Intra-District Equity in Four Large Cities: Data, Methods and Results

BY LEANNA STIEFEL, ROSS RUBENSTEIN, AND ROBERT BERNE

In the traditional approach to school finance and governance, a central district office allocates funds to schools within the district for prescribed uses and intra-district variation in the allocation of monies for various purposes is rarely examined. However, in keeping with the increasing interest in schools as centers of management and budgeting authority, school finance researchers are beginning to focus on resource allocation decisions at the school, rather than district, level. School-level analyses have the potential to yield useful information for state and local policy makers, educators, the courts, and researchers because most educational resources are actually expended at the school site, and because schools (in contrast to districts) are the units primarily responsible for producing educational outcomes. Specifically, school-level analyses are capable of revealing intra-district patterns of equity or inequity. As resources in school districts around the country become increasingly constrained and new ways of financing schools grow (e.g. vouchers and charter schools), the equity of resource allocation patterns among schools as well as districts will be of critical importance.

In this article we first review the literature on school-level resource allocation to demonstrate the types of recent research

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1. This paper was made possible by funds granted by the Andrew W. Mellon Foundation. We thank three anonymous readers and Catherine Clark, the reviewer for this volume, for helpful comments on previous drafts. The statements made, and views expressed, are solely those of the authors.


3. Although one could make a strong case that classrooms, not schools, are the most relevant education units, classrooms may be too limited a unit for analyzing educational outcomes. Moreover, from a real standpoint, only limited decisions are likely to be made at the classroom level.

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activity based on school-level data and the numerous remaining problems with such analyses. In the second section, we propose the use of the concepts of horizontal, vertical and equal opportunity equity, as developed by Berne and Stiefel, at the school level. We then describe and compare the school-level data available from the four large cities in this study (Chicago, Fort Worth, New York City, and Rochester). The fourth section summarizes the results of equity analyses in the four cities; the last section offers conclusions.

REVIEW OF THE LITERATURE ON SCHOOL-LEVEL RESOURCE ALLOCATION

Efforts at producing school-level analyses have been plagued by numerous difficulties, ranging from the conceptual to the practical. One of the most common problems researchers encounter is simply the lack of available school-level data in most states and school districts. Several researchers have found that data on teachers tend to be the most readily available, although they are often lacking in one or more respects. For example, Monk discovered that New York State collects micro-level data on the allocation of teacher time within secondary schools, but collects no data on other resource allocations, including overall fiscal allocations. Goertz found similar limitations in her research, although she was able to piece together a fuller picture of fiscal expenditures for staff using local payroll and staffing lists. Both Goertz and Monk point out that teachers themselves provide the data on assignments; therefore, the reports may not be consistent across schools and teachers. Berne, Stiefel and Moser report that in Rochester, New York, school-level data were collected by different departments within the school system, requiring merging and coordination of different data sources to facilitate meaningful analysis.

Compounding the technological problems may be a lack of interest on the part of many educators and policy makers in over-


coming these limitations. Herrington looked at the development of school-level financial reporting systems in Florida (a state long involved in school-based management and school-level data collection) and found that policy makers, educators, and the public demonstrated little interest in using the school-level data that were available, or in expanding the technological resources needed to improve data collection. Busch and Odden review a number of papers on school-level financial analysis prepared for the Consortium for Policy Research in Education (CPRE) and report that of seven states with which the researchers were familiar, only three collected fiscal, staff, and student data at the school level. In these three states, data collection systems were still in their early stages and therefore presented numerous problems. While it is not essential that state, rather than local, education agencies collect school-level data, important opportunities for cross-district comparisons can be lost if individual districts each adopt their own reporting systems. Indeed, even when states collect data, there is wide variation in the methods of collecting and reporting.

Cooper et al. have attempted to standardize the reporting of school and district level expenditures through their “School-Site Allocations Model.” The model separates district and school-level expenditures, then classifies them into one of five functional categories. Building on this work, Speakman et al. at the accounting firm of Coopers and Lybrand developed the Finance Analysis Model, a standardized system for classifying school-level expenditures by function, location, school type, and program. The model also provides a method for allocating shared costs to multiple schools or across functions. Using a consistent method for classifying expenditures can help researchers avoid problems of comparability in between-district comparisons.


Classification by function permits researchers to examine how much money actually reaches students in the classrooms. The results of such analyses depend on a number of factors, including the accuracy, consistency, and detail of the reported data, as well as assumptions made by researchers in creating categories and assigning individual expenditures to each. School-level data may be more likely than district-level data to include complex or inconsistent coding schemes and definitions that researchers must sort through in order to understand the information they present. Cohen's example of an athletic director in Ohio illustrates the way in which reported data can be confusing, if not misleading. Ohio districts have the discretion to assign one of four function codes to an athletic director based on the position's multiple duties (e.g., sports instruction, administration, community recreation). These codes will, in turn, affect the way researchers assign expenditures for that position to aggregate function categories. Like the athletic director, most school personnel perform multiple duties. Therefore, a detailed accounting of time spent in each activity for each staff member is needed to accurately allocate costs by function. Unless these data are available, functional aggregates will remain only estimates.

Despite the inconsistencies in state and district financial reporting discussed above, most educational resource allocation studies have reached surprisingly consistent conclusions regarding spending by function, with approximately 60 percent of district funds spent on instruction. For example, Cooper et al., using their School Site Allocation Model, found that between 59 percent and 66 percent of total district expenditures in eight districts were spent on instruction at the school site. Nakib found that districts in Florida spent an average of 58.4 percent of total expenditures on instruction, with 5.9 percent and 1.2 percent of the total spent on

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13. Barnes and Siegel, "Measuring Equity at the School Level."
16. Cooper et al., "School-Site Cost Allocations."
school-level administration and district-level administration, respectively. These school- and district-level expenditure patterns varied little based on the level of total per-pupil expenditures or school size.

Krop, Carroll, and Ross conducted a cross-sectional analysis of educational expenditures in California for 1992-93, tracing expenditures by state offices, county offices, school districts, and school-sites. They found that 92 percent of total expenditures were at the district-level or below (which includes school-site expenditures), with the remainder spent by counties and by the state. At the school-site, an average of approximately 68 percent of total expenditures was in the category "classroom personnel and materials," with most of those funds spent on teacher salaries, while districts spent an average of about 5 percent of total expenditures on administrator salaries.

One of the few studies to reach substantially different conclusions is Speakman, et al.'s examination of New York City school expenditures for 1993-94, which found a relatively low 48 percent of total district funds spent on instruction and a relatively high 26 percent spent in the category "Operations-Schools," which includes transportation, food service, maintenance, and clerical staff. This system-wide average for spending on operations is somewhat misleading, however, in part because it includes special education students in small specialized programs.

In November of 1996, the New York City Board of Education released School-Level Budget Reports, which, for the first time, track all system expenditures to the school-level. While the reports represent a substantial advance in data availability—particularly in the allocation of citywide and subdistrict expenditures to individual schools—a number of shortcomings may still limit future research. For example, the data report teacher salaries at the subdistrict, rather than school level. As the district overcomes these limitations,


the reports will undoubtedly facilitate improved analyses of expenditure patterns across New York City schools.

Policy makers and the public have been particularly interested in spending for district administration as compared to instructional expenditures. Former Secretary of Education William Bennett helped to popularize the notion that an "administrative blob" exists in many large school districts. Proponents of this view, which has been supplemented by the work of Chubb and Moe on bureaucracies, argue that excessive administrative expenditures (at the school-site and, particularly, at the district level) negatively affect school outcomes by diverting resources needed in classrooms and by creating large unresponsive bureaucracies incapable of adequately educating most students.20 Brewer, though, using data for all New York State districts except New York City, found that a relatively low proportion of district expenditures (about 7 percent) funded building administrative salaries, with another 4 percent spent on district administration.21 Taking this analysis one step further, he estimated production functions for the districts and found that the fraction of resources devoted to non-instructional purposes had little significant effect on student outcomes.

Along with interest in allocations by function, several studies have examined allocations by program, paying particular attention to comparisons between expenditures for general education as compared to those for special education. Of special note in two of these studies is their longitudinal approach, which tracks changes in real per-pupil expenditure patterns over time. One drawback to these studies, however, is their use of districts, rather than schools, as the unit of analysis. Lankford and Wyckoff tracked expenditures for all New York State districts from 1980 to 1992 and found that approximately 70 percent of the real per-pupil increases in educational expenditures over the period were devoted to teaching, with 40 percent spent on general education and 30 percent spent on teaching students with disabilities.22 General education teaching's share of total expenditures decreased over the period, however.

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while the share for teaching of students with disabilities increased substantially.

Rothstein and Miles examined expenditures by program for eight representative districts from 1967 to 1991. Like Lankford and Wyckoff, they found that while real per pupil expenditures increased by 62 percent over the period (using an alternative to the Consumer Price Index for urban consumers to calculate real changes), a disproportionate share of the new spending was devoted to special education. Thus, special education rose from an average of 4 percent of total expenditures to 17 percent, while general education’s share fell from an average of 80 percent in 1967 to an average of 59 percent in 1981. Monk and Roellke, examining the disposition of teacher resources in New York State districts for the 1991-92 school year, found that while the “academic” curriculum receives over 80 percent of total resources on average, its share remains steady or declines as per-pupil spending increases. Conversely, “special classes” receive a 66 percent higher share of total resources in the highest spending districts as compared to the lowest. This finding would seem to be consistent with Lankford and Wyckoff’s longitudinal findings regarding the use of additional resources in New York State districts.

This brief review of the literature illustrates that the use of school-level data has become an important tool for examining how resources are allocated within districts. By moving beyond district-level aggregates, researchers can more accurately track the uses of scarce educational resources and begin to determine whether funds are being used effectively. School-level data could also provide opportunities to more accurately track the actual resources available to individual students across schools in order to examine the equity of intra-district allocations. The literature review points out, though, that the extant research has largely overlooked the study of equity at the school-level. The next section discusses the concept of equity and implications for school-level analysis.

CONCEPTUAL ISSUES IN THE ASSESSMENT OF SCHOOL-LEVEL EQUITY

Berne and Stiefel develop concepts and measures of three equi-


ty principles—equal opportunity, horizontal equity, and vertical equity. In their early work, these principles are measured with district-level data. Research using districts as the unit of analysis implicitly assumes that each school within a given district receives the average level of resources available to schools within the district. This assumption may be reasonable in small districts with relatively few schools. In large districts with many schools (such as the districts examined in this article), it is important to determine whether resource disparities arise between schools within the districts, and to explore the factors that may be systematically linked to such disparities.

*Equal opportunity* is defined in terms of the relationship between school objects and a second variable, where in most cases the absence of a relationship signifies equal opportunity. School objects are broadly conceptualized to include inputs, outputs, outcomes, and processes. While earlier work has used mostly input measures, more recent work has included outputs. At the district level, equal opportunity with respect to ability to pay is the dominant political and fiscal issue. Since individual schools do not have revenue-raising responsibilities or individual tax bases on which to draw, a new series of equal opportunity issues is important at the school level. These might include relationships between resources (broadly defined) and student characteristics, or between resources and a school’s geographic location within a district. Within many districts, there are concerns about the distribution of resources with respect to student race or ethnicity. Similarly, it is often claimed that certain areas within a given district are favored with additional resources.

*Horizontal equity*, or the equal treatment of equals, takes on particular significance at the school level. Funding streams coming to the school often can be separated into general education resources, intended to provide an equal base for all students, and

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26. Statistical methods to assess equal opportunity include regression and correlation analysis and calculation of elasticities to measure the relationship between the object and the variable of interest.


28. Horizontal equity may be measured by numerous univariate dispersion measures, including the Gini coefficient, McLeod index, Theil index, and coefficient of variation. (See Berne and Stiefel. *The Measurement of Equity* for a complete list of univariate dispersion measures applied to school finance.)
special education or compensatory education resources, which are meant to be used differentially across students. Horizontal equity can provide a valid criterion upon which to evaluate the equity of general education or basic funding.

Vertical equity, or the appropriately unequal treatment of unequals, is an important equity concept at the school level.29 As researchers move closer to individual pupils in their work, differential pupil needs become more salient. Pupil characteristics such as student and family poverty, learning and physical disabilities, and native languages other than English are likely to indicate greater educational needs among those students. Schools with higher concentrations of students with these special needs might require more resources to achieve desired outcomes, as compared to schools with lower concentrations. Vertical equity measures assess the degree to which those schools receive more resources per pupil, as well as the sources of the additional funds.

There are numerous alternative methods to measure each of the three equity concepts described above, with each method implying different value judgments.30 A number of different measures were used in this study to assess each equity concept and produced very similar results. Therefore, only the most common measures are shown in the tables and discussed in the paper.

**Comparison of School-level Data in Four Cities**

Table 1 shows characteristics of the school-level data used in each of the four cities in this study and reveals some basic differences in resource availability among the districts. New York City is the largest district and Rochester the smallest. Rochester spends the most per pupil, followed by New York City, Chicago, and Fort Worth. Pupil-teacher ratios tell a slightly different story, however. Although the highest spending district (Rochester) has the lowest pupil-to-teacher ratio, as would be expected, the other three districts have nearly the same ratios. This pattern results in lower total spending in Fort Worth, which may be somewhat offset by higher teacher salaries in the other cities.31 With this context in mind, we

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29. Vertical equity may be analyzed through the use of regression and correlation analysis to assess the relationship between objects and variables of interest, or by using univariate dispersion measures combined with student counts weighted to reflect differential student needs and characteristics.


31. These differences may largely reflect historical patterns that have produced lower teacher salaries on average in southern states as compared to northern states.
### TABLE 1
**Characteristics of Data Used in This Study**

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Total district budget or expenditures</td>
<td>$3,857 billion</td>
<td>$7,002 billion (no debt service)</td>
<td>$347 million all funds; $264 million general fund</td>
<td>$313 million current expenditures</td>
</tr>
<tr>
<td>Total number of students in district (district count)</td>
<td>110,000</td>
<td>961,462</td>
<td>3,410</td>
<td>71,114</td>
</tr>
<tr>
<td>Total number of students used in analyses</td>
<td>100,889 (91% of total enrollment)</td>
<td>625,040 (65% of total enrollment)</td>
<td>30,572 (99% of total enrollment)</td>
<td>71,102 (99% of total enrollment)</td>
</tr>
<tr>
<td>Total expenditures per pupil, using district total expenditures</td>
<td>$6,968 per enrolled pupil</td>
<td>$7,282 per enrolled pupil</td>
<td>$7,658 general fund per enrolled pupil</td>
<td>$4,406 per enrolled student</td>
</tr>
<tr>
<td>Pupil-Teacher Ratio (Fall 1993)</td>
<td>18.9</td>
<td>18.2</td>
<td>14.5</td>
<td>18.9</td>
</tr>
<tr>
<td>Teacher salaries available?</td>
<td>Yes</td>
<td>Yes—at subdistrict level</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Fringes (included or percentage applied?)</td>
<td>Included as school aggregates</td>
<td>Included for reimbursable dollars only</td>
<td>Applied</td>
<td>Neither included nor applied</td>
</tr>
<tr>
<td>What items are not analyzed at school level?</td>
<td>City wide services; school center services; central services</td>
<td>High schools; spec. ed.; central admin.; school safety; transportation; food services; school facilities; and some small others</td>
<td>Spec. ed.; central school facilities; and some small others</td>
<td>Transportation</td>
</tr>
<tr>
<td>Percentage of budget reported at school level</td>
<td>74%</td>
<td>33%</td>
<td>44%</td>
<td>78%</td>
</tr>
<tr>
<td>Number of schools in district</td>
<td>555</td>
<td></td>
<td></td>
<td>100 plus some</td>
</tr>
<tr>
<td>Student poverty count</td>
<td>Higher of percent eligible for free lunch or families receiving public assistance</td>
<td>Higher of percent eligible for free lunch or families receiving public assistance</td>
<td>Percent receiving free or reduced price lunch</td>
<td>Percent receiving free or reduced price lunch</td>
</tr>
<tr>
<td>Data produced routinely or need to work with district?</td>
<td>Work with district (through Chicago Policy on School Data)</td>
<td>Produced for two years only; difficult to get in computer readable form</td>
<td>Not produced routinely; need to work intensively with central district offices</td>
<td>Yearly according to state codes; need to work with district to obtain matching data</td>
</tr>
</tbody>
</table>

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12. Cities may have changed their policies; this table describes the data that existed for the year in which they were obtained.

13. Some analyses use fewer students due to omission of outliers from data.

turn to a discussion of the differences in school-level data available in this study.

In each city it was necessary to work with central office staff to obtain the necessary data; no city made adequate school-level data available in enough detail, with matching output data, in computer readable form. However, the degree of difficulty in obtaining data varied, with Fort Worth providing the easiest access, perhaps because of an existing statewide requirement to publish some school-level financial data. In Rochester and Chicago, it was necessary to work intensively with district offices. Although New York City published printed copies of school-level budgets in the year used, it was still necessary to work with the district to obtain computable readable forms of the data and to obtain other input and output.

The year of the data for each city differs because some cities took longer than others to provide data and we began to work in the cities at different times. Two cities provided budget data and two provided expenditure data, although in these years the budget data did not differ significantly from the expenditure data. All the districts provided data organized by accounting fund and by object. No district provided an adequate breakout by program (regular education, special education, bilingual education, etc.), so a combination of fund and revenue source data were used to create these where possible. For example, if the general fund contained mostly revenues from state operating aid and local sources, then the general fund was used as “basic” or “regular” education funding (resources available to all pupils in a school.) Education funding for students

35. The Texas Education Agency is required to publish school report cards containing school-level performance data as well as basic information on pupil-teacher ratios and administrative and instructional costs per student.

36. Working with Chicago was made somewhat easier because the Chicago Panel on School Policy shared their budget database with us. The Chicago Panel, however, works intensively with the district to obtain these data.

37. New York City stopped printing data on school-level budgets after two years. The data were printed in a report (word processing) file and not an analytical one. It took at least a week of time to convert the file to an analytical one because of the massive amount of data, the file setup, and the lack of appropriate labels on the variables. Recently, New York City has produced a new, more complete set of budget reports. They have not yet been fully analyzed, a necessary step to determine their strengths and weaknesses.

38. In New York City, the budget data were for January, after major adjustments were made. For Chicago, the data were for mid-fall, again after the final set of major adjustments were made. In general, budget data can differ from expenditure data if districts make significant adjustments after the budgets are established. For the kinds of analyses in this article, expenditure data are preferred.
with disabilities was usually contained in a separate fund. but three cities (New York, Chicago, and Rochester) did not provide adequate detail on students served. This latter point is important, because special education expenditures have grown faster than other types of spending over the past few decades and should, therefore, be analyzed.

Teacher salary data were available in different ways across the cities. No city provided these data with all fringes included. Chicago provided line items for teacher pensions at the school level; however, teacher benefits could not be separated from those for administrators and aides. New York provided fringe benefit information at the subdistrict level, while no benefit information was available in Rochester and Fort Worth. In Rochester, a percentage was applied to the salary data to account for fringes (and sometimes pensions.) Because fringe and pension benefits can amount to between 20 and 30 percent of salary expenditures, it is important to find a way of providing more accurate total salary information.

The percentage of funds allocated and reported at the school level varied across cities, and this accounts for the major differences in the percentage of total district spending analyzed. District-level and cross-school expenses were removed from the analyses. In addition, in New York and Rochester, the funding for special education was removed from the analyses since it could not be traced to the school level. The highest percentages of total resources were analyzed in Chicago and Fort Worth because of the amount reported initially at the school level. In New York City, the smallest proportion was analyzed because of the small amount of school-level data (for elementary and middle schools only) that the city provided. 39

All districts provided some school-level data on student characteristics, primarily poverty data and the percentage of students eligible for bilingual services. These input data are probably universally available because of federal government reporting requirements for funding based on student counts.

**RESULTS OF SCHOOL-LEVEL EQUITY ANALYSES IN FOUR CITIES**

Results of the equity analyses across the four cities are summa-

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39. In particular, only elementary and middle school general education and reimbursable funding was allocated by school (with adequate accompanying student counts); data for high schools, central administration, transportation, food, most fringes and pensions were available only at the district level. Special education funding was allocated to the schools, but the student counts were not.
ized in two ways. First, Table 2 shows the objects, measures, and methods used in each city. Table 3 summarizes findings from each city.

OBJECTS, MEASURES AND METHODS

Looking at Table 2, one sees that for all equity measures in all cities, analysts are able to study input equity only. Despite lack of data for process or output equity, input equity across the schools (intra-district) yields interesting results. For horizontal equity in both Chicago and New York, resources for general education are capable of being separated from those for other purposes. This is a preferable way to measure an input object for horizontal equity, because general education funding comes closest to measuring the resources meant to be spent for all students. In Rochester and Fort Worth, only total expenditures are used. A range of horizontal equity measures was calculated in each city and the coefficient of variation is reported in Table 3. (Other measures showed similar results.)

For vertical equity. Chicago and New York data allow the separation of funds targeted toward poor or low achieving students; this is not true in Rochester or Fort Worth. While analyses in all cities look at the relationship of total funds and total positions (or teacher positions) with a measure of poverty, in Chicago and New York, targeted funds are studied as well. Bivariate regression or correlation analysis is the method used in three cities; in Rochester multiple regression analysis is also used. These methods assess the direction, size, and strength of the relationships between the level of poverty in schools and various funding sources. The analyses assume that schools serving higher proportions of students from poverty should receive additional resources. Therefore, a positive relationship between per-pupil funding and poverty indicates that some degree of vertical equity is present:

Equal opportunity analyses use various measures of funding and positions as objects. In Rochester, equal opportunity with respect to non-white students, as well as school location, is measured, while in the other cities only relationships with non-white students are studied. Data for New York City are not readily available in this year to study equal opportunity. Methods in all cities involve bivariate regression (to assess the direction, size, and

40. The analyses make no attempt to determine the appropriate level of additional resources these schools should receive, however.
<table>
<thead>
<tr>
<th></th>
<th>Chicago</th>
<th>New York City</th>
<th>Rochester</th>
<th>Fort Worth</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Objects</strong></td>
<td>- Total budget (w/fringes)</td>
<td>- General education total budget (no fringes)</td>
<td>- Total General Fund expenditures (w/fringes)</td>
<td>- Total current operating expenditures (all funds)</td>
</tr>
<tr>
<td></td>
<td>- General Fund</td>
<td>- General education direct school budget (no fringes) and total positions</td>
<td>- Total General Fund positions</td>
<td>- Expenditures by function (instruction, support, administration, operation, food)</td>
</tr>
<tr>
<td></td>
<td>- General Fund less special education</td>
<td>- General education indirect school budget (no fringes) and total positions</td>
<td>- General education teachers' salary (no fringes)</td>
<td>- Average teacher salary</td>
</tr>
<tr>
<td></td>
<td>- General fund less special education and desegregation</td>
<td>- General education teachers' salary (no fringes)</td>
<td>- General education teachers' salary (no fringes)</td>
<td>- Total teacher positions</td>
</tr>
<tr>
<td></td>
<td>- Instructional budget Teacher positions</td>
<td>- General education total positions</td>
<td>- General education teaching positions</td>
<td></td>
</tr>
<tr>
<td><strong>Pupil count</strong></td>
<td>Total School enrollment</td>
<td>Total school or subdistrict enrollment</td>
<td>Total school enrollment</td>
<td>Total school enrollment</td>
</tr>
<tr>
<td>Measures reported (pupil weighted in all cases)</td>
<td>- Coefficient of variation</td>
<td>- Coefficient of variation</td>
<td>- Coefficient of variation</td>
<td>- Coefficient of variation</td>
</tr>
</tbody>
</table>
TABLE 2 (CONTINUED)

<table>
<thead>
<tr>
<th>Dependent Variables (objects)</th>
<th>Chicago</th>
<th>New York City</th>
<th>Rochester</th>
<th>Fort Worth</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Same as for horizontal equity, plus:</td>
<td>Same as for horizontal equity, plus:</td>
<td>- Total General Fund plus:</td>
<td>- Total current operating expenditures (all funds)</td>
</tr>
<tr>
<td></td>
<td>- Average teacher salary</td>
<td>- Federal and State</td>
<td>- Special Aid Fund</td>
<td>- Average teacher salary</td>
</tr>
<tr>
<td></td>
<td>- State Chapter I Budget</td>
<td>reimbursable and competitive budgets (w/fringes)</td>
<td>- Average teacher salary</td>
<td>- Total teacher positions</td>
</tr>
<tr>
<td></td>
<td>- Federal Title I Budget</td>
<td></td>
<td>- Total teacher positions</td>
<td></td>
</tr>
<tr>
<td>Independent variables</td>
<td>- Higher of percent students eligible for free lunch or receiving public assistance</td>
<td>- Higher of percent students eligible for free lunch or receiving public assistance</td>
<td>- Percent students receiving free or reduced price lunch</td>
<td>- Percent students receiving free or reduced price lunch</td>
</tr>
<tr>
<td>Student Counts</td>
<td>- Total enrollment</td>
<td>- Total enrollment</td>
<td>- Total enrollment</td>
<td>- Total enrollment</td>
</tr>
<tr>
<td>Methods (pupil weighted in all cases)</td>
<td>- Total reimbursable funds enrollment</td>
<td>- Total reimbursable funds enrollment</td>
<td>- Total enrollment</td>
<td>- Bivariate regression</td>
</tr>
<tr>
<td></td>
<td>- Bivariate regression</td>
<td>- Bivariate regression</td>
<td></td>
<td>- Correlations</td>
</tr>
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</table>

### EQUAL OPPORTUNITY

<table>
<thead>
<tr>
<th>Dependent Variables (objects)</th>
<th>Same as for vertical equity, plus:</th>
<th>None with available data</th>
<th>Same as for vertical equity</th>
<th>Same as for vertical equity</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>- Deseg funds per pupil</td>
<td></td>
<td>- Percent minority students</td>
<td>- Percentage black students</td>
</tr>
<tr>
<td>Independent Variables</td>
<td>- Percent non-white</td>
<td></td>
<td>- Location</td>
<td>- Percent Hispanic students</td>
</tr>
<tr>
<td>Student Counts</td>
<td>- Total enrollment</td>
<td></td>
<td>- Total enrollment</td>
<td>- Total enrollment</td>
</tr>
<tr>
<td>Methods (pupil weighted in all cases)</td>
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<td>- Bivariate regression</td>
<td>- Correlations</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- Correlations</td>
<td></td>
</tr>
</tbody>
</table>

41. Within each district, multiple horizontal equity measures (see Berne and Stiefel, *The Measurement of Equity*) were calculated and produced consistent results regarding the distribution of funding. In the interest of brevity, only the coefficient of variation is reported here.
strength of the relationship between funding and school characteristics or correlation analysis (to assess the direction and strength of the relationship).  

RESULTS

The horizontal equity results in Table 3 show that in Chicago, New York, and Fort Worth most coefficients of variation are below 0.15. For Fort Worth, the object of analysis is total funding, so that the result either hides inequities in base funding or shows an extremely flat distribution of all funds. In Rochester, where all funds are also used as an object, the coefficients of variation are above 0.15 and thus slightly less equitable. In general, schools in these cities are in a horizontally equitable range, although individual cities might want to push the number closer to perfect equality (zero).

For vertical equity with respect to the percentage of students in poverty, the two cities where "compensatory" funds are separated (Chicago and New York) show some vertical equity (positive relationships between these funds and poverty). For general education or total funds, all cities show mixed results—some positive relationships and some weak negative relationships.

There are some interesting subtleties with respect to vertical equity in the cities. For example, in New York and Rochester, total funds show a stronger positive relationship with poverty in the middle schools than at other levels. In New York, the middle school

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42. Equal opportunity analysis focuses on the first pass on whether a relationship is present, rather than the magnitude of the relationship. Therefore, correlation analysis provides adequate information for making a first judgment about equal opportunity.

43. Equity conclusions always contain value judgments. In the case of equal opportunity and vertical equity, the size of the relationships is such a value. For all the analyses, the following summary looks at signs of regression coefficients and relative strength of relationships (R2), but not the size of the regression coefficients. Judgment of the appropriate size of regression coefficients requires the transposition of value judgments.

44. The coefficient of variation ranges from zero to one, with a value of zero indicating that all schools receive the same level of funding per pupil and higher values indicating a less equal distribution of resources.

45. In the future, however, all analyses of horizontal equity should focus on "general education" or "base" funds alone.

46. See Berne and Stiefel, "Measuring Equity at the School Level," for a more detailed description of the New York City equity patterns.

### Table 3
Results of School-Level Equity Analyses by City

#### Horizontal Equity

<table>
<thead>
<tr>
<th>Chicago</th>
<th>New York City</th>
<th>Rochester</th>
<th>Fort Worth</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Elementary and High Schools</strong></td>
<td><strong>Elementary and Middle Schools</strong></td>
<td><strong>Elementary Total</strong></td>
<td><strong>Elementary, Middle, High Schools</strong></td>
</tr>
<tr>
<td>Object</td>
<td>Coeff. of Variation</td>
<td>Object</td>
<td>Coeff. of Variation</td>
</tr>
<tr>
<td>General Fund less Special Education and Desegregation</td>
<td>.12 or .13</td>
<td>General Education, school-level budget and positions</td>
<td>.10 to .14</td>
</tr>
<tr>
<td>General Fund at elementary level</td>
<td>.27</td>
<td>Subdistrict level except Indirect</td>
<td>.06 to .10</td>
</tr>
<tr>
<td>Object</td>
<td>Relationship</td>
<td>Object</td>
<td>Relationship</td>
</tr>
<tr>
<td>-------------------------</td>
<td>------------------------------------------------</td>
<td>-------------------------</td>
<td>------------------------------------------------</td>
</tr>
<tr>
<td>Total Budget</td>
<td>Weak and positive with percent non-white</td>
<td>No Available Data-Not Done</td>
<td>Total expenditures and teacher salaries</td>
</tr>
<tr>
<td>General Fund Budget</td>
<td>Elementary: weak and negative with non-white.</td>
<td></td>
<td>Positions</td>
</tr>
<tr>
<td>Budget (total and less special education and desegregation funds)</td>
<td>High Schools: weak and positive with non-white.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Desegregation Funds</td>
<td>Elementary: weak and negative with non-white.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>High Schools: weak and positive with non-white.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

48 Coefficients of variation are not reported here for all objects, but are available from the authors.

49. Relationships summarized in Table 3 are derived from regression equations for Chicago, New York City and Rochester, and from correlations for Fort Worth.
result is related to the lower pupil-to-position configuration in those schools. In Chicago, the General Fund shows a negative relationship between poverty and dollar allocations at the elementary level, while the total budget shows a positive relationship at that level. Since compensatory funds are in the total but not in the general budget, this indicates some problems with vertical equity and dollar expenditures.50

Equal opportunity is measured with respect to the percentage of non-white students in three cities and with respect to location as well in Rochester. In Chicago, all relationships between funds per pupil and percentage of non-white students in the school are weak, some having positive and some having negative signs. In Rochester, relationships between dollars per pupil and percentages of non-white pupils are weak and of mixed sign for middle and high schools, and of moderate strength and positive in sign for elementary schools. In Fort Worth, the relationships are mostly weak.51 For elementary schools, though, there is a moderate positive relationship between expenditures per pupil and the percentage of black pupils and a moderately strong negative relationship between average teacher salaries and the percent of Hispanic pupils. Finally, in Rochester there is a moderately strong relationship with location, with the inner ring (poorer) schools receiving more funds per pupil. Overall, in these cities, there are only a few instances of a lack of equal opportunity (as indicated by a negative relationship between the percentage of minority students and funding).

There are a number of important equity issues that the analyses highlight, including: (1) New York City treats elementary schools differently than middle schools; (2) although the distribution of General Fund teacher positions in Chicago may be equitable, dollar allocations and average teacher salaries tend to favor schools with lower poverty levels; (3) Fort Worth has some problems with resource distribution to Hispanic students; and (4) Rochester has a somewhat wide variation in the distribution of total funding among its elementary schools.

In addition, there is the problematic finding of a negative relationship between average teacher salaries and percentages of poor, and sometimes minority, students. This relationship appears to be compensated at times by putting relatively more positions in schools with higher percentages of poor students. Without further evidence on the trade-off between what higher salaries buy and what smaller class sizes buy in terms of achievement or other out-


51. See Berne and Stiefel, et al., School-Level Resource Allocation in Urban Public Schools for more discussion of Fort Worth resource allocation patterns.
comes, it is difficult to make an equity judgment about this tradeoff.

CONCLUSIONS

Equity will always be a major issue in the financing of education, even in an era when student achievement has captured the public’s attention. We believe that it is meaningful and feasible to assess school-level equity using the concepts of horizontal, vertical, and equal opportunity equity. Moreover, studying equity at the school-level presents a number of important methodological advantages over traditional district-level equity analyses. In large districts with many schools, school-level data allow researchers to move beyond district averages to examine the kinds of variations in resources that may appear within the district. For example, school-level analyses can match funding streams and student counts more appropriately and thus better measure horizontal equity. Other issues important at the school-level, such as relationships with geographic location or with concentrations of low-income students, can also be studied.

Such analyses are often hampered, though, by a lack of reliable, detailed school-level fiscal data. The analyses presented in this paper highlight some of the difficulties in obtaining these data even in districts practicing some form of school-based budgeting. Increasingly, detailed and improved school-level finance data are becoming available, though. For example, in November 1996, New York City revised its school-level accounts so that its entire education budget is allocated to the schools. In our study only 33 percent of the budget was so allocated. Data improve as we write. As large cities begin to make such information publicly available, it is important that analysts be ready to understand the data’s strengths and weaknesses and to use the data for meaningful public policy purposes. Moreover, it is essential that data be routinely collected and published in order to improve school-level decision-making and public accountability for the use of educational resources.

Empirical analyses of school-level equity also emphasize the importance of using a broad approach to equity which considers inputs and personnel, as well as dollars. The case of Rodriguez v. LAUSD52, in which a consent decree ordered the Los Angeles Unified School District to equalize spending and teacher experience across schools, may be the most prominent recent example of a court addressing school-level resource disparities. The analyses presented here demonstrate that these issues are not specific to Los Angeles. As the focus in education finance increasingly moves from districts to schools, it is likely that other districts will also confront these issues, as well as the difficulties inherent in achieving an equitable distribution of school resources in large public districts.