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Does Texas' Compensatory Education Funding Get to the Intended Students?

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Abstract: Two questions about Texas school expenditure patterns are examined. First, “How progressive are spending patterns among high and low poverty schools?” Second, “How unequal are expenditures per pupil between schools with at least 70 percent of their students classified as economically disadvantaged, in different districts?” The data, for school year 2017-2018, are restricted to 3,453 elementary and middle schools in 90 large Texas districts. The schools in each district were divided into high and low poverty groups. The differences in the average per pupil spending for operations between the two groups ranged from plus \$1,382 in one district to a negative \$802 in another. The average expenditures in schools with at least 70 percent economically disadvantaged students were 75 percent greater in one district than in another. It is demonstrated that districts with less extreme average levels of low income students have more opportunity to act as good Samaritans, generally exhibiting substantially greater spending in their high poverty schools. This finding supports arguments for student funding weights that increase with increasing proportions of economically disadvantaged students. An incidental finding is that a commonly used measure of funding progressivity is a direct function of district and school level variances in poverty averages, and is therefore biased by them.

Keywords: Educational Finance; Educational Equity (Finance); Texas; Intra-district Equity; Funding Progressivity

Introduction

The State of Texas distributes approximately \$4.0 billion each year to school districts based on the numbers of economically disadvantaged (ED) students that attend its schools. The purpose of these funds is to help reduce the academic achievement gap between ED and non-ED students (Texas Education Agency, 2020a). Students classified as economically disadvantaged were those who were eligible for the federal free or reduced-price lunch (FRPL) program. Apart from the question as to whether this amount of additional funding is sufficient to significantly improve the performance of ED students, there is also the factual question as to whether these funds, distributed by the state to school districts, reach the schools which the qualifying students actually attend.

One might think that answering this question should be fairly straight-forward, given the financial detail found in the Texas PEIMS (Public Education Information System) data system, and the fact that there is a provision in the law that permits the Texas Education Agency (TEA) to conduct periodic studies to see if school districts are complying with the intended use of the compensatory education funds. Chapter 109, Section 109.25 of the Texas school code gives the authority to perform audits of the use of the state compensatory education funds (Texas Education Agency, 2020b). If audits are undertaken, paragraph (f) states that TEA will issue a final report. In response to a Public Information Request for examples of such reports, the representative for TEA replied that “TEA has conducted a good faith search for any and all information related to your request and has not been able to locate information that may be responsive to your request.” This apparent lack of oversight is one of the reasons why this study was undertaken.

The specific purpose of this paper is to address two questions. The first question is, to what extent do schools with greater proportions of ED students exhibit greater total operational expenditures per pupil than other schools in the same district with lower levels of ED students? The observations presented below will shed light on the extent to which these additional compensatory education funds actually get to the schools that the qualifying students attend.

The second question is, how unequal are expenditures per pupil in schools with at least 70 percent of their students classified as economically disadvantaged, comparing the averages for these schools within each district to those in the other districts? These comparisons are, therefore, between the high poverty schools across all of the 90 districts whose data are used in this study. There were 79 districts that had one or more schools with ED rates of at least 70 percent.

In the course of addressing the first of these questions, a side question arose with respect to an apparent problem with one of the commonly used indexes that attempts to quantify the degree of a positive relationship between the percentages of economically disadvantaged students and the levels of per student funding. The positive or negative relationship between poverty and funding is referred to as the degree of progressivity of a state funding system, when school districts are the foci of interest, or the degree progressivity of school districts, when schools are the foci of interest.

Policy Background

The underlying concern of this paper is the continuing academic achievement gaps between groups of students from different socioeconomic backgrounds. The academic performance differences between schools with low percentages of economically disadvantaged students and those with high percentages of such students are plainly visible within the data for Texas elementary and middle school students used herein. Comparing the lowest and highest quintiles of students, based on poverty, one sees the following: for the lowest poverty quintile,

the average pass rate on Texas' STAAR1 test is 91%; for the highest poverty quintile, the average pass rate is 70%. STAAR is the acronym for the State of Texas Assessments of Academic Readiness. STAAR1 refers to test results based on the least demanding scoring criterion, namely "Approaching Grade Level."

The goal of ensuring that all students received at least comparable levels of resources was the original purpose of the profession of school finance (Cubberley, 1905). The early focus was on what came to be called wealth neutrality, designing school finance formulas to channel state money to districts in such a manner as to offset differences in property values per student, the primary funding base for most school districts. More recently, attention has also focused on vertical equity, which attempts to guarantee that students with greater academic deficiencies receive greater amounts of funding designed to eliminate or overcome those deficiencies (Berne & Stiefel, 1999). Inevitably the concern with vertical equity has moved the focus somewhat away from inter-district equity concerns to intra-district concerns, as in many cases students with greater needs tend to be concentrated in different schools within the same districts. A tension has thus developed between those still most concerned with inter-district, indeed interstate, funding differences, and those focusing more on intra-district disparities (Baker & Welner, 2010; Hill, Roza, & Harvey, 2008).

Inter-district versus intra-district equity issue

The specific focus in this paper is on the differences in spending patterns within each of the 90 of the largest school districts in Texas, with particular attention given to spending differences related to poverty differences. When I became curious about the extent to which dollars generated within Texas' school funding formula for low-income students actually reach those students, and learned that the Texas Education Agency apparently does not even monitor the distribution of those funds, my curiosity increased even more.

Analysis and discussion of intra-district expenditure differences should not diminish the importance of inter-district expenditure differences. In considering either, a rational comparison must acknowledge differences in the socioeconomic characteristics of the schools and districts as well as other cost-related factors.

While considerations of both types of differences are valid and important, the two perspectives are not symmetric. Achieving more cost-based inter-district revenue equity requires the heavy lifting. Either more state revenues must be provided and the school finance formula revised to distribute the new revenues appropriately, or, perhaps even more difficult, the existing amounts of state revenues would have to be redistributed. An even more extreme solution would be to redistribute local revenues, as is done to some degree in Texas with the school finance formula's recapture provision. If the additional state revenues to achieve inter-district equity are forthcoming, then existing intra-district expenditure inequities could also likely be achieved with less parent and local taxpayer objections. If state governments were to impose rules and regulations forcing the achievement of intra-district equity without providing new revenues, local resistance to redistributing the existing fixed amounts within each district would likely be very strong. And achieving intra-district equity, district by district, would not alleviate any existing inter-district inequities.

Bruce D. Baker and others have been highly skeptical of some of those who have focused on intra-district inequities. After providing a summary of previous studies of the intra-district equity issue, Baker and Welner critique several on their merits (Baker & Welner, 2010, p.2):

An increasing volume of rhetoric around school finance rests on claims that states have largely met their obligations to resolve disparities between local

public school districts. This premise is then extended to the contention that the bulk of remaining disparities are those that persist within school districts, due to irrational and unfair school district resource allocation practices between individual schools (see, for example, McClure, Wiener, Roza, & Hill, 2008; Public Impact, et al., 2008).

Baker also took issue with two other studies that focused on alleged intra-district inequities (Baker, 2017). One of these came out of the Buckeye Institute in Ohio (Carr, Gray & Holley, 2007); the other was published by Families for Excellent Schools (Families for Excellent Schools, 2015). In both of these Baker took specific issue with their faulty methodology. He also made the assertion that “Over the next decade through the late 2000s, within district inequality became a convenient scapegoat issue for federal policymakers, informed by beltway think tanks.” (Baker, 2017).

It is Baker’s contention that all four of the above-cited studies placed too much emphasis on intra-district expenditure differences and in doing so neglected or diminished inter-district disparities. As mentioned previously, sidestepping or ignoring remaining inter-district revenue disparities, whether in one state or among states, is setting aside the most difficult and costly task. The question is, what might account for the focus in intra-district revenue disparities while ignoring the remaining substantial inter-district and interstate differences? One possible explanation is that several of the organizations involved, and many of the foundations that support them, are supporters or members of the conservative and corporate oriented State Policy Network and the related American Legislative Exchange Council. For example, the authors of the four works cited above by Baker and Welner are associated with or received funding from at least 20 foundations that have provided funds to organizational members of the State Policy Network. These relationships are documented in Appendix C. In addition, papers contained in *Mapping Corporate Education Reform: Power and Policy Networks in the Neoliberal State* also explore the relationship between education policy and corporate-funded support (Au & Ferrare, eds, 2015).

Funding progressivity issue

In addition to inter-district versus intra-district considerations a related issue is that of the degree of funding progressivity of states and school districts. Progressivity is a measure of the degree to which states, or school districts, direct greater resources to schools with relatively greater proportions of ED students. The degree to which expenditures within Texas school districts are concentrated on schools with larger proportions of economically disadvantaged students is a central focus of this paper. One of the measures that has been used to evaluate statewide educational funding progressivity, for all states, will be employed below as a benchmark to this paper’s findings.

Some studies that examined the issue of funding progressivity have broadened the concept to include measures of progressivity as related to the proportions of minority students. Minority-based funding progressivity is not explicitly considered here. Minority status, as such, plays no direct role in the distribution of funds to Texas schools, though funds for Limited English Proficient students might be put in this category. However, it is noted that the correlation coefficient between the percentages of White students and the percentages of ED students in the data analyzed here has a value of -0.863 , meaning more White students, less poverty, or fewer White students, more poverty. The same measure for Hispanic students is 0.753 , and for Black students 0.151 . It should therefore be no surprise that in a number of the districts included in this study that allocate significantly more dollars per pupil to schools with high levels of ED students, the students in those schools are predominately Black and Hispanic students.

Recent work by Sean Reardon and his associates at Stanford Center for Education Policy Analysis has shed new light on the relationship between poverty and educational performance. Using "...8 years of data from all public school districts in the U.S." they reached the following conclusion:

The association of racial segregation with achievement gaps is completely accounted for by racial differences in school poverty: racial segregation appears to be harmful because it concentrates minority students in high-poverty schools, which are, on average, less effective than lower-poverty schools. (Reardon, et al, 2019, p. 1)

Data and Methodology

Data

As one of the objects of this study is to compare the degree of progressivity of expenditures among and within school districts in Texas, it was decided to restrict the analysis to districts with sufficient numbers of schools to make such comparisons meaningful. The minimum number of elementary and middle schools qualifying a district to be selected was set at 14. It was anticipated that the inclusion of high schools would complicate matters, for two reasons. First, many districts have established a variety of different types of high schools, ranging from magnet schools for the performing arts or STEM specializations, to those dealing primarily with students under adjudication. Second, from previous work, it was observed that rates of participation in the federal fee or reduced price-lunch program (FRPL) often dropped substantially among high school students, even though their families' incomes made them eligible. This would have introduced an inconsistency in this poverty measure, which forms the basis for measuring economic progressivity. In addition, it is the author's opinion that the earliest grades are the most critical in addressing the educational needs of economically disadvantaged students. Therefore determining the extent to which school districts direct more funds to their higher poverty schools in the pre-high school grades is especially critical.

Even when restricted to elementary and middle schools within school districts that contained at least 14 such schools, the resulting data set is substantial, comprising 3,453 schools in 90 districts, with a total enrollment of 2,365,078 students. These schools included 69 percent of all elementary and middle school students enrolled in grades 1 through 8 in school year 2017-2018 in public schools in Texas. This number of students--2,365,078-- exceeds the total number of students in all but three other states in the U.S. So even though not all Texas school districts and schools are included in the data being examined, the data does include a consequential number of districts, schools, and students. Table 1 presents data items on several subsets of Texas school districts.

Table 1

Enrollment data for several groupings of Texas school districts

| Type or enrollment groupings | Number of districts or charter systems | Number of schools | Enrollment | Enrollment as percent of regular district enrollment | Percent economically disadvantaged students |
|--|--|-------------------|------------|--|---|
| All districts and charters | 1,200 | 8,759 | 5,385,012 | 105.8 | 58.8 |
| All charters | 177 | 705 | 296,213 | 5.8 | 67.5 |
| All regular districts | 1,023 | 8,054 | 5,088,799 | 100.0 | 58.3 |
| Regular districts less than 1,600 | 642 | 1,534 | 382,463 | 7.5 | 58.1 |
| Regular districts between 1,600 and 5,000 | 197 | 1,45 | 551,017 | 10.8 | 59.9 |
| Regular districts greater or equal to 5,000 | 184 | 5,475 | 4,155,319 | 81.7 | 58.0 |
| 90 districts with at least 14 elementary and middle schools (this study) | 90 | 3,453 | 2,365,078 | 46.5 | 58.9 |

Note: First 7 rows of data taken from Texas Education Agency (2018f). Final row's data obtained from Texas Education Agency (2020c).

The dollar amounts used to compare per pupil spending levels between low-poverty and high-poverty elementary and middle schools are Total General Funds Program Expenditures (Objects 6100-6400 only), for the school year 2017-2018. The school-level expenditure data were downloaded from the TEA website which makes available accounting data for all schools and school districts (Texas Education Agency, 2020c). Amounts to maintain and operate the school facility itself (Plant Maintenance/Operations) were subtracted from those amounts. Federal revenues are not included. Non-federal compensatory education funds that are related to the incidence of economically disadvantaged (ED) students are included. The expenditure amounts reported by schools were not adjusted for possible differences in wage costs in different parts of the state, as the comparisons of most interest are those between groups of schools in the same districts and therefore in the same labor markets.

Texas school district funding calculations begin with a per pupil funding factor called the Basic Allotment. The Basic Allotment is modified in several steps, first using districts' Cost of Education Indexes. Then a scale or enrollment factor is applied for districts with fewer than 5,000 students. Since all of the 90 districts considered in this study had more than 5,000 students, this adjustment for small or mid-sized districts was not applicable. These adjustments to the Basic Allotment result in a funding parameter called the Adjusted Allotment (AA). The AA is then multiplied by the number of regular students (those with no additional weighting factors) to

determine the largest grant line item, and also by the numbers of full time equivalent students in special programs where add-on weights are applied. One of these programs is the compensatory education program, with the additional weight of 0.2. The number of compensatory education students is based on the numbers of students who qualified for the free or reduced-price lunch program during the prior year. In the school year 2017-2018, the year corresponding to the data being used, 58.8 percent of the 5.0 million students in all districts, including charter schools, qualified for compensatory education funding.

The sum of all of the allotments just described totaled \$37.3 billion for the 2017-2018 school year. The amount for compensatory education was \$4.0 billion. The total allotment amount for each district is first funded by local maintenance and operations (M&O) tax revenues, with any shortage made up by the state. This is the calculation that gives rise to that special feature of Texas school finance. If the local revenue from a district's M&O tax rate exceeds the total of all allotments to which it is entitled, the negative difference, with some refinements, is submitted to the state in the form of a recapture payment. There are also two "enrichment tiers" on top of the Tier 1 just described, which generate some additional state dollars for districts that adopt M&O tax rates above the threshold rate of \$1.04 per hundred dollars of equalized assessed valuations. A final twist is that local funds raised with tax rates between 1.04 and 1.07 are not subject to recapture, no matter how property wealthy a district might be, but additional monies raised with tax rates above 1.07 to the maximum permissible 1.17 are, again, subject to recapture, and are matched at a lesser level.

The add-on compensatory education funds generated by the 0.2 additional funding weight is the main focus of this paper. The total amount of the extra 20 percent, if used effectively, could have significant effects on the educational outcomes of the eligible students, namely those whose family incomes qualified them for the federal free or reduced-price lunch (FRPL) program. Researchers Jackson, Johnson, and Persico found that "the estimated effect of a 22.7 percent increase in per-pupil spending throughout all 12 school-age years for low-income children is large enough to eliminate the education gap between children from low-income and non-poor families." (Jackson, Johnson, & Persico, 2016, p. 26).

If results such as those just noted can be achieved with additional funding of 22.7 percent, which is just over the additional amount provided to FRPL-eligible students in Texas, it is especially important to confirm that these funds are being used appropriately. Such concern should not be seen as diminishing the importance of questions of inter-district funding equity. While it may be easier for a well-funded district to be more generous to its higher poverty schools, it is still necessary to ensure that those funds generated for compensatory education programs in all districts are used for the intended purposes.

The state permitted up to 48 percent of the compensatory education funds allocated to districts to be used for overhead expenses. The remaining 52 percent were to be used for the benefit of at risk students, educationally disadvantaged students, and those at risk of dropping out.¹ A single ED student increases the funds going to a typical district by approximately \$1,100.

Methodology

Using the data described, schools with large proportions of ED students should show higher per pupil expenditures than schools with low proportions of ED students, on average, since it can be expected that the revenues in support of "regular students" are distributed among schools on approximately a per capita basis. Thus, students not in the ED category should not be the source of

¹ The TEA school finance calculated amounts for the entire state or for individual districts are available from the Texas Education Agency (Texas Education Agency, 2020d).

significant per pupil funding differences between schools in the same district. It is possible, of course, that some campuses could have greater proportions of higher salaried teachers. This issue is not examined here. A higher incidence of students receiving special education services might also affect observed expenditure levels. The incidence of Limited English Proficient (LEP) students is also ignored. In the aggregate, funding for LEP students is only approximately one-eighth as great as the funding for ED students.

The following steps describe the procedures used.

Schools designated by the Texas Education Agency (TEA) as Elementary and Middle are examined, restricted to the 90 districts with at least 14 middle and elementary schools, combined.

Within each of the 90 districts, the schools were sorted, from low to high, on the basis of the percent of ED students in each. Those schools containing up to but not including fifty percent of the elementary and middle school students in each district with the highest levels of poverty comprise Group 2; the remainder comprise Group 1. These two groups will be referred to as the High Poverty and Low Poverty groups in each district.

There are three key relevant pieces of data for each school: the school enrollment; the percentage of students eligible for the free or reduced-price lunch program (ED students); the Total General Fund (GF) expenditures, minus expenditures for maintenance. The means of the proportions of ED students, and the means of the GF expenditures for Group 1 and Group 2, in each district, are calculated, with enrollments used to determine the means. i.e., weighted by enrollments.

The differences in the means of the GF Expenditures per pupil for the two groups in each district indicate the extent to which districts direct more, the same, or fewer dollars to the campuses in each group. These mean differences thus reflect the extent to which districts allocate more funds, or fewer funds, to those campuses with higher rates of ED students.

In addition to the differences in the means between the low-poverty and high-poverty groups in each district, estimates (described below) were made of how much more, on average, campuses in Group 2 should receive in compensatory education (CE) funds than should be received by campuses in Group 1.

Since the two groups of schools within each district, divided on the basis of an increasing incidence of ED students, have approximately the same total number of students, the estimate of how much more compensatory education revenues per pupil should be received by Group 2, as compared to Group 1, can be written as:

$$\text{Calculated Difference (per pupil)} = (\text{ED}_2\% - \text{ED}_1\%) \times \text{AA} \times 0.2/100. \quad (1)$$

The term AA, described earlier, is the Adjusted Allotment. Also, as pointed out above, the state statute actually permitted up to 48 percent of the CE entitlements to be used for various overhead expenses. (This was reduced to 45 percent in 2019.) Therefore, for a given district the difference between the two groups in the amount required to be spent directly on programs benefiting the educational outcomes of the ED students who generate those funds can be estimated by multiplying the amount calculated in Equation 1 by the factor 0.52. The extent to which districts take advantage of this provision may be one of the factors that affect the results.

Results and Analysis

The basic results for questions 1 and 2 will first be presented, after which several specific problems will be analyzed.

Results

Results, question 1: What is the extent of differences in expenditures between high and low poverty schools in the same districts?

The numerical results for all 90 districts are shown in Appendix A. A summary, in the form of a histogram, is shown in Figure 1. As can be seen in that figure, in 17 districts per pupil expenditures are actually greater, on average, in schools with lower percentages of ED students than in their higher poverty counterparts within the same districts. In these 17 districts the differences between spending in the higher versus the lower poverty groups are negative. It can also be observed in Figure 1 that in seven districts the expenditures per pupil in the higher poverty group exceed those in the lower poverty group by \$1,000 or more. The arithmetic average amount by which expenditures per pupil in the higher poverty groups exceeded those in the lower poverty groups was \$368. The corresponding enrollment-weighted average difference is \$414 per pupil.

Figure 2 exhibits the actual expenditure differences between each district's high and low poverty groups (vertical axis) plotted against the calculated differences, using Equation 1 (above). The estimated amounts are not reduced by the permissive 0.48 factor mentioned previously. In Figure 2, for districts that fall on or near the diagonal line, the actual expenditure differences and the estimated differences are equal. For those, such as Round Rock ISD and Katy ISD, the amounts by which expenditures in their higher poverty schools exceed expenditures in their lower poverty schools are substantial, \$1,382 in the case of Round Rock ISD.² On the other hand, in districts, such as Richardson ISD and Donna ISD, substantially greater expenditures per pupil occur in their lower poverty schools than in their higher poverty schools.

² The comparable numbers for all 90 districts are contained in Table A1.

Figure 1

Mean differences in general fund expenditures per pupil between low and high poverty Texas middle and elementary schools, by district

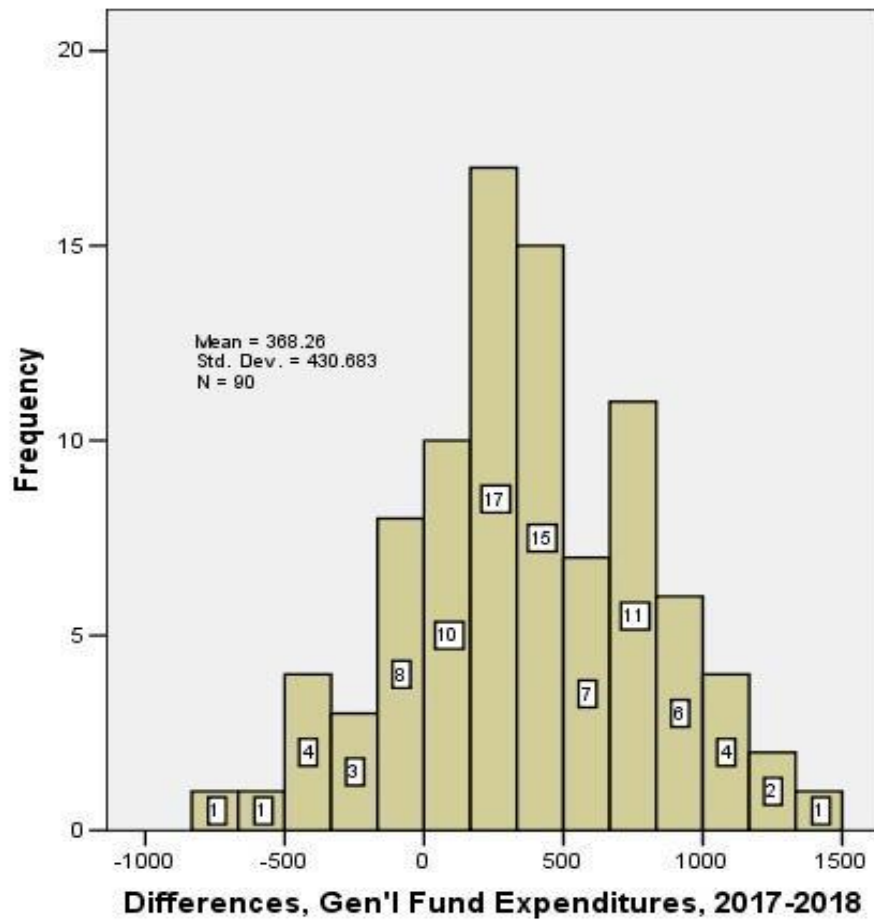
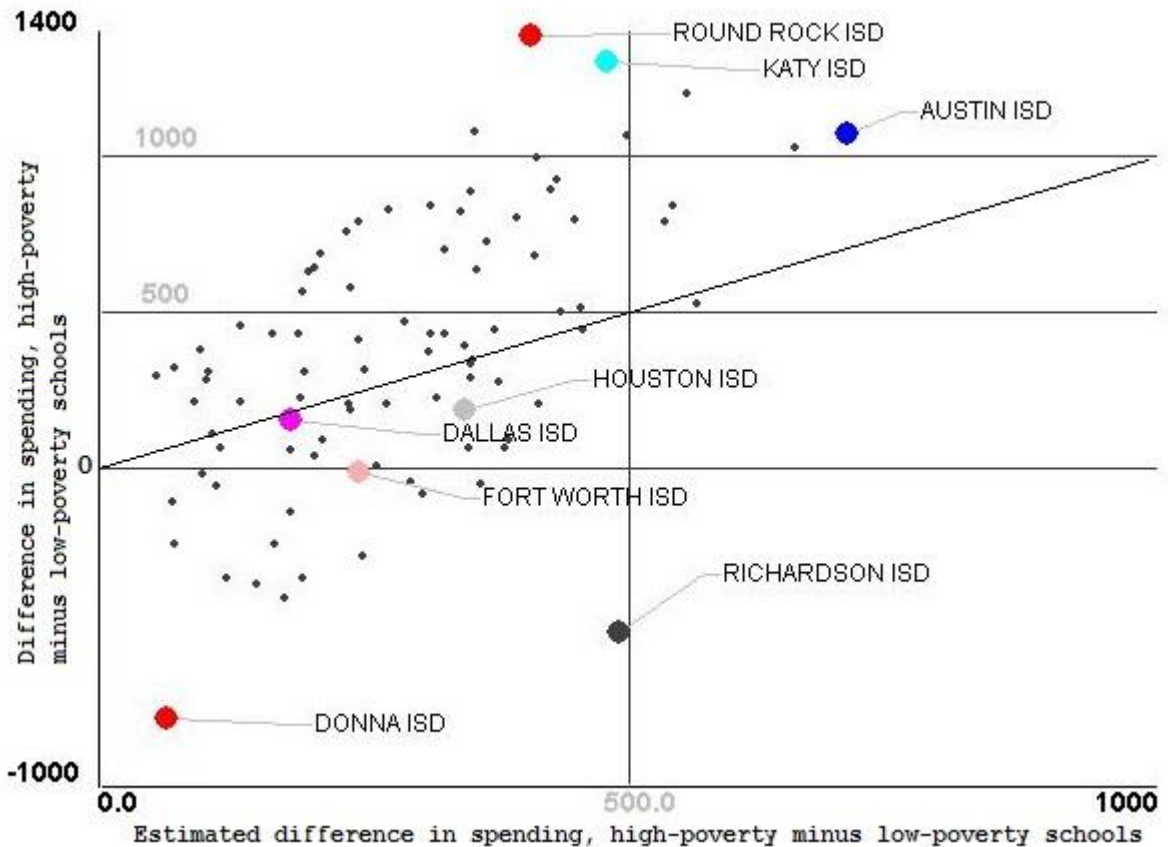


Figure 2

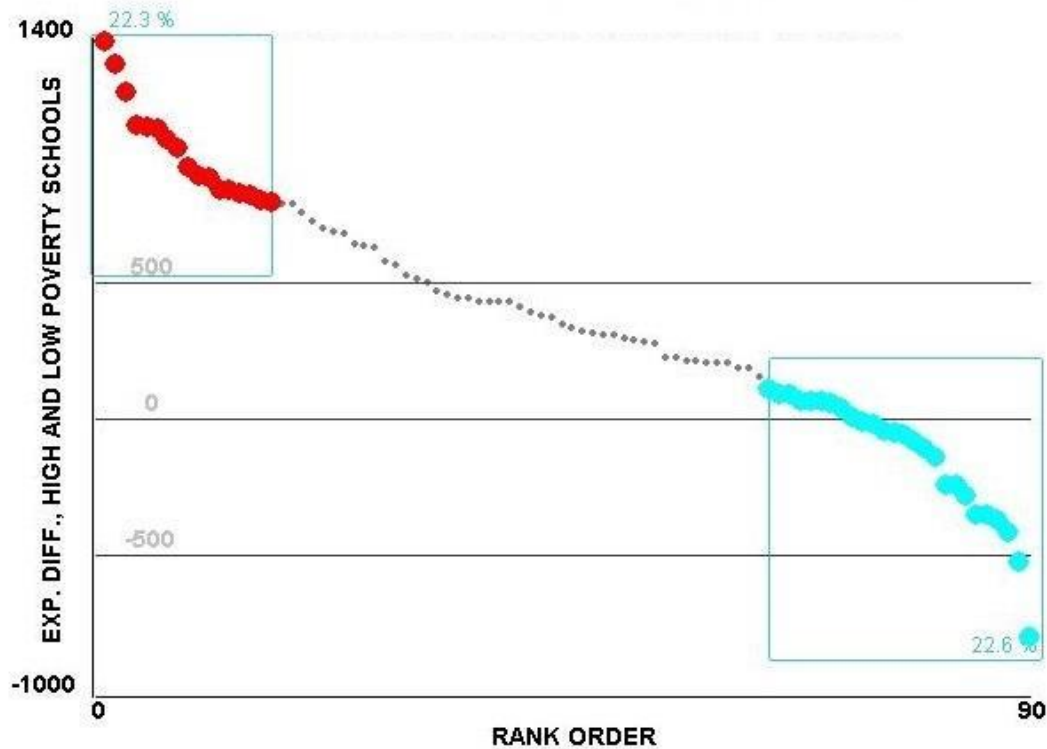
District average actual expenditure differences between high and low poverty schools versus estimated average expenditure differences between high and low poverty schools



In Figure 3 the expenditure differences between the high poverty and low poverty schools within each district are presented in an alternative fashion, by first sorting the districts from high to low based on those expenditure differences. Districts at the extremes of this distribution are highlighted and aggregated results displayed beneath the graph, for each group. The two groups highlighted each contain approximately 22 percent of all middle and elementary students in the 90 districts being examined. The data line labeled SEQ 1 (row 1) applies to the districts with greater differences in expenditures favoring their high poverty schools. Each of the data column headings is now described and the data commented upon. All data are for the school year 2017-2018.

Figure 3

Expenditure differences between high and low poverty schools, averaged by district for 90 large Texas school districts



| SEQ | NBR | EX_HIPOV | EX_LOPOV | DIFF | AVG_EXPP | AVG_ED | DIFF_ED | MKTVAL_PP |
|-----|-----|----------|----------|-------|----------|--------|---------|-----------|
| 1 | 17 | 7,177 | 6,152 | 1,025 | 6,664 | 47 | 42 | 488,213 |
| 2 | 26 | 6,233 | 6,356 | -124 | 6,295 | 75 | 19 | 248,257 |

Description of data elements beneath Figure 3:

NBR: The number of school districts included in summary data in each row.

EX_HIPOV: General funds operations expenditures per pupil, averaged for the higher poverty schools in each district and then averaged for the 17 districts in row 1 and the 26 districts in row 2.

EX_LOPOV: Same as previous, except the expenditure amounts for the lower poverty set of schools in each district were averaged, and these in turn averaged over the districts include in each row.

DIFF: The differences in the first two columns. On average, the first group of 17 districts spent \$1,025 more per pupil in their higher poverty schools. The other group, row 2, spent \$124 less in their high poverty schools, on average.

AVG_EXPP: This column represents the average per pupil expenditures for operations in all of the elementary and middle schools in each district, which are then averaged over the

districts that were selected in each row of data. As can be seen, the districts that were more generous with their higher poverty schools had higher average expenditures per pupil in all elementary and middle schools by \$369 per pupil

AVG_ED: The average percent ED students for all elementary and middle schools. The 47 percent figure is the average of the school averages in the 17 districts in row 1, and the 75 percent figure is the average ED for all schools in the 26 districts represented in row 2.

DIFF_ED: For each district, the average percent of economically disadvantaged students in the high-poverty and the low-poverty groups was calculated, and their differences determined. The value in this column for row 1—42—represents the average of those individual district's differences for the 17 districts included in row 1.

MKTVAL_PP: The figures in this column represent the average of the equalized property tax base values in each set of districts. The higher average per pupil property values for the districts represented in row 1 may explain at least part of the higher AVG_EXPP for these districts. In spite of the highly equalized nature of Texas' school finance system, there remains an advantage for districts with higher property valuations. Also, but not shown, the average of the maintenance and operations tax rates for the districts in row 1 are slightly greater than the average for the districts in row 2.

An explanation of the variations in expenditure differences between the high-poverty and low-poverty groups in each district will be presented below, after the results from question 2 are presented.

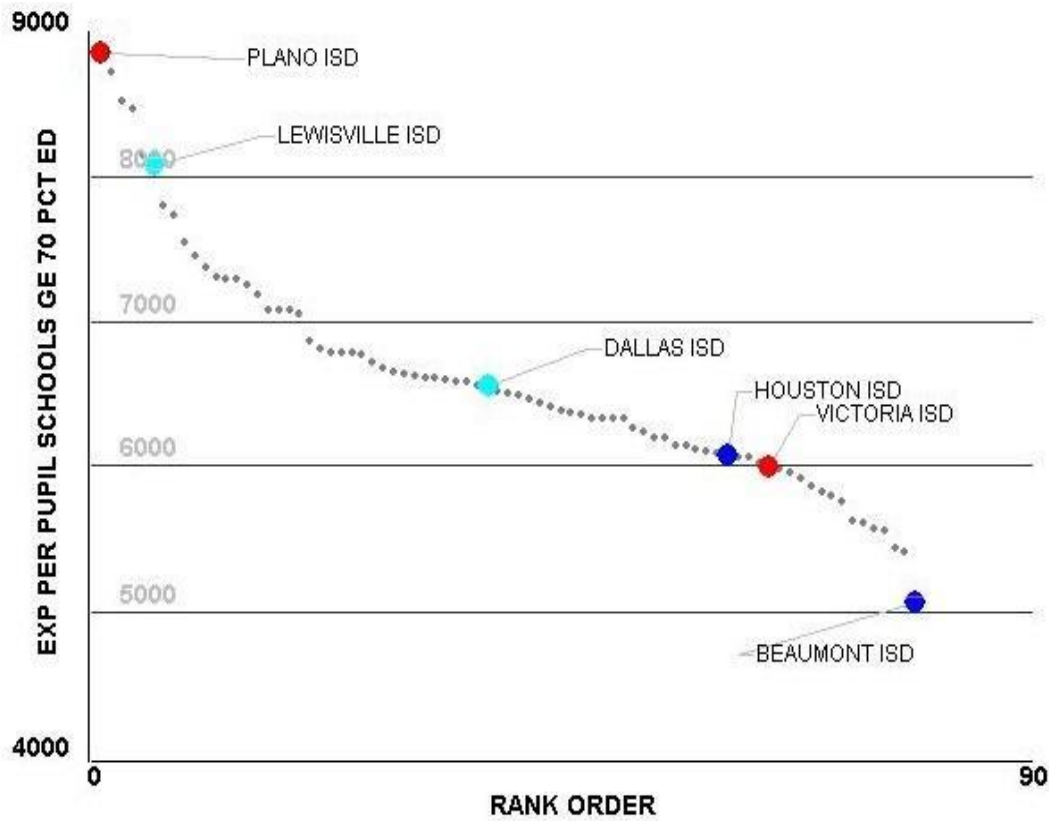
Results, question 2: How much do expenditure levels in schools with at least 70 percent economically disadvantaged students vary among districts?

The differences in expenditures per pupil between high and low poverty schools described above are interesting in their own right, and perhaps also say something about priorities in the various districts. But the amounts actually spent in the highest poverty schools are of equal if not greater concern, bearing upon the issue of the absolute level of expenditures in high poverty schools. In addressing this issue, the average expenditures per pupil in schools with at least 70 percent ED students were calculated for such schools in each district. These amounts are also included in Table A1 (Appendix A)

Seventy-nine of the 90 districts had at least one school with ED rates exceeding 70 percent. The average expenditures per pupil in these schools, calculated for each of the 79 districts, are displayed in Figure 4, with several districts identified. As can be seen, the average expenditures per pupil amounts for schools with at least 70 percent ED vary from \$8,848 per student in Plano ISD (6 schools) to \$5,058 per student in Beaumont ISD (16 schools). The per pupil expenditure level in Plano ISD's highest poverty schools exceeded that in Beaumont ISD by 75 percent. The data beneath Figure 4 shows that the level of operation expenditures per pupil in the schools in Plano with more than 70 percent ED is \$8,848, \$1,858 more than the average for all of its elementary and middle schools. In Beaumont ISD, where 16 of its 20 elementary and middle schools have ED rates above 70 percent, the operations expenditures per pupil in the schools with more than 70 percent ED is just \$5,058, nearly \$4,000 per student less than in the comparable schools in Plano ISD. Plano ISD benefits from a much greater property tax base per pupil, but it is also exerting the maximum maintenance and operations tax effort permitted under state law, at a rate of \$1.17 per hundred dollars of assessed valuation.

Figure 4

Expenditures per pupil in schools with 70 percent or greater economically disadvantaged students, averaged for all such schools in each district



| ID | NAME | OPS_GE70 | AVG_EXPP | AVG_ED | MKTVAL_PP | MO18 |
|--------|----------------|----------|----------|--------|-----------|------|
| 43910 | PLANO ISD | 8.848 | 6.990 | 31 | 700,224 | 1.17 |
| 61902 | LEWISVILLE ISD | 8.072 | 7.243 | 34 | 493,197 | 1.04 |
| 123910 | BEAUMONT ISD | 5.058 | 5.064 | 81 | 429,554 | 1.04 |
| 235902 | VICTORIA ISD | 5.994 | 5.582 | 72 | 327,406 | 1.15 |
| 57905 | DALLAS ISD | 6.548 | 6.573 | 87 | 489,616 | 1.17 |
| 101912 | HOUSTON ISD | 6.077 | 5.984 | 80 | 623,589 | 1.04 |

Descriptions of data elements beneath Figure 4 not previously defined.

OPS_GE70 represents the average level of general fund operations expenditures within schools with an average level of economically disadvantaged students of at least 70 percent.

MO18 is the property tax rate for maintenance and operations purposes in the school district. The other column headings were defined previously.

Analysis of Results and Problems

Analysis of differences in expenditures between high-poverty and low-poverty schools.

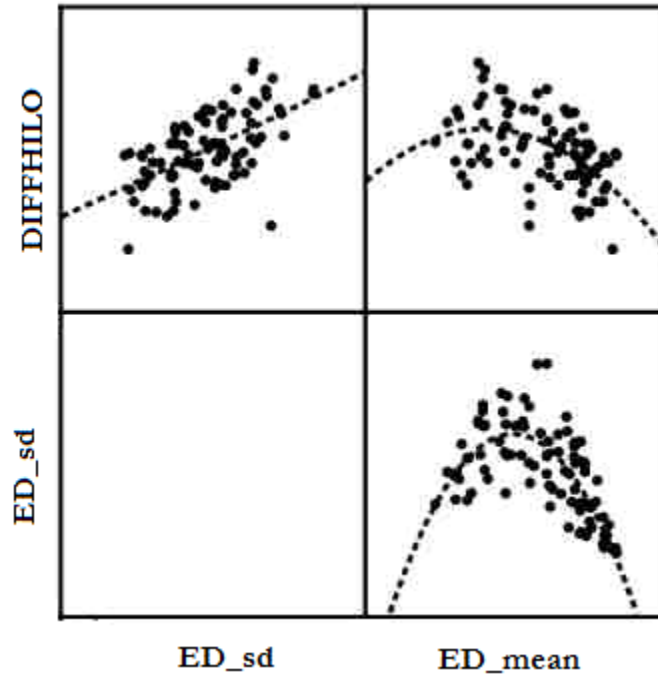
The basic results of comparing expenditures per pupil in the high-poverty and low-poverty groupings of elementary and middle schools in each of the 90 school districts were presented above. The results were summarized in Figures 1, 2, and 3, and the numerical results are contained in Appendix A for each district. This section attempts to explain those results.

The differences in AVG_ED and DIFF_ED for the districts represented in the 2 rows of data beneath Figure 3 appear to be critical in influencing the observed differences in expenditures between the high-poverty and low-poverty schools in these two district groupings. Districts with below average rates of ED students overall and with a relatively wide range of variation in ED among its schools have considerably greater flexibility in reallocating resources from its low-poverty, academically high performing schools to its high-poverty, lower performing schools. For example, Aldine ISD has an overall ED rate of 90 percent and a difference of just 6 percent between the ED rates in its high poverty and low poverty schools. Hence, all of Aldine ISD's schools have very high poverty rates, leaving virtually no opportunity to allocate more resources to its schools with the highest poverty levels. On the other hand, a district such as Fort Bend ISD, with an average ED rate of 42 percent, and a difference in ED rates between its high poverty and low poverty schools of 44 percent, has much more opportunity to reallocate resources from its low poverty to its high poverty schools. And in fact, Fort Bend ISD does exactly that, with a spending advantage of \$1,066 in its higher poverty elementary and middle schools. Many of the other districts that are located at the higher ranges of positive expenditure differences in Figures 2 and 3 do likewise.

Three related scatter plots are shown in Figure 5, involving the relationships between DIFFHILO, ED_mean, and ED_sd., where ED_mean refers to the mean rate of ED students in a district, and ED_sd refers to the standard deviation of the mean ED rates of the schools in a district. Again, these data are for the 90 large districts being examined here. First, note the positive relationship between DIFFHILO and ED_sd in the upper left-hand scatter plot. Higher standard deviation (“socioeconomic segregation”) is related to more funds being directed to high poverty schools, as represented by DIFFHILO. Second, note that the relationship between DIFFHILO and ED_mean is generally negative, with some ambiguity on the left. Third, note the relationship between ED_sd and ED_mean. While the correlation coefficient between these two is just -0.505 , if ED_sd is regressed on ED_mean, using a second-degree polynomial in ED_mean, the r-squared value is 0.568. This relationship shows a strong tendency for low ED_sd at low levels of ED_mean, low ED_sd levels also at very high values of ED_mean, but relatively high values of ED_sd for mid-range values of ED_mean. The relationship peaks at a value for ED of 0.47.

Figure 5

Relationships among expenditure differences, poverty standard deviations and poverty means, 90 large Texas school districts (2018)



If DIFFHILO is regressed on ED_sd and ED_mean, the coefficient for ED_sd is 26.867 and that for ED_mean is -4.420 (see Table 2). The positive sign and high degree of significance of the regression coefficient for the district level standard deviations suggests that more variation in poverty among schools results in greater proportions of funds to poor schools. The question is, why is this so?

Table 2

Regression of differences in per pupil expenditures (DIFFHILO) against means and standard deviations of school poverty in high and low poverty schools in Texas (2018)

| | Unstandardized Coefficients | | Standardized Coefficients Beta | t | Sig. |
|------------|-----------------------------|------------|-----------------------------------|--------|------|
| | B | Std. Error | | | |
| (Constant) | 99.759 | 88.961 | | 1.057 | .293 |
| ED_sd | 6.867 | 5.903 | .451 | 4.552 | .000 |
| ED_mean | -4.420 | 1.891 | -.232 | -2.337 | .022 |

Dependent Variable: DIFFHILO Adj. R-sqr = 0.348

While both independent variables in this regression are highly significant, the r-squared of just 0.348 indicates that other influences are at work. Adding the average expenditures per pupil for the schools in each district to the regression increased the r-squared only modestly, to 0.376. The coefficient of this additional variable, however, was significant (0.022). This suggests that the over-all level of resources may have some positive effect on greater expenditures in higher poverty schools, but the greater factor appears to be the degree of segregation of ED students among the various schools, as measured by ED_sd.

The analysis to this point has consisted of calculating the average expenditures per pupil for the higher poverty and lower poverty groupings within each of the 90 school districts being examined. These groups were selected so that the numbers of students in each group, within each district, were approximately the same, as close as could be arranged given that individual schools were either totally in one group or the other. The differences in average expenditures per pupil in these groups were termed the HILO differences, within each district. The relationship of these differences to the districts' average percentages of ED students was displayed in the upper right-hand graph in Figure 5 above.

The HILO differences can be viewed as a measure of expenditure progressivity. But how would this measure compare to one of the more commonly used and accepted measures? That comparison will be made.

At least two such measures have been applied, either to all of the districts in all or most of the states in the U.S., or to the districts in an individual state. One of these, a regression-based approach, has been developed and promoted by Baker and Farrie (2010). Baker and Farrie include independent variables intended to correct for such factors as economies of scale, student geographical density, and their interaction. They also include measures of poverty and a comparable wage index. The purpose of the other variables--district size, geographical student density, and the comparable wage index-- is to be able to estimate the poverty coefficient "corrected" for these influences. The resulting poverty coefficients, termed the Poverty multiplier, are listed, by state, in Table 4, State Progressiveness Factor (Baker & Farrie, 2010).

The other method of assessing expenditure progressivity considered, which was developed and promoted by Chingos and Blagg (2017), involves calculating two weighted sums of each district's per pupil expenditures. In one instance the weights are the numbers of poor students in a district; in the other the numbers of non-poor students are used as the weights. The index can be

presented in two forms. Subtracting the weighted sums for nonpoor students from the weighted sums for poor students gives the index in difference form. Forming the ratios of the weighted sums for poor students over the weighted sums for nonpoor students yields the Chingos-Blogg progressivity index (CBI) in ratio form.

The data involved in the calculation of the Chingos-Blogg index (CBI) correspond to that which is used in calculating the HILO expenditures differences described above. Since all of the 90 districts being examined have enrollments of more than 5,000 students, none of the small or medium-sized adjustment factors used in the Texas school finance formula are relevant. The same is true for the sparsity factor. Additionally, as the basic units of analysis, schools, in each case are all within the geographical confines of their respective districts, including a comparable wage index is also not relevant. These considerations suggested that the refinements that Baker used in his regression approach are unnecessary. As the required data elements to calculate the CBIs are coincident with the data used to calculate the HILO expenditure differences described earlier, the Chingos-Blogg progressivity measure seemed to be a natural choice to use as a check on them. Instead of using district level expenditure and poverty data, necessary for calculating a state level progressivity measure, the CBIs will be calculated with school level expenditure and poverty data, for each district, giving district measures of expenditure progressivity.

Comparison of the HILO expenditure differences with the Chingos-Blogg measure of expenditure progressivity

Chingos and Blagg, in addressing the issue of equity in the financing of ED students described the calculation of the CBI as follows:

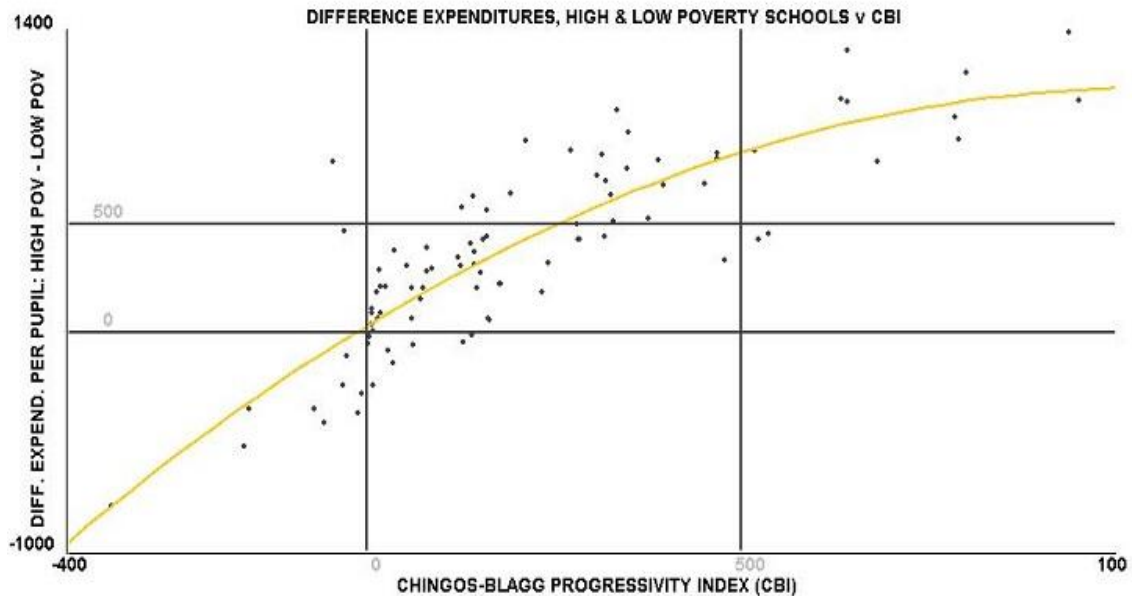
Specifically, for each state, we calculate a weighted average of each district's per-student funding, where the weights are the number of poor kids in each district. We then calculate the same figure weighted by the number of nonpoor kids.

Our progressivity measure for each state is the difference between the average funding for poor and nonpoor kids. For example, an estimate of \$100 would imply that, on average, poor students attend districts that receive \$100 more in per-student funding than the districts attended by nonpoor students. (Chingos & Blagg, 2017, p. 3)

The CBI for a state is based on the relevant data aggregated to the district level; applied to districts, as is the case here, the data will instead consist of school-level data. The CBIs were calculated for the 90 districts included in this study, based on the expenditures of their elementary and middle schools. In Figure 6 the differences in spending between schools in the high-poverty and low-poverty groups in each district are plotted on the vertical axis, and the districts' CBIs, as calculated, are plotted on the horizontal axis. Note that the difference form of the CBI is used here. There is an obvious positive relationship between the HILO expenditure differences and the CBIs, and it appears somewhat non-linear. Ignoring the non-linearity, the Pearson coefficient of correlation between the two variables is 0.84. There are a number of districts with CBI values in the zero range, which would mean that per pupil expenditures are approximately the same in the high poverty and low poverty groups of schools within their respective districts.

Figure 6

District differences in per pupil expenditures in high-poverty and low-poverty schools versus Chingos-Blagg Progressivity Index: Texas' large districts (2018)



Chingos and Blagg noted the tendency for greater economic segregation among districts associated with higher levels of their index (Chingos & Blagg, 2017). They suggested that one reason for this was the possibility that states are in fact better able to direct funds to poor students if such students are more segregated by school districts. They described the difference between New York State and Florida in this regard. Florida has only 67 countywide districts. With so few districts, regions with extreme levels of ED percentages are averaged out, so to speak. Therefore, only relatively small variations in the percentages of ED students among those large districts are observed. The opposite, they argue, is true in New York. With 675 schools, less averaging of the ED rates among different localities occurs.

Others have also observed that districts with greater variation in economically disadvantaged (ED) students among their schools exhibit greater per pupil spending levels in their higher poverty schools than in the lower poverty schools. For example, Shores and Ejdemyr stated: “Conversely, socioeconomic segregation positively correlates with the poor to nonpoor spending gap, meaning that in districts with greater concentrations of poor students in schools, those poor students receive a greater district share of resources.” (Shores & Ejdemyr, 2017, p. 17). Note that “socioeconomic segregation” refers to different “concentrations of poor students.” The standard deviation of the schools’ ED rates in a district is used as a measure of socioeconomic segregation, herein.

Likewise, Lane, Linden and Stange state, “We find that both economic and racial segregation are positively correlated with the extent of progressive within-district funding...” (Lane, Linden & Stange, 2018, p. 4), which is another confirmation of the tendencies for higher values of the CBI to be associated with greater degrees of economic segregation.

Knight and Mendoza used Baker’s regression approach as well as the Chingos and Blagg weighted averages approach in their attempt at evaluating a major change to California’s school

funding formula (Knight & Mendoza, 2019). In their comparison of results using the two methods they stated the following: “The weighted average approach is more sensitive to funding differences in more segregated states (and less sensitive in more integrated states) and thus disproportionately ‘rewards’ segregation” (Knight & Mendoza, p. 15). Keeping in mind that this use of the term “segregation” corresponds to either the variance or standard deviation of the mean levels of ED among the schools within districts focused on herein, this is one more observation that the CBI tends to be greater with greater levels of variance in ED among districts, if using district level data. It seems reasonable to assume that the same relationship between the values of the CBI indexes and variances of ED for the schools within individual districts would also be observed.

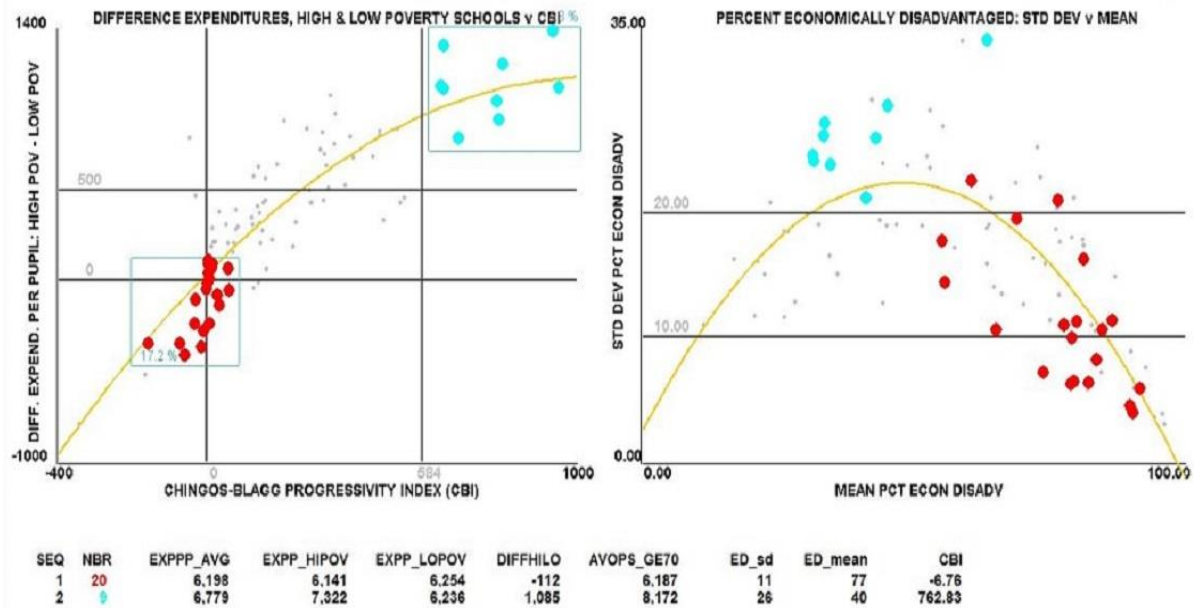
In contrast, an analysis of school expenditures among Texas elementary schools by Ajwad found that spending is “...higher in neighborhoods where income is low and where the minority (in particular black) population is high. However, the magnitude of these spending biases is small.” (Ajwad, 2006, p. 563). Ajwad used a regression-based analysis, and made no mention of a relationship between expenditures and intra-district or inter-district variances of levels of economically disadvantaged students. This would reinforce observations by Knight and Mendoza that there can be significant differences in the two measures of progressivity. However, further analysis of those differences is beyond the scope of this paper. There is further analysis of the CBI index below, however, since that is the one chosen for comparison purposes here.

The basic observation included in the four papers referenced above, that greater within-district segregation is associated with more funds being allocated to schools with greater percentages of ED students, may be valid. That possibility is explored in the following, and a possible explanation for the observed relationship between greater segregation and greater values of the CBI will be offered.

Figure 7 contains two graphs, with the graph on the left the same as that in Figure 6. The same two groups of districts are highlighted in both graphs, with distinctive shading for each group. The graph on the right hand side of Figure 7 shows points that represent combinations of district ED percentages (horizontal axis) and the standard deviations of the ED percentages (vertical axis) for the schools in each district, a repeat of the lower right-hand plot in Figure 5. The districts represented by the darker/red circles are some of those with CBIs near to or below zero in the graph on the left. The pattern is easy to visualize and to describe: districts with very low average levels of ED, of necessity, consist primarily of schools with low ED levels, hence a low standard deviation. The same is true for districts with very high average levels of ED, with most of their

Figure 7

Texas large 90 districts' differences in expenditures per pupil between high and low poverty schools, and relationship between districts' means and standard deviations among schools in each district



schools having very high levels of ED and hence low standard deviations. Particularly in the latter, high ED case, such districts would have very little opportunity or motivation to attempt to move funds from one school to another. It is hard to imagine Harlandale ISD, for example, scraping significant amounts of funds from its lowest poverty school, with 85 percent ED students, in an attempt at improving conditions at another school in that district. All of the schools in Harlandale ISD would benefit from more funds and it is unlikely that any could escape negative consequences if funds were reduced.

In contrast, the districts represented by the light gray/green circles in Figure 7 all had relatively high values of the CBI. The pictures tell the story very well, and the data beneath the graphs reinforce it. Districts in the highlighted low CBI group have a negative \$112 per pupil average difference in expenditures between their higher poverty and lower poverty schools, with a standard deviation of ED percentages of 11 and a mean ED percentage of 77 (see Row 1/SEQ 1). In contrast, the districts selected in the high CBI group spend, on average, \$1,085 per pupil more in their higher poverty schools. The standard deviation of the EDs for this group is 26, and the average ED rate is just 40 percent.

The argument above is that in districts where all schools have uniformly high levels of ED, with little variation, there is little opportunity for districts to move resources from their lower poverty schools to their higher poverty schools—all have high rates of ED students. Therefore, such districts will be assigned low values of a progressivity index, such as the CBI. Thus far this argument has been based solely on the data for the elementary and middle schools in the 90 districts in Texas which have at least 14 such schools. An obvious question is, does the same pattern shown for Texas in Figures 5 and 7, namely the inverted u-shaped relationship between the standard deviations of the

average levels of ED and the mean levels of ED among schools in various districts exist in other states? The answer is yes.

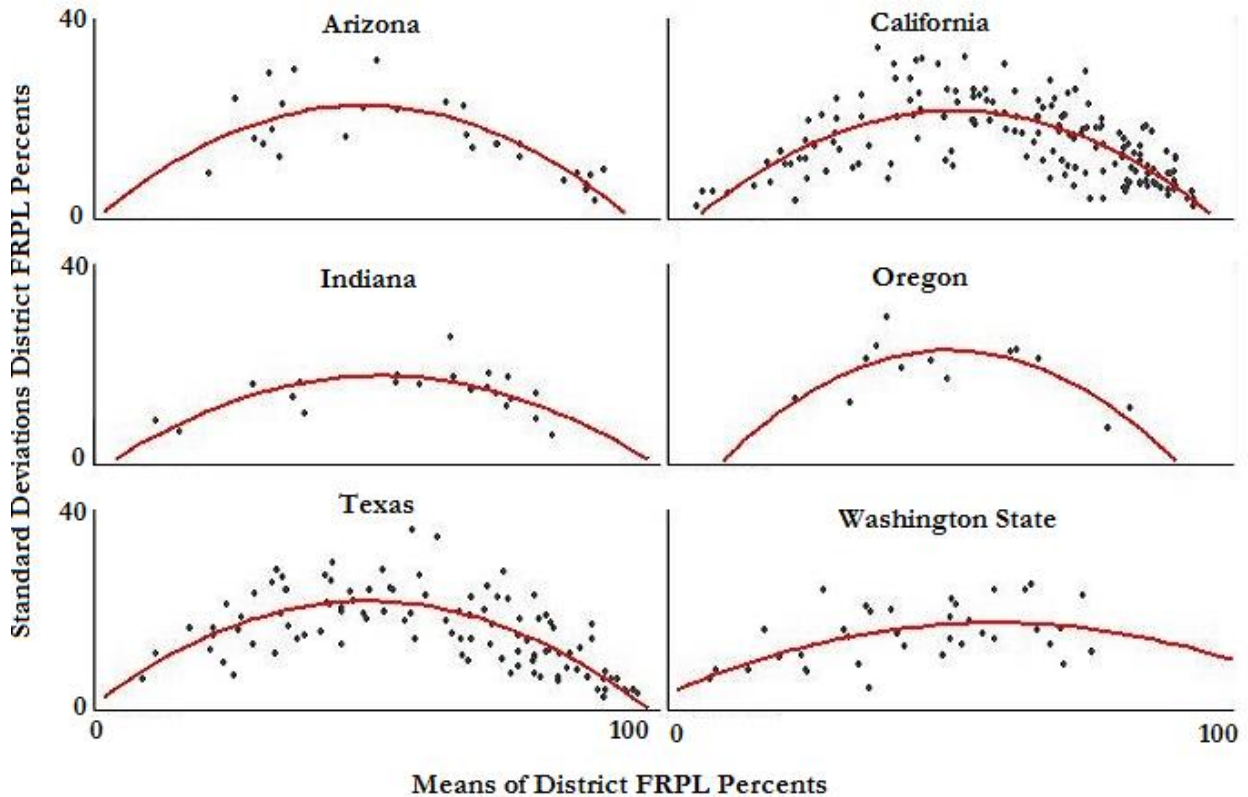
The percentages of students qualifying for the Federal Free and Reduced Price Lunch Program were obtained for all schools in all states in the U.S., downloaded from the nces.ed.gov website.³ The results for six states, including Texas for reference purposes, are shown in Figure 8. The data used in creating the graphs in Figure 8 were restricted to regular, non-charter elementary and middle schools, and to districts that contained at least 10 such schools.

The mere existence of similar patterns in the two variables plotted does not, of course, mean that the same association of the two values will result in the same levels of progressivity in other states as in Texas. That is, will combinations of very high values of mean ED and corresponding low values of the standard deviation of ED be associated with a low level of progressivity in other states? And will combinations of high standard deviations of ED and corresponding moderate levels of mean ED tend to result in higher progressivity measures, as they did for the 90 Texas districts? This is an empirical question that can only be answered by obtaining and analyzing the school level expenditure and poverty data for other states.

³ A single URL address for the data files could not be determined. To get to the free/reduced-price lunch school data, the steps are: (1) go to <http://nces.ed.gov/ccd/>; (2) select CCD Data Files; (3) select CCD Data File Tool; (4) in the three select boxes at the bottom of the page, select nonfiscal, school, and year (of choice); (5) on the new page which will be presented, under Lunch Program Eligibility select Flat and SAS Files. The files, in zipped format, should then begin downloading.

Figure 8

Relationship between standard deviations and means of poverty percentages of students in schools in districts in six states



Note: Graphs show only non-charter districts with at least 10 elementary and middle schools. Data Source: National Center for Education Statistics. See footnote 3 herein.

Critique of Chingos and Blagg progressivity index

Chingos and Blagg wondered if it might be possible that their “...progressivity measure is mechanically driven by student sorting across districts.” (Chingos & Blagg, 2017, p. 13). They answered their own musing with the following: “We argue that, to the extent this is true, it largely reflects the degree to which segregation enables targeting of resources.” This goes back to their suggestion that New York, with its socioeconomically segregated districts, could better target funds to poor students than could a state such as Florida, with its county-wide districts.

The possibility that the CBI might substantially be a function of “student sorting” is now examined. This is accomplished with a very simple model, as follows. Assume that an amount E is allocated to districts for each enrollee, and that an additional grant equal to rE , with $r > 0$, is awarded to districts for each economically disadvantaged or poor student enrolled. Equation 2 is a reproduction of Equation B10 in Appendix B, where it is derived, from the model based on these premises.

$$\text{CBI} = \frac{N^{\text{NP}} [N^{\text{P}}(1 + rp) + r(\text{nd})\text{Var}(p_i)]}{N^{\text{P}} [N^{\text{NP}}(1 + rp) - r(\text{nd})\text{Var}(p_i)]} . \quad (2)$$

Since the focus in this paper is upon the degree of progressivity in individual districts, Equation 2 will be interpreted from this perspective. Note, incidentally, that Equation 2 defines the CBI in the ratio form.

In Equation 2, N^{NP} is the total number of nonpoor students in all schools, N^{P} the total number of poor students, p the average number of poor students in all schools in the district being considered, (nd) the number of schools in the district, and $\text{Var}(p_i)$ the variance of the proportions of poor students in the schools in the district.

Note the following about Equation 2. (a) If $r=0$, there is no add-on grant to poor students, and $\text{CBI} = 1$; (b) if the average percent of economically disadvantaged students is the same in all schools in a district, $\text{Var}(p_i)$ would be zero, and the CBI would again be unity; (c) if $r > 0$ and $\text{Var}(p_i)$ is > 0 , then the CBI for that district would be greater than unity. For a given average p across all schools, greater variance or “segregation” results in a greater CBI.⁴ The factor r , resulting in a grant of rE , represents the additional effort being made by a state to benefit poor students.

Applied to the districts in a given state, it seems problematical to say that a state with greater variance in poor students among its districts, and hence a greater CBI, is thereby making a greater effort than a state with a lesser variance if both states provide the same additional amount, rE , for each poor student and both have the same average number of poor students, p , in their districts.

It is hypothesized that a district with a moderate overall percentage of ED students, but which includes a large range of average levels of ED among its individual schools, will have more opportunity to allocate additional revenue per pupil to its high poverty schools than to its low poverty schools. The relationship between the means and the standard deviations of the percentages of ED students in the schools in the 90 Texas districts is displayed in the right-hand graph in Figure 7. In particular, the lower SDs, measuring “socioeconomic segregation”, that is associated with higher district percentages of ED students reduces the flexibility of districts to direct larger amounts of resources to their higher need students. These districts will display minimal socioeconomic segregation, and hence minimal additional spending in their higher poverty schools. They will also tend to have a low measure of the CBI index.

Conclusions

Based on the data being analyzed here, it appears that the degree of progressivity in spending by schools within districts is the result of two factors, possibly a third. First, for school year 2017-2018, the State of Texas not only used an add-on poverty factor of 0.2 in its funding formula, but it also imposed the requirement that at least 52 percent of the additional funds were to be used for the benefit of the students that generated those funds. Second, some school districts are better positioned than others to allocate more funds to their higher poverty schools. Many districts appeared to meet or exceed not just the 52 percent rule, but appeared to meet or exceed putting 100 percent of the additional compensatory education funds into their higher poverty schools. Several districts seemed to do the opposite, apparently taking advantage of lax state oversight. These results were depicted in Figure 2 above, where districts above the diagonal line were actually spending more in their higher poverty schools than was allocated by the state for compensatory education purposes. But the districts with the most progressive records also tend to have modest levels of ED students

⁴ A greater number of schools (nd), given the variance, would also increase the CBI. And of course, with a non-zero variance, any increase (decrease) in r would increase (decrease) the CBI.

and relatively high standard deviations of ED students among their schools, as represented in Figure 7. As described above, these characteristics are structural in nature, not specifically dependent on improved targeting of funds to students in poverty by state or district administrators.

The possible third factor in explaining the degree of progressivity exhibited by an individual district is the district's response to pressures imposed by the state's academic accountability system. If the district administration perceives a possibility that increased resources to its higher poverty schools will improve their academic performance, and that reduced resources to its lower poverty schools will have negligible adverse impact on those schools' performances, then it may undertake such a reallocation. This would also assume that any objections from stakeholders in the nonpoor schools could be managed.⁵

It is clear, from Figure 2 above, that some districts spend less in their higher poverty schools than in their lower poverty schools. For districts with extremely high average levels of ED, comparisons of spending between those schools with very high rates of ED students and those with even higher rates may be moot. Such comparisons, and their degree of progressivity based on the CBI, may be irrelevant. This may also illustrate a shortcoming, or perhaps a misuse, of this index. The assigning of such indexes to districts, and even to states, carries with it the suggestion that some districts or states are doing better than others, in some sense, in addressing the needs of their more disadvantaged students. However, such a conclusion may not always be justified, as suggested by Equation 2 above. Instead of greater socioeconomic segregation allowing better targeting, the greater segregation, along with modest average levels of poor students, provides the opportunity for more progressive intra-district allocation of funds. Therefore, it appears that what is measured by the CBI reflects some combination of the following: (a) effort by the state, as measured by r ; (b) segregation, or the variance of the percentages of economically disadvantaged students, among districts; and (c) genuine effort by many districts to allocate resources to schools with greater proportions of disadvantaged students.

Some of the largest school districts in Texas appear to be making commendable efforts on their own initiative of directing more of their available resources towards their higher poverty, academically lower performing schools. These are the districts that lie at or near the top of the district plot in Figure 3. Many of the districts that fall near the lower levels depicted in Figure 3 tend to have (a) very high levels of economically disadvantaged students and, (b) correspondingly low differences in the levels of ED between the higher and lower poverty groupings of their schools, i.e., less socioeconomic segregation. For these districts, attempts to reallocate resources from schools with high levels of ED students to those with even higher levels of ED students is not a meaningful or practical approach to dealing with the problem of the need for more scarce resources in high poverty schools which are embedded within high poverty school districts.

Related to the issue of large percentages of ED students is the fact that, on average, ED students are less prepared for school when they begin, and find it very difficult, if not impossible, to catch up, to erase the "gap". That is why school districts that have lower average levels of ED students, and simultaneously a wide spread in ED averages among their schools can get by with skimping, to some degree, on schools with low levels of ED students and shifting more resources to the higher poverty schools. Non-poor students who attend schools with greater proportions of

⁵ Baker, studying what works in improving educational outcomes, concluded, "The available evidence suggests that appropriate combinations of more adequate funding with more accountability for its use may be most promising." (Baker, 2019, p. i). One must be cautious, of course, about giving all the credit for positive efforts by school districts to the accountability system, as opposed to the professional expertise and personal values of the district administrators themselves.

students with higher income, better-educated parents can likely endure somewhat larger class sizes, for example, without significant loss in academic performance. And even the ED students in these schools may benefit from peer effects of attending classes with generally higher performing students. But such opportunities to shift resources around just do not exist in many school districts.

The inter-district differences in expenditure levels among schools with at least 70 per cent of their students classified as economically disadvantaged is nothing less than astonishing. Whether the reasons for such differences are due to decisions made at the local level, the state level, or both, these differences need to be acknowledged, understood, and steps taken to reduce if not eliminate them. If it is the goal of the State of Texas to diminish the achievement gap between ED students and other students, it is highly inequitable and counter-productive if 75 percent more funds are directed to those students in one district than in another. These levels of inter-district variations are reminiscent of those that existed between districts before states began distributing revenues to offset large variations in property tax bases. That issue was acted upon by states after many years of litigation. Maybe more such litigation is required in this situation, also.⁶

Much has been written about the debilitating effects of poverty upon educational performance. The Poverty & Race Research Action Council (undated) published an extensive bibliography that gives an excellent over-view of the literature on the topic. The direct, indirect and peer factors that negatively impact student learning in high poverty schools are widely recognized. Districts consisting entirely of high poverty schools are at a distinct disadvantage in coping with the effects of poverty upon student performance as compared with districts with more moderate levels of poverty. In 2019 the Texas Legislature modified the extra-funding weight to be applied to students classified as economically disadvantaged. The original weight, which was used in generating the compensatory education funding amounts that were in place during the 2017-2018 school year, upon which this study is based, was 0.2. This provided, essentially, an additional 20 percent funding for each qualified student. The single weight of 0.2 has been replaced by a set of five weights, varying from 0.225 to 0.275. These weights depend upon several socio-economic factors obtained from the U.S. Census. In addition, as previously noted, the 52 percent rule was changed to a 55 percent rule. As described by TEA in an information release:

The statute requires that at least 55 percent of the SCE [State Compensatory Education] funds allocated must be used to fund supplemental programs and services designed to eliminate any disparity in performance on assessment instruments administered under the TEC, Subchapter B, Chapter 39, or disparity in the rates of high school completion between: (1) students who are educationally disadvantaged and students who are not educationally disadvantaged; and (2) students at risk of dropping out of school, as defined by the TEC, (sec.)29.081, and all other students.” (Texas Education Agency, 2020e)

These are certainly laudable goals. However, an increase of \$1 billion in compensatory education funds, spread over 3.6 million such students, with the option for districts to use 45 percent of those new funds for overhead purposes, leaves approximately \$150 for each ED student in new funding to accomplish those goals. It is difficult to imagine that this amount of additional funding will result in a perceptible impact upon the achievement gap of economically disadvantaged students in Texas anytime soon.

⁶“Students, families, and other parties harmed by intradistrict funding disparities should use state courts and state constitutions’ education clauses to extend previous inter-district school funding victories and to force policymakers to implement more equitable intradistrict funding.” (Webb, 2017, p. 2169).

Recommendations

Recommendation 1: Student poverty weighting factors for districts with very high poverty levels should be increased.

The relationship between the means of the percentages of economically disadvantaged students in the schools within districts, and the segregation or variance of those percentages within districts, seems helpful in understanding why expenditure progressivity varies among districts. Recognizing that not all districts have the same opportunity to reallocate resources to their schools with the highest proportions of economically disadvantaged students lends weight to arguments that districts with much higher proportions of ED students should benefit in an increasing, non-linear fashion. That is, greater weighting factors should be used in funding ED students in districts with very large proportions of such students.⁷

Recommendation 2: The Texas Education Agency (TEA) should monitor and report on the intra-district distribution of compensatory education allotments.

In response to a public information request for copies of reports by TEA of school district utilization of compensatory education grants, the agency indicated that no such reports existed. The comptroller of a local district, one of the 90 districts included in this study, said that he could not recall his district's use of compensatory education funds ever being audited during his 20 years with the district.

Even a very cursory look at the expenditure patterns between high poverty and low poverty schools in some districts should set off alarm bells. An example is that of Richardson ISD. The outlier status of Richardson ISD is plainly visible in Figure 2. Richardson ISD has an overall rate of economically disadvantaged students slightly below the statewide average, and has a relatively high degree of segregation of poor students among its 48 elementary and middle schools, two characteristics of districts demonstrating more expenditure progressivity. Yet the lower poverty schools in Richardson ISD show expenditures of \$841 per student greater than its higher poverty schools.

Recommendation 3: The Texas Education Agency should specifically monitor the disparities in resources going to schools with at least 70 percent economically disadvantaged students.

The extreme ranges in expenditure levels in schools with very high rates of economically disadvantaged students are just plainly beyond comprehension. The state cannot pretend to be serious about improving the relative performance of educationally disadvantaged students when high poverty schools in one district exhibit expenditure levels nearly \$4,000 per student below those in another district. High poverty schools in all districts should be at or near the higher level.

Recommendation 4: Additional analysis of progressivity indexes needs to occur.

The analysis by Knight and Mendoza comparing two measures of funding progressivity, the regression approach by Baker, and the weighted sums approach by Chingos and Blagg, should be extended. Perhaps an examination of the regression approach, similar to that presented in this paper

⁷ Whether to recommend a non-linear poverty weight for the school finance formula for the State of Maryland was studied by Wool, Fermanich, and Reichardt (2015). An annotated bibliography on the topic can be found in Poverty & Race Research Action Council (undated).

for the Chingos and Blagg method, could be developed that would permit a more analytical comparison of the two indexes.

Recommendation 5: Extend the analysis of the impact of intra-district poverty distributions upon district expenditure progressivity to other states.

The same pattern of percentages of economically disadvantaged students within districts, plotted against the standard deviations of those percentages for the schools within districts, exhibited in Figures 5 and 7 above, are also exhibited in a number of other states. The patterns for five of those other states were presented in Figure 8. It would be interesting, using school-level expenditure data for states other than Texas, to determine if the same relationship between those factors helps explain the different degrees of school district expenditure progressivity in those states also.

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Appendix A

Data for Texas school districts with at least 14 elementary and middle schools, school year 2017-2018

The data column headings for Table A1, which begins on the following page, have the following definitions:

N: District sequence number, districts in descending order by the amounts shown in the column designated as DIFFHILO

DISTNAME: Official district name.

GFOPSPP HIGH POV: The average dollar amount of general fund operating expenditures per pupil for the higher poverty group of elementary and middle schools in each district.

GFOPSPP LOW POV: The average dollar amount of general fund operating expenditures per pupil for the lower poverty group of elementary and middle schools in each district.

DIFFHILO: These amounts are the differences of GFOPSPP_HP minus GFOPSPP_LP.

EST. DIFF: These figures represent the estimated amounts by which general fund operating expenditures per pupil would be greater in the higher poverty schools in each district.

Equation 1 in the text was used in calculating these estimates.

EXPP GE70: The figures in this column are the average amounts of general fund operating expenditures per pupil observed in the elementary and middle schools in each district in which at least 70 percent of their students were classified as economically disadvantaged.

N_SCHS GE70: The numbers in this column represent the numbers of elementary and middle schools in each district with percentages of economically disadvantaged students of at least 70 percent.

NA indicates the district had no elementary or middle schools with 70 percent of their students classified as economically disadvantaged, hence the data is missing.

Table A1

Expenditures per pupil for high and low poverty groups, and schools with at least 70 percent economically disadvantaged students

| N | DISTNAME | GFOPSP HIGH POV | GFOPSP LOW POV | DIFF HILO | EST. DIFF | EXPP GE70 | N_SCHS GE70 |
|----|--------------------------|--------------------|-------------------|--------------|--------------|--------------|----------------|
| 1 | ROUND ROCK ISD | 7,121 | 5,739 | 1,382 | 409 | 8,710 | 4 |
| 2 | KATY ISD | 7,469 | 6,167 | 1,302 | 481 | 8,135 | 3 |
| 3 | LEWISVILLE ISD | 7,843 | 6,643 | 1,200 | 556 | 8,072 | 6 |
| 4 | KLEIN ISD | 7,078 | 6,002 | 1,075 | 355 | 8,457 | 6 |
| 5 | AUSTIN ISD | 7,197 | 6,124 | 1,074 | 708 | 7,289 | 54 |
| 6 | FORT BEND ISD | 7,149 | 6,083 | 1,066 | 499 | 7,728 | 15 |
| 7 | SPRING BRANCH ISD | 6,695 | 5,672 | 1,023 | 659 | 6,633 | 17 |
| 8 | MCKINNEY ISD | 7,533 | 6,542 | 991 | 414 | 8,515 | 4 |
| 9 | DENTON ISD | 7,333 | 6,409 | 924 | 433 | 7,363 | 6 |
| 10 | PLANO ISD | 7,436 | 6,544 | 892 | 426 | 8,848 | 6 |
| 11 | ALVIN ISD | 7,157 | 6,271 | 886 | 350 | 7,075 | 1 |
| 12 | VICTORIA ISD | 6,002 | 5,161 | 841 | 312 | 5,994 | 12 |
| 13 | NORTH EAST ISD | 7,137 | 6,296 | 841 | 543 | 7,282 | 22 |
| 14 | LEANDER ISD | 6,747 | 5,921 | 826 | 272 | NA | NA |
| 15 | BRAZOSPORT ISD | 6,828 | 6,006 | 822 | 342 | 7,072 | 4 |
| 16 | EL PASO ISD | 7,182 | 6,379 | 803 | 394 | 7,068 | 52 |
| 17 | LUBBOCK ISD | 6,575 | 5,782 | 793 | 450 | 6,548 | 25 |
| 18 | GRAND PRAIRIE ISD | 7,065 | 6,273 | 791 | 243 | 6,674 | 22 |
| 19 | LAMAR CISD | 7,069 | 6,281 | 787 | 535 | 7,795 | 9 |
| 20 | TOMBALL ISD | 6,739 | 5,984 | 755 | 233 | NA | NA |
| 21 | KILLEEN ISD | 6,903 | 6,176 | 727 | 365 | 6,854 | 20 |
| 22 | SAN ANGELO ISD | 5,280 | 4,583 | 697 | 325 | 5,409 | 9 |
| 23 | ALLEN ISD | 7,107 | 6,421 | 685 | 208 | NA | NA |
| 24 | HUMBLE ISD | 6,814 | 6,135 | 678 | 412 | 7,296 | 4 |
| 25 | EAGLE MT-SAGINAW ISD | 6,621 | 5,979 | 641 | 203 | 7,052 | 1 |
| 26 | PFLUGERVILLE ISD | 7,030 | 6,396 | 633 | 356 | 7,446 | 1 |
| 27 | YSLETA ISD | 7,016 | 6,390 | 626 | 197 | 6,783 | 40 |
| 28 | JUDSON ISD | 6,590 | 6,014 | 575 | 237 | 6,575 | 12 |
| 29 | SOCORRO ISD | 6,216 | 5,648 | 568 | 191 | 6,140 | 24 |
| 30 | CONROE ISD | 6,199 | 5,670 | 528 | 566 | 6,502 | 13 |
| 31 | AMARILLO ISD | 6,562 | 6,051 | 512 | 455 | 6,454 | 32 |
| 32 | CYPRESS-FAIRBANKS ISD | 5,421 | 4,923 | 498 | 436 | 5,439 | 21 |
| 33 | GARLAND ISD | 6,600 | 6,130 | 469 | 287 | 6,607 | 26 |
| 34 | FRISCO ISD | 6,186 | 5,733 | 454 | 132 | NA | NA |
| 35 | MCALLEN ISD | 6,190 | 5,746 | 443 | 374 | 6,194 | 19 |
| 36 | NORTHSIDE ISD | 6,646 | 6,204 | 442 | 457 | 6,772 | 31 |
| 37 | WYLIE ISD | 6,399 | 5,965 | 433 | 163 | NA | NA |
| 38 | KELLER ISD | 6,792 | 6,361 | 431 | 314 | NA | NA |
| 39 | HARLINGEN CISD | 6,682 | 6,251 | 431 | 188 | 6,623 | 20 |
| 40 | CORPUS CHRISTI ISD | 5,893 | 5,465 | 428 | 327 | 5,854 | 38 |
| 41 | GOOSE CREEK CISD | 6,195 | 5,782 | 413 | 244 | 6,195 | 10 |
| 42 | MIDLAND ISD | 5,821 | 5,428 | 393 | 346 | 5,558 | 8 |

Table A1 (Cont'd)

Expenditures per pupil for high and low poverty groups, and schools with at least 70 percent economically disadvantaged students

| N | DISTNAME | GFOPSPP HIGH POV | GFOPSPP LOW POV | DIFF HILO | EST. DIFF | EXPP GE70 | N_SCHS GE70 |
|----|----------------------------------|---------------------|--------------------|--------------|--------------|--------------|----------------|
| 43 | SAN BENITO CISD | 6,150 | 5,773 | 377 | 95 | 5,958 | 14 |
| 44 | CLEAR CREEK ISD | 6,147 | 5,772 | 375 | 310 | 6,810 | 2 |
| 45 | MANSFIELD ISD | 6,280 | 5,934 | 346 | 353 | 5,817 | 2 |
| 46 | WICHITA FALLS ISD | 5,984 | 5,650 | 334 | 350 | 5,984 | 10 |
| 47 | BROWNSVILLE ISD | 6,242 | 5,918 | 325 | 69 | 6,065 | 47 |
| 48 | BRYAN ISD | 6,573 | 6,256 | 317 | 250 | 6,482 | 13 |
| 49 | ABILENE ISD | 5,670 | 5,364 | 307 | 193 | 5,618 | 14 |
| 50 | ALIEF ISD | 6,555 | 6,248 | 306 | 103 | 6,434 | 35 |
| 51 | LAREDO ISD | 6,381 | 6,082 | 299 | 53 | 6,231 | 24 |
| 52 | COMAL ISD | 5,787 | 5,500 | 287 | 350 | NA | NA |
| 53 | PHARR-SAN JUAN- ALAMO ISD | 6,495 | 6,212 | 283 | 100 | 6,351 | 33 |
| 54 | CARROLLTON- FARMERS BRANCH IS | 6,810 | 6,531 | 279 | 377 | 6,780 | 17 |
| 55 | NORTHWEST ISD | 6,140 | 5,911 | 229 | 189 | NA | NA |
| 56 | UNITED ISD | 6,617 | 6,391 | 226 | 318 | 6,602 | 29 |
| 57 | SAN ANTONIO ISD | 7,359 | 7,145 | 214 | 88 | 7,252 | 64 |
| 58 | WACO ISD | 6,434 | 6,224 | 210 | 133 | 6,322 | 19 |
| 59 | COLLEGE STA. ISD | 5,784 | 5,575 | 209 | 270 | NA | NA |
| 60 | PEARLAND ISD | 5,952 | 5,745 | 207 | 235 | NA | NA |
| 61 | HAYS CISD | 6,143 | 5,936 | 207 | 415 | 6,376 | 4 |
| 62 | NEW CANEY ISD | 6,334 | 6,144 | 190 | 236 | 6,147 | 6 |
| 63 | HOUSTON ISD | 6,078 | 5,889 | 189 | 345 | 6,077 | 166 |
| 64 | DALLAS ISD | 6,650 | 6,496 | 154 | 180 | 6,548 | 175 |
| 65 | IRVING ISD | 6,700 | 6,590 | 110 | 105 | 6,643 | 26 |
| 66 | BIRDVILLE ISD | 6,321 | 6,228 | 93 | 388 | 6,265 | 13 |
| 67 | SOUTHWEST ISD | 6,147 | 6,056 | 90 | 210 | 6,095 | 15 |
| 68 | TYLER ISD | 5,831 | 5,766 | 65 | 383 | 5,798 | 15 |
| 69 | SPRING ISD | 6,133 | 6,068 | 64 | 113 | 6,060 | 24 |
| 70 | GRAPEVINE- COLLEYVILLE ISD | 6,750 | 6,686 | 64 | 348 | 7,539 | 1 |
| 71 | MISSION CISD | 6,260 | 6,198 | 62 | 179 | 6,322 | 16 |
| 72 | CROWLEY ISD | 6,560 | 6,521 | 39 | 202 | 6,323 | 6 |
| 73 | BEAUMONT ISD | 5,069 | 5,060 | 9 | 261 | 5,058 | 16 |
| 74 | FORT WORTH ISD | 6,063 | 6,075 | -13 | 245 | 6,086 | 86 |
| 75 | GALENA PARK ISD | 6,559 | 6,580 | -21 | 96 | 6,578 | 19 |
| 76 | ROCKWALL ISD | 5,755 | 5,800 | -45 | 294 | NA | NA |
| 77 | ARLINGTON ISD | 6,565 | 6,617 | -52 | 361 | 6,507 | 36 |
| 78 | LA JOYA ISD | 6,373 | 6,432 | -59 | 109 | 6,403 | 31 |
| 79 | HURST-EULESS- BEDFORD ISD | 5,689 | 5,770 | -82 | 305 | 5,755 | 4 |
| 80 | ALDINE ISD | 6,315 | 6,423 | -107 | 68 | 6,371 | 54 |
| 81 | PASADENA ISD | 7,039 | 7,181 | -142 | 180 | 7,174 | 45 |
| 82 | HARLANDALE ISD | 6,551 | 6,795 | -244 | 70 | 6,708 | 17 |
| 83 | EDINBURG CISD | 6,632 | 6,876 | -244 | 164 | 6,784 | 33 |

Table A1 (Cont'd)

Expenditures per pupil for high and low poverty groups, and schools with at least 70 percent economically disadvantaged students

| N | DISTNAME | GFOPSPP HIGH POV | GFOPSPP LOW POV | DIFF HILO | EST. DIFF | EXPP GE70 | N_SCHS GE70 |
|----|------------------|---------------------|--------------------|--------------|--------------|--------------|----------------|
| 84 | ECTOR COUNTY ISD | 5,358 | 5,641 | -283 | 249 | 5,561 | 7 |
| 85 | MESQUITE ISD | 5,793 | 6,143 | -350 | 191 | 5,914 | 32 |
| 86 | DUNCANVILLE ISD | 5,493 | 5,846 | -353 | 118 | 5,603 | 14 |
| 87 | WESLACO ISD | 5,887 | 6,255 | -368 | 147 | 6,119 | 14 |
| 88 | EAGLE PASS ISD | 5,812 | 6,225 | -414 | 173 | 6,018 | 14 |
| 89 | RICHARDSON ISD | 6,581 | 7,107 | -526 | 492 | 6,594 | 17 |
| 90 | DONNA ISD | 5,897 | 6,699 | -802 | 63 | 6,322 | 18 |

Note: Figures in columns 3 – 7 in dollars.

Appendix B

Properties of the Chingos-Blagg Progressivity Index (CBI)

The basic notion of the CBI, as stated by Chingos and Blagg, is quite straightforward:

Specifically, for each state, we calculate a weighted average of each district's per-student funding, where the weights are the number of poor kids in each district. We then calculate the same figure weighted by the number of nonpoor kids.

Our progressivity measure for each state is the difference between the average funding for poor and nonpoor kids. For example, an estimate of \$100 would imply that, on average, poor students attend districts that receive \$100 more in per-student funding than the districts attended by nonpoor students. (Chingos and Blagg, 2017, p. 3.)

The CBI will first be discussed and applied at the state/district level, focusing on the state's distribution of allotments to individual school districts. The district/school distribution, and the associated CBI, will also be briefly discussed.

For ease of exposition it will be assumed that all of the funds a district receives come from the state. This would also apply to a system utilizing local resources if those resources are fully equalized by the state's school funding formula.

It is assumed that there are just two types of allotments. The first, in amount E , is paid to each district for each student in attendance. In addition, an add-on weight of r , with r greater than 0, is applied to each student classified as economically disadvantaged, or poor. The additional amount the district receives for each poor student is rE . The following notation and definitions are used:

- E : Flat grant allotment for each enrolled student.
- rE : Additional grant for each poor student, with r greater than zero.
- n_i : Number of students enrolled in the i^{th} district.
- p_i : The proportion of students in district i classified as poor.
- X_i : Total grant to district i .
- x_i : Per pupil grant to district i (i.e. $x_i = X_i/n_i$).
- N^T : Total number of students in all districts.
- N^P : Total number of poor students in all districts.
- N^{NP} : Total number of nonpoor students in all districts.
- nd : Number of districts.
- S^P : Total of grants to districts for their poor students.
- S^{NP} : Total of grants to districts for their nonpoor students.

The total amount of grants to district i can be written as

$$X_i = p_i n_i E(1 + r) + (1 - p_i) n_i E. \quad (\text{B1})$$

$$\begin{aligned} x_i &= p_i E(1 + r) + (1 - p_i) E \\ &= E[p_i + p_i r + 1 - p_i]. \end{aligned}$$

The per pupil grant for each student is therefore described by Equation B2.

$$x_i = E(1 + p_i r). \quad (B2)$$

The indicated summations which follow include all of the districts in a given state. The weighted sum of amounts going to districts for poor students is

$$\begin{aligned} S^P &= \sum p_i n_i E(1 + p_i r) = E \sum [p_i n_i + r p_i^2 n_i], \text{ or} \\ S^P &= E[N^P + r \sum p_i^2 n_i]. \end{aligned} \quad (B3)$$

The average weighted amount to poor students is

$$S^P/N^P = E[N^P + r \sum p_i^2 n_i]/N^P. \quad (B4)$$

Similarly, the student-weighted sum to all districts for their nonpoor students is

$$\begin{aligned} S^{NP} &= \sum (1 - p_i) n_i E(1 + p_i r) = E \sum [(1 - p_i) n_i (1 + p_i r)] \\ &= E \sum [n_i (1 + p_i r - p_i - p_i^2 r)] \\ &= E \sum [n_i + r p_i n_i - p_i n_i - r p_i^2 n_i] \\ &= E[N^T + r N^P - N^P - r \sum p_i^2 n_i] \\ &= E[N^{NP} + r N^P - r \sum p_i^2 n_i], \text{ or} \\ S^{NP} &= E[N^{NP} + r p N^T - r \sum p_i^2 n_i]. \end{aligned} \quad (B5)$$

The average amount of the weighted sum for nonpoor students is

$$S^{NP}/N^{NP} = (E/N^{NP})[N^{NP} + r p N^T - r \sum p_i^2 n_i]. \quad (B6)$$

The ratio form of the CBI index is $(S^P/N^P)/(S^{NP}/N^{NP})$, or

$$CBI = \frac{(E/N^P)[N^P + r \sum p_i^2 n_i]}{(E/N^{NP})[N^{NP} + r p N^T - r \sum p_i^2 n_i]}. \quad (B7)$$

Chingos and Blagg observed a positive correlation between their measure of progressivity and a measure of segregation within districts, which they termed a dissimilarity index. Though Chingos and Blagg did not define the dissimilarity index, it appeared to be the standard deviation or the variance of the p_i s for districts in each state. The variance of the p_i s for the districts in a state, weighted by each district's enrollment, would be

$$\text{Var}(p_i) = (1/nd) \sum (p_i - \mu_p)^2 n_i, \quad (B8)$$

where μ_p refers to the mean of the p_i s and nd represents the number of districts in the state. Solving Equation B8 for $\sum p_i^2 n_i$ results in

$$\sum p_i^2 n_i = (nd) \text{Var}(p_i) + \mu_p N^P. \quad (B9)$$

Substituting p for μ_p , the enrollment-weighted mean proportion of poor students in all districts, this expression can be substituted into Equation B7 for $\sum p_i^2 n_i$, and after simplification becomes

$$CBI = \frac{N^{NP} [N^P(1 + r p) + r(nd) \text{Var}(p_i)]}{N^P [N^{NP}(1 + r p) - r(nd) \text{Var}(p_i)]}. \quad (B10)$$

Given that the add-on weight of r for poor students, resulting in an additional grant of rE , was the only source of additional funds in support of poor students, it is not surprising that if r is set to zero that the value of the CBI becomes exactly 1.0. Further, if the $\text{Var}(p_i)$ is set to zero, which

^{B1} The validity of Equation B10 was confirmed with spreadsheet simulations, calculating the CBI with this equation, and also by applying the direct definition as per Chingos and Blagg (2017), with the same results.

would happen, for example, if all districts had the same proportions of poor students, the CBI would again equal unity.^{B2}

However, if r is greater than zero, then any amount of variance in the p_i s would result in a CBI greater than unity, and the greater the variance, the greater the CBI, assuming a constant average p . Increases in $\text{Var}(p_i)$ increase the numerator and decrease the denominator of B10. This is consistent with the observations by Chingos and Blagg. However, they attributed this relationship to the ability and opportunity of “how states with more segregated school districts can more readily target poor students because those students are more concentrated within certain districts” (Chingos & Blagg, 2017, p. 11). But Equation B10 shows this relationship to be a mathematical function of the variance of the proportions of poor students among the various districts within a state.

These results are consistent also with assertions by Shores and Ejdeymyr who found that “poor, black, and Hispanic shares of school resources are greater in more segregated districts.” (Shores & Ejdeymyr, 2017, p. 22). In present terms, the CBI is, indeed, greater in districts with greater $\text{Var}(p_i)$.

Lane, Linden and Stange arrived at the same conclusion, stating the following: “Furthermore, funding is more progressive in states that have more across-district economic segregation.” (Lane, Linden & Stange, 2018, p. 24).

In general, given two states that apply the same $r > 0$ in determining rE , the state with greater $\text{Var}(p_i)$ will appear the most progressive. Yet, in some sense, states making the same effort to direct more funds to poor students, measured by r , are equally progressive.

There is another approach to the distribution of additional grants, rE , for the benefit of economically disadvantaged students. Specifically, let the additional funds be channeled directly to the entitled students, not just to the districts and the schools that they attend. Under these conditions, Equation B1 is no longer appropriate. Instead, the share of all funds going to poor students would become

$$S^P = \sum p_i n_i E(1+r) = E(1+r)N^P. \quad (\text{B11})$$

This reflects the assumption that the extra funds, rE , benefit only the poor students in the districts, and in the schools within the districts which those students attend. The average amount to poor students would become

$$(S^P/N^P) = (1/N^P) E(1+r)N^P = E(1+r). \quad (\text{B12})$$

The grants to nonpoor students are now solely based on E . Therefore, the total to nonpoor students would be $N^{\text{NP}} \times E$, and the mean amount to nonpoor students is:

$$(S^{\text{NP}}/N^{\text{NP}}) = E. \quad (\text{B13})$$

^{B2} Shores and Ejdeymyr very nearly stated these same conditions for the index to reflect perfect equality. Referring to an equation describing the calculation of the index, they concluded as follows: “First, perfect equality will arise if there is no segregation between the two groups—that is, if the group shares are uniformly distributed across schools. Second, perfect equality also arises from equal spending on each school within the district (regardless of the across-school distribution of the two groups). Thus, both segregation and spending variation are necessary for the measure to deviate from 0.” (Shores & Ejdeymyr, 2017, p. 8). Instead of requiring “equal spending on each school” they probably meant to say “equal spending [per pupil] on each school.” But most importantly, they did not arrive at the conclusion that values of the index would increase solely due to increases in segregation, i.e., the variance of p . It is this that brings into question the applicability of this index.

The CBI thus becomes merely

$$\text{CBI} = E(1 + r)/E = 1 + r. \quad (\text{B14})$$

The CBI measure of progressivity no longer depends on $\text{Var}(p_i)$. All districts that distribute add-on grants of rE to poor kids would have a CBI of $1 + r$. The same effort, as measured by r , results in the same index value. However, as currently applied, two districts with the same $\text{Var}(p_i)$ and making the same effort as measured by r would receive the same CBI value, even if one district makes extra effort to actually focus the additional resources on their poor students who generate the additional funding.

Currently, in Texas, the law permits districts to intercept up to 45 percent of the additional compensatory education grants for overhead purposes. In school year 2017-18, the year for which the data used in this paper derived, the permissive rate for overhead was 0.48. With an r of 0.2 for that year, the CBI, all else equal, would have been expected to be 1.096 instead of 1.2, assuming that all of the funds not intercepted by the district were exclusively applied to the low income students in each school.

Since the additional allotments for poor students are effectively paid in full to districts in Texas, but the districts are permitted to siphon off nearly half for overhead purposes, and that there is no guarantee that districts actually allocate the remainder to the schools which the poor students actually attend, it is not surprising that Lane, Linden and Stange reached the following conclusion:

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. 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. (Lane, Linden & Stange, 2018, p. 24)

In view of the relationship between the CBI index and the variance in school districts' proportions of poor students, described above, and the nearly total lack of evidence regarding the extent to which school districts and schools specifically target their poor students with the additional grants which those students generate, it seems very difficult to compare the spending progressivity between the different levels involved—state, districts, and schools—using the CBI.

The difference in calculating the CBI for a given state using district-level data, as opposed to school level data, can be demonstrated with the data used in this paper using two different methods for calculating a “state” CBI. The basic data were school level general funds expenditures, from which expenditures for building maintenance were removed. Method 1 will consist of aggregating the school data to the district level—enrollments, numbers of poor kids, and expenditures. Method 2 will consist of first calculating subtotals of expenditures by poor or nonpoor, at the school level, by applying the proportion of poor students to the school level expenditures and enrollments. These poor-nonpoor subtotals will in turn be aggregated to the district levels. Each of these two sets of district subtotals, obtained with the two different procedures, will be used to calculate a “state” level CBI, where the 90 districts that were used in this study comprise the “state.”

The resulting CBIs, using the two methods are:

Method 1: CBI = -\$9.

Method 2: CBI = +\$203.

The lower level of progressivity resulting from using Method 1 demonstrates clearly that the school level detail is obscured by aggregation to the district level. Utilizing the school level data with Method 2 indicates that, on average, more expenditures occurred to the benefit of poor kids, in the amount of \$203 per pupil. The CBIs for the individual districts were plotted in Figures 4 and 5 above. It is noted that a simple average of those 90 individual district CBIs is \$213, quite close to the one just referred to as resulting from Method 2.

Perhaps even more important is that the school level data reveals substantial differences in the degrees of progressivity among the 90 districts. One must be careful in making direct comparisons, for reasons noted previously. Districts with all schools at very high percentages of poor kids have little or no opportunity to specifically target poor schools—they are all poor. But when differences in district average levels of poor kids, and the variances in the percentages of poor kids among the schools are taken into account, comparisons can be quite useful in calling attention to low district progressivity due to circumstances, and low district progressivity due to an apparent choice. Certainly such comparisons provide a starting point for better understanding such differences.

Appendix C

Corporate Funded Foundations' Support for Intra-district Funding Studies

It was stated above (p. 3) that the four works cited by Baker and Welner (Baker & Welner, 2010; Baker, 2017) are associated with or received funding from at least 20 foundations that have provided funds to organizational members of the State Policy Network (SPN). That assertion is documented in Table C1.

One of the original goals of the SPN was to establish policy think tanks in every state to produce studies that would promote the interests of the large number of substantially conservative corporate-funded foundations that supported the network (Mayer, 2017, p. 425). The purpose of a related organization, the American Legislative Exchange Council (ALEC) was, and is, to meet with conservative legislators from all states, with corporate donors also in attendance, and draft model legislation that would promote the interests of the corporate sponsors, and to get those model bills passed in as many states as possible. Many of the legislators who attend the ALEC meetings receive political contributions from those same corporate representatives with whom they meet. For example, Texas Representative Tom Craddick, who at one time was the Chairman of the ALEC Board of Directors, “received \$878,000 in campaign contributions from ALEC corporate members from 2004 to 2011.”^{C1} These ALEC-sponsored meetings received little public notice for many years. Eventually ALEC’s activities were publicized by the website ALEC Exposed and by a series of important books that detailed the development of the SPN, ALEC, and their financial supporters (Fang, 2013; Mayer, 2017; Anderson, 2020);

A partial list of items that have been on the legislative agenda of ALEC and SPN includes the following:

- Opposition to tax increases—Super Majority Act;^{C2}
- Living Wage Mandate Preemption Act;^{C3}
- Opposition to Global Warming reduction legislation;^{C4}
- Scholarship tax credits;^{C5}
- Voter ID Act;^{C6}
- Right to Work Act.^{C7}

^{C1} Taken from “Texas ALEC Politicians,”

Sourcewatch, http://www.sourcewatch.org/index.php/Texas_ALEC_Politicians , accessed on 10-21-2016

^{C2} http://www.alecexposed.org/w/images/5/5c/8G1-Super-Majority_Act_Exposed.pdf, accessed 10-22-2016.

^{C3} http://www.alecexposed.org/w/images/b/ba/1E6-Living_Wage_Mandate_Preemption_Act_Exposed.pdf , accessed 10-22-2016.

^{C4} http://alecexposed.org/w/images/9/9d/6D0-Against_US_Participation_in_International_Agreement_in_Copenhagen_Exposed.pdf , accessed 10-22-2016.

^{C5} <https://www.alec.org/model-policy/the-great-schools-tax-credit-program-scholarship-tax-credits> , accessed 10-22-2016.

^{C6} http://alecexposed.org/w/images/d/d9/7G16-VOTER_ID_ACT_Exposed.pdf , accessed 10-22-2016.

^{C7} http://alecexposed.org/w/images/c/c8/1R10-Right_to_Work_Act_Exposed.pdf , accessed 10-22-2016.

Table C1

Foundations' Support for Intra-district Funding Studies

| Authors and organizations cited in Baker and Welner (2010) and Baker (2017) | Related Organizations ^a | Donor Foundations ^b | Contributions ^c (\$) (2004 – 2018) | | |
|---|------------------------------------|--------------------------------|---|----------|---------|
| (McClure, Wiener, Roza, & Hill, 2008) | Edvance Research | Broad | 255,426 | | |
| | | Dell | 5,500,000 | | |
| | | Bradley | 335,000 | | |
| | | Broad | 129,000 | | |
| | | Dell | 1,950,500 | | |
| | | Hume | 60,000 | | |
| | | Joyce | 250,000 | | |
| | | Kauffman | 350,039 | | |
| | | Kern | 141,000 | | |
| | | Walton | 624,750 | | |
| | | (Public Impact et al. (2008) | Fordham Institute | Arnold | 52,500 |
| | | | | Bradley | 767,500 |
| | | | | Broad | 456,250 |
| | | | | Carnegie | 919,700 |
| | | | | Dell | 67,000 |
| Fordham F | 325,000 | | | | |
| Gates | 7,013,823 | | | | |
| Hertog | 110,000 | | | | |
| Joyce | 993,500 | | | | |
| Kauffman | 425,250 | | | | |
| Kern | 1,310,185 | | | | |
| Koch | 25,000 | | | | |
| Koret | 130,000 | | | | |
| Kovner | 1,225,000 | | | | |
| Scaife | 160,000 | | | | |
| Searle | 567,000 | | | | |
| Silicon | 350,000 | | | | |
| Simon | 342,500 | | | | |
| Walton | 6,922,780 | | | | |
| (Cary, Gray & Holley, 2007) | Buckeye Institute | Badley | 350,000 | | |
| | | Hume | 90,000 | | |
| | | Koch | 275,281 | | |
| | | Roe | 175,000 | | |
| | | Scaife | 300,000 | | |
| | | Searle | 331,500 | | |
| (Families for Excellent Schools, 2013) | Families for Excellent Schools | Broad | 3,029,000 | | |
| | | Hertog | 2,300,000 | | |
| | | Walton | 27,036,000 | | |
| | | Total | 65,645,484 | | |

^aThe organizations and funding sources listed as related to authors McClure, Wiener, Roza, and Hill were identified on Edunomics Lab's website <https://edunomicslab.org/about-us/> and the Building State Capacity

& Productivity Center’s website: <http://www.bscpcenter.org/aboutus/> . Contribution amounts from the Arnold, Gates, and Walton foundations, to Edunomics Lab, if any, could not be determined. It is noted that Margarite Roza, the Director of the Edunomics Lab, was at one time a Senior Economic Advisor to the Bill & Melinda Gates Foundation (See <https://www.educationnext.org/author/maroz/>).

^bThe full names of the donor foundations are listed in Table C2.

^cThe dollar amounts of contributions by the donor foundations were obtained from the website of Foundation Directory Online. A paid subscription is required to access their data.

Table C2

Full names of donor foundations listed in Table C1

| Short name | Official name ^a |
|------------|--|
| Arnold | Laura and John Arnold Foundation |
| Bradley | The Lynde and Harry Bradley Foundation, Inc. |
| Broad | Eli & Edyth Broad Foundation |
| Carnegie | Carnegie Corporation of New York |
| Dell | Michael & Susan Dell Foundation |
| Fordham | Thomas B. Fordham Foundation |
| Gates | Bill & Melinda Gates Foundation |
| Hertog | Hertog Foundation, Inc. |
| Hume | Jaquelin Hume Foundation |
| Joyce | The Joyce Foundation |
| Kauffman | Ewing Marion Kauffman Foundation |
| Kern | The Kern Family Foundation, Inc. |
| Koch | Charles Koch Foundation |
| Koret | Koret Foundation |
| Kovner | The Kovner Foundation |
| Roe | The Row Foundation |
| Scaife | Sarah Scaife Foundation, Inc. |
| Searle | Searle Freedom Trust |
| Silicon | Silicon Valley Community Foundation |
| Simon | William E. Simon Foundation, Inc. |
| Walton | Walton Family Foundation |

^aFull names of foundations as used on Foundation Directory Online

As can be seen from the bottom of Table C1, the total amount of identified contributions from the 20 donor foundations to the organizations related to the authors cited by Baker is \$65,645,484. Elsewhere, this author tallied the contributions from these same foundations to the State Policy Networks members and associate members, for the years 2003 to 2013, also based on data obtained from Foundation Directory Online. Those amounts totaled \$276,068,000 (Toenjes, 2016). These amounts strongly suggest that many of the goals that those funding organization might pursue in their promotion of the State Policy Network and the American Legislative Exchange Council--lower taxes, lower government regulation of industry, more constraints on unions-- would also be influential in their pursuit of school choice, vouchers, and privatization of the U.S. education system.

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Laurence A. Toenjes served as a Research Associate Professor at the University of Houston until his retirement. Toenjes was previously employed by the Bureau of the Budget and the Office of the Comptroller in Illinois as a fiscal and educational finance analyst and by the Texas Association of School Boards. His papers have appeared in Education Policy Analysis Archives, The American Economist, Journal of Education Finance and other publications. Laurence received his BA and MA degrees in economics from the University of California at Berkeley, and his PhD in economics from Southern Illinois University at Carbondale.

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