relationship in Florida at the school level (2a) remains visible when aggregating to the district level (2b). In contrast, the U-shaped pattern in Illinois at the school level (2c) is less evident at the district level (2d), as we cannot see the higher-spending high FRPLE schools in the district-level averages.

In Table 3, we report the average of per-pupil expenditure in each state, then the average weighted by FRPLE enrollment, weighted by non-FRPLE enrollment, and the ratio of the two. We report these measures calculated based on school-level (Panel A) and district-level (Panel B)

versions of these data. As with the inequality measures, the district-level patterns in Panel B are similar to those generated with the district-level F-33 data (estimates not shown).

Panel A shows that the average FRPLE student in Florida attended a *school* that spent $8,508 per pupil, about 6 percent more than the $8,006 for the school of the average non-FRPLE student. However, we cannot see this relationship, which we characterize as modestly progressive due to the extent it favors economically disadvantaged students, in the district-level data. Panel B shows that in Florida, the average FRPLE student is in a *district* that spends $8,372 per pupil, similar to the $8,294 per pupil spent in the average non-FRPLE student's district.

In Illinois, the school-level spending patterns are regressive: average spending in schools attended by FRPLE students was $12,717, about 4 percent lower than the $13,275 in schools attended by non-FRPLE students. Progressivity measured at the district level (Panel B) and school level (Panel A) are similar.

As with the inequality measures discussed above, the district-level data reveal more of the relevant variation in school-level spending in Illinois than they do in Florida, where districts contain many more schools. The ranking of the two states is the same whether we use the school- or district-level data—Florida looks more progressive than Illinois—but the difference between the two states is substantially larger when the measures are derived from school-level rather than district-level data. The district-level data mask some of the regressivity present across all schools in Illinois, and most of the progressivity across all schools in Florida that can be seen in the school-level data.

Viewing the data at the school (rather than district) level will typically have a larger effect on our understanding of spending patterns in states where districts have many schools, because larger districts can mask more variation in spending in aggregate data. The school-level

variation within larger districts could mean that school-level spending distributions are more progressive *or* more regressive than the district-level analyses reveal. Without the school-level data, it is impossible to tell.

Discussion

Much of the literature on school finance focuses on the variation in spending across school districts within states, often comparing states to one another along measures of equality or progressivity. This is an important goal, given the outsize role state-level policy plays in school finance. However, when one wishes to compare how funds are distributed within different states, the level at which one can observe the data—that is, at the school versus district level—can shape how states' school finance systems are characterized. The choice of level of observation matters more when school districts contain many schools.

Ranking states by equality or progressivity is not simply an intellectual exercise. There are high stakes uses of these measures; for example, Title I's EFIG formula rewards states with federal funding based on an inequality measure constructed from district-level data, and advocates make legal arguments about the fairness of school finance laws based in part on measures of inequality.[11] If one cares about the distribution of resources to schools, as opposed to districts, one could get the wrong ranking of states using district-level data. At the same time, spending data have been reported at the school level for only a short time, and there is room for improvement in the consistency and transparency of reporting. In this paper we consider only two states, but document suspiciously high shares of centrally allocated funding in Illinois.

[11] The EFIG formula incorporates a weighted coefficient of variation in current per-pupil spending, in which each district's Title I eligible students are weighted at 1.4 and non-Title I eligible students are weighted at 1.0, as the Equity Factor. This metric does not distinguish between progressive variance due to spending *more* in the schools attended by Title I-eligible students versus regressive variance due to spending *less* in them.

Hopefully, the quality of these data will improve as states and school districts get more experience producing these data and external monitors assess them.

Understanding how spending is distributed across schools and districts within states is important, but a more complete understanding of how resources are allocated nationally will also require increased attention to cross-state differences in average spending, in addition to variation across schools within districts. For example, Illinois is by no means an exemplar in equitable school finance, yet its average per-pupil spending of $13,000 is about 50 percent higher than Florida's of $8,500. Attention to the average level of spending in a state, in addition to how it is allocated across districts and schools, is warranted.

Equipped with the newly available school-level data, researchers will be able to better understand the factors that influence how educational resources are allocated at the state, school district, and school level.

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Appendix A. Measures of inequality and progressivity

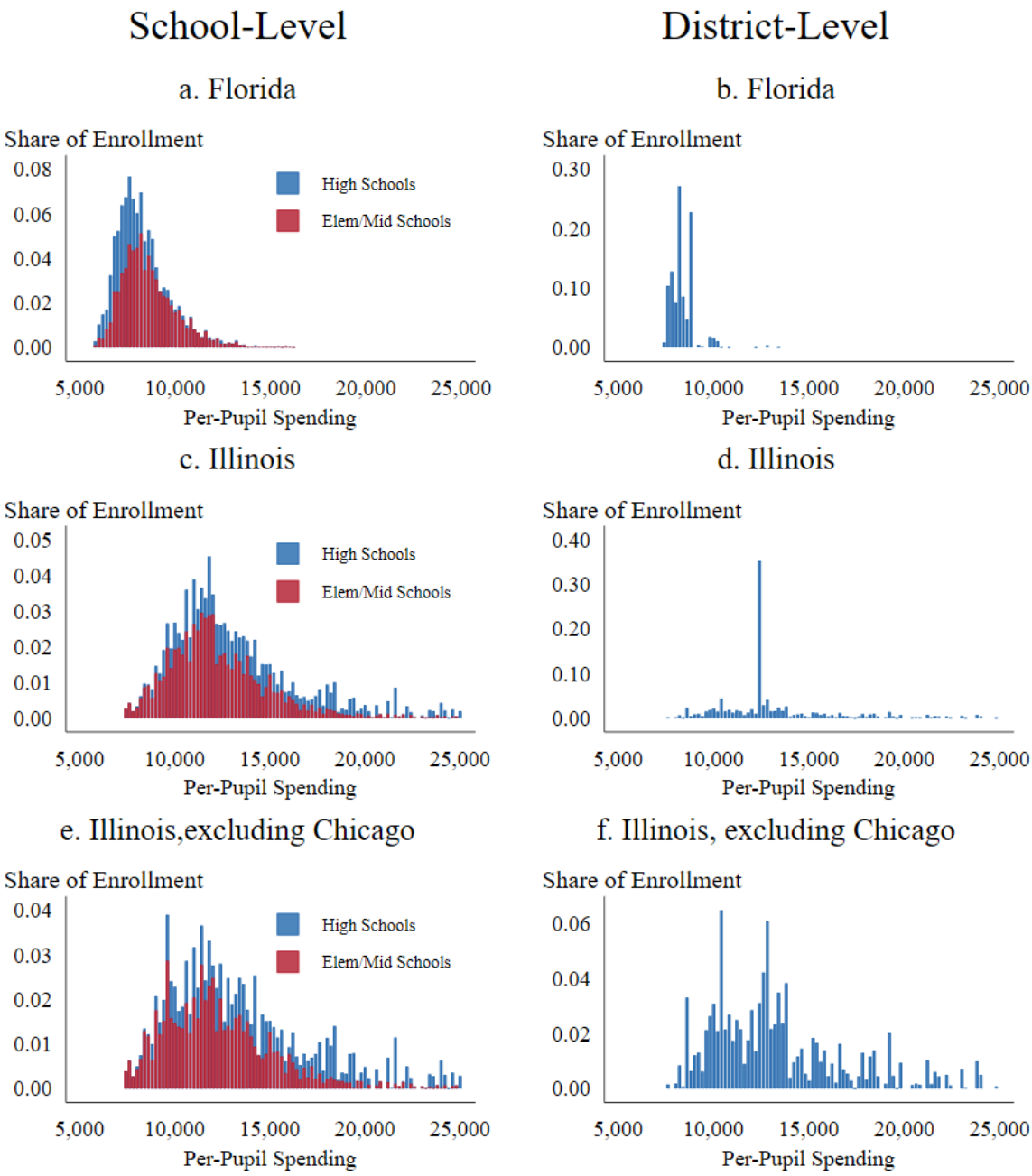
We use per-pupil expenditure and FRPLE data (share economically disadvantaged) to construct three measures of inequality and one measure of progressivity in school-level spending. We begin with the measures of inequality: the 90/10 ratio, the Gini coefficient, and the coefficient of variation. Each of these three measures captures aspects of the full distribution of school-level spending.

The 90/10 ratio is the most straightforward inequality measure. In Florida, ordering all schools in the state from lowest to highest per-pupil spending, weighted by enrollment, the school at the tenth percentile spent $6,812, and the school at the ninetieth spent $10,281. The 90/10 ratio is simply the ratio of those values: in this case about 1.5. In Illinois, school spending levels are greater overall: the school at the tenth percentile spent $9,573, the school at the 90th percentile spent $17,685, and the 90/10 ratio is 1.8.[12] In other words, the gap between low- and high-spending schools is greater in Illinois, where the school at the 90th percentile spent close to twice as much as the school as the 10th percentile, than in Florida, where the 90th percentile school spent only one and a half times as much as the school at the 10th percentile.

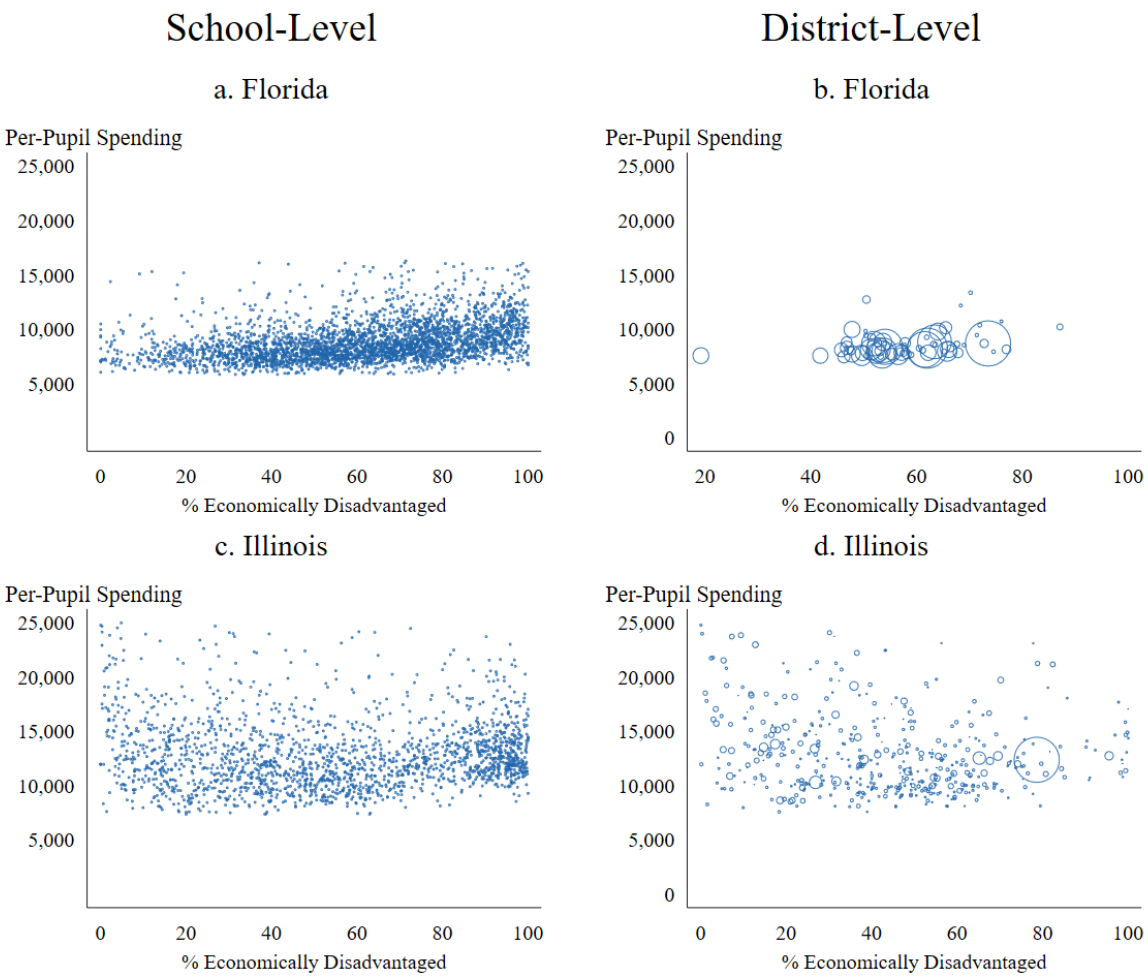
While the 90/10 ratio is easy to interpret, it does not incorporate the full distribution of the data, only the values at the 90th and 10th percentile, ignoring everything in between. The Gini coefficient captures in a single number how the entire distribution deviates from an equal distribution, where every school spends the same amount. It ranges from zero, representing perfect equality, to 100, measuring perfect inequality. The coefficient of variation is the ratio of the standard deviation of a distribution to its mean. In our context, this standardization is important because the average spending statewide differs between Florida and Illinois.

[12] These figures are based on the trimmed sample as described in the main text.

In addition to these measures of inequality, we construct a simple measure of progressivity in school spending. In each district, we calculate the average spending per-pupil in schools attended by FRPLE students (that is, weighted by the number of FRPLE students enrolled in the school) and the average spending per-pupil in schools attended by non-FRPLE students, then take the ratio. A value greater than one means that on average, per-pupil spending is higher in schools attended by FRPLE students than in schools attended by non-FRPLE students; a value of one means the two are equal; a value less than one means more is spent in schools attended by higher-income students than lower-income students. We calculate non-FRPLE enrollment by subtracting FRPLE counts from total enrollment at the school level. We rely on data from the Florida Department of Education's Archive of Data Publications and Reports and the Illinois State Board of Education's Report Card Data Library for enrollment counts.



Notes: Districts reporting more than 30 percent of spending as centralized and Jefferson County, FL are excluded. We trim the top and bottom 1% of schools ranked by per-pupil spending, weighted by enrollment. All schools that include 12th grade are classified as high schools, even if they also serve grades below 9th grade. See text for details.



Notes: Districts reporting more than 30 percent of spending as centralized and Jefferson County, FL are excluded. We trim the top and bottom 1% of schools ranked by per-pupil spending, weighted by enrollment. See text for details.

TABLE 1 Descriptive Statistics

	Florida	Illinois	Illinois (restricted sample)
School-level data			
Site-based per-pupil (PP) spending	$8,148	$9,069	$10,341
Total PP spending	$8,534	$13,004	$13,086
1st percentile total PP spending	$5,845	$7,390	$7390
99th percentile total PP spending	$16,117	$24,685	$24,685
% Free or reduced-price lunch eligible	58%	49%	52%
% American Indian	0%	0%	0%
% Asian	3%	8%	8%
% Black	22%	16%	19%
% Hispanic	34%	26%	28%
% White	37%	48%	43%
Number of schools	3,587	3,706	1,991
Number of schools per district			
Mean	54.3	4.3	4.3
Median	21.0	3.0	2.0
10th percentile	4.0	1.0	1.0
90th percentile	146.0	7.0	6.0
Average enrollment (per school)	743.4	493.9	530.0
Total enrollment (per district)	40,401	2,131	2,304
Number of districts	66	859	458
Number of elementary and middle schools per district			
Mean	41.4	3.9	4.2
Median	15.0	2.0	2.0
10th percentile	2.0	1.0	1.0
90th percentile	112.0	7.0	6.0
Average enrollment (per school)	669.0	357.0	349.7
Total enrollment (per district)	27,723	1,402	1,460
Number of districts	66	761	376
Number of high schools per district			
Mean	12.9	1.5	1.9
Median	7.0	1.0	1.0

10th percentile	1.0	1.0	1.0
90th percentile	35.0	2.0	2.0
Average enrollment (per school)	850	728	889
Total enrollment (per district)	10,973	1,099	1,733
Number of districts	66	475	216

Sources: Florida Department of Education's Archive of Data Publications and Reports, Florida Department of Education's Every Student Succeeds Act (ESSA) Per-pupil Spending, Illinois State Board of Education's Report Card Data Library, and Common Core of Data (CCD) Public School Universe.
Notes: The restricted sample includes only districts in which at least 70 percent of funds are allocated to school sites, as opposed to centrally. Jefferson County, FL is excluded.

TABLE 2 Measures of Inequality in Total Per-Pupil Spending

	All Schools		Elementary and Middle Schools		High Schools	
	Florida	**Illinois**	**Florida**	**Illinois**	**Florida**	**Illinois**
	(1)	(2)	(3)	(4)	(5)	(6)
Mean	$8,340	$12,982	$8,641	$12,252	$7,695	$14,369
90/10 ratio						
Across all schools	1.51	1.85	1.52	1.66	1.34	1.99
Between-district	1.15	1.70	1.17	1.49	1.19	1.88
Within-district	1.45	1.29	1.45	1.31	1.28	1.18
Gini						
Across all schools	10.53	13.00	9.98	12.39	11.48	14.04
Between-district	6.58	15.12	5.96	14.17	9.53	14.94
Within-district	9.39	6.02	8.73	6.23	9.19	3.96
Coefficient of variation						
Across all schools	19.73	24.22	18.52	23.06	23.40	25.67
Between-district	13.83	27.99	11.92	26.68	20.63	27.80
Within-district	17.66	13.35	16.25	13.22	19.70	12.51
Number of schools	3,349	1,926	2,673	1,529	676	397
Number of districts	66	441	66	360	66	207

Sources: Florida Department of Education's Every Student Succeeds Act (ESSA) Per-pupil Spending, Illinois State Board of Education's Report Card Data Library.
Notes: Jefferson County, FL and districts in Illinois reporting more than 30 percent of funds as centrally allocated are excluded. The "high schools" category includes any schools that include 12th grade, even if they include grades below 9th grade.

TABLE 3 Progressivity of Spending

		Florida	Illinois
A. Across all schools			
	Mean spending per pupil (PP)	$8,340	$12,982
	Weighted by FRPLE enrollment	$8,580	$12,717
	Weighted by non-FRPLE enrollment	$8,006	$13,275
	Ratio FRPLE: non-FRPLE	1.07	0.96
	Number of schools	3,349	1,926
B. District Level			
	Mean spending PP	$8,340	$12,982
	Weighted by FRPLE enrollment	$8,372	$12,617
	Weighted by non-FRPLE enrollment	$8,294	$13,387
	Ratio FRPLE: non-FRPLE	1.01	0.94
	Number of districts	66	441

Sources: Florida Department of Education's Archive of Data Publications and Reports, Florida Department of Education's Every Student Succeeds Act (ESSA) Per-pupil Spending, Illinois State Board of Education's Report Card Data Library.
Notes: FRPLE is Free or Reduced Price Lunch Eligible; the statistics above excludes Jefferson County, Florida, and districts in Illinois reporting more than 30 percent of funds as centrally allocated.

APPENDIX TABLE 1 Florida and Illinois compared to the United States

			All U.S. States		
	Florida	**Illinois**	**Mean**	**25th percentile**	**75th percentile**
	(1)	(2)	(3)	(4)	(5)
Number of districts	67	870	416	145	491
Number of schools per district (unweighted)	59.6	4.6	10.4	4.6	10.4
Average district enrollment (unweighted)	42,297	2,282	5,897	2,019	5,412
Share of students in unified district	1.00	0.44	0.86	0.85	1.00
Share free or reduced-price lunch eligible (FRPLE)	0.56	0.51	0.49	0.41	0.55
Dissimilarity index in district of average student	0.24	0.10	0.15	0.10	0.19
FRPL isolation index in district of average student	0.60	0.46	0.52	0.43	0.61
FRPL isolation index in district of average FRPL student	0.64	0.68	0.61	0.54	0.67

Sources: Reardon et al. (2021) and Common Core of Data Local Education Agency (LEA) universe.
Notes: Washington, D.C. and Hawaii are excluded. Charter-only districts and other districts are excluded. The number of school districts and share of students eligible for free or reduced-price lunch (FRPL) do not match those in Table 1 because this table uses National Center for Education Statistics data instead of data from the Florida and Illinois state departments of education.

APPENDIX TABLE 2 Measures of Inequality in Total Per-Pupil Spending, adjusted for CWI

	All Schools		Elementary and Middle Schools		High Schools	
	Florida	**Illinois**	**Florida**	**Illinois**	**Florida**	**Illinois**
	(1)	(2)	(3)	(4)	(5)	(6)
Mean	$9,329	$12,774	$9,659	$12,034	$8,624	$14,181
90/10 ratio						
School-level	1.53	1.73	1.52	1.58	1.40	1.86
Between district	1.16	1.54	1.20	1.35	1.20	1.61
Within district	1.45	1.29	1.45	1.31	1.28	1.18
Gini						
School-level	10.74	11.66	10.07	11.08	12.30	12.18
Between	8.03	12.65	6.75	12.02	11.47	12.09
Within	9.39	6.04	8.73	6.25	9.19	3.98
Coefficient of variation						
School-level	20.12	21.85	18.63	20.93	25.03	22.18
Between	16.40	23.49	13.29	23.20	24.11	22.08
Within	17.66	13.35	16.25	13.23	19.70	12.52
Number of schools	3,349	1,913	2,673	1,521	676	392
Number of districts	66	430	66	353	66	203

Sources: Florida Department of Education's Every Student Succeeds Act (ESSA) Per-pupil Spending, Illinois State Board of Education's Report Card Data Library, NCES Comparable Wage Index for Teachers (CSWIFT).

Notes: Jefferson County, FL and districts in Illinois reporting more than 30 percent of funds as centrally allocated are excluded. The "high schools" category includes any schools that include 12th grade, even if they include grades below 9th grade.

APPENDIX TABLE 3 Progressivity of Spending, adjusted for CWI

		Florida	Illinois
A. School Level			
	Mean spending PP	$9,329	$12,774
	Weighted by FRPLE enrollment	$9,581	$12,377
	Weighted by non-FRPLE enrollment	$8,980	$13,212
	Ratio FRPLE: non-FRPLE	1.07	0.94
	Number of schools	3,349	1,913
B. District Level			
	Mean spending PP	$9,329	$12,774
	Weighted by FRPLE enrollment	$9,351	$12,283
	Weighted by non-FRPLE enrollment	$9,299	$13,316
	Ratio FRPLE: non-FRPLE	1.01	0.92
	Number of districts	66	430

Sources: Florida Department of Education's Archive of Data Publications and Reports, Florida Department of Education's Every Student Succeeds Act (ESSA) Per-pupil Spending, Illinois State Board of Education's Report Card Data Library, NCES Comparable Wage Index for Teachers (CSWIFT).
Notes: FRPLE is Free or Reduced Price Lunch Eligible; the statistics above excludes Jefferson County, Florida, and districts in Illinois reporting more than 30 percent of funds as centrally allocated.