RETHINKING THE INTRADISTRICT DISTRIBUTION OF SCHOOL INPUTS TO DISADVANTAGED STUDENTS

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I. Introduction

Research examining the distribution of resources across schools, rather than districts, dates back over thirty years. In this time, however, relatively little research has focused on the processes and patterns of resource allocation across schools within districts due, in part, to the primacy of districts in funding K-12 education and to the scarcity of school-level data on resources. At the same time, school district consolidations have led to larger and larger school districts and an increasing share of the country's students attending schools in large districts. While almost 75 percent of school districts in the United States have fewer than five schools, the largest 100 school districts, enrolling almost one-quarter of total public school students, average 163 schools each (Sable and Hoffman, 2005). In addition, these 100 districts serve a student population that is disproportionately poor, African-American and Latino,[1] making intradistrict allocations a key component of overall resource distribution. As we will show, there is considerable evidence that resources vary across schools within these larger districts, driven, perhaps, by differences in students, teachers, or politics. Further, there is some concern that the within-district variation is perverse, for example, allocating more of some resources, such as more experienced or educated teachers, to schools with fewer poor children, fewer minority children or fewer immigrants. Understanding the allocation of resources to schools is important for two reasons. First, to the extent that education is, in fact, produced by *schools* rather than districts, the level and quality of

resources received by the school itself will be critical to determining student performance. Second, the federal *No Child Left Behind* Act aims to shift accountability for student performance to the school level. Thus, it is critical to move beyond district-level analyses to more accurately assess the resources actually available to students in their schools. Better understanding of current resource allocation can also aid in the development of school finance policies that provide resources more appropriately targeted to schools in which students are having trouble reaching performance targets.

Examining educational spending at the school level takes on particular significance in the wake of the many court decisions addressing the adequacy of education funding. For example, in 2003 the New York State Court of Appeals ruled in the *CFE v. New York State* decision that New York State was not meeting its constitutional obligation to provide a "sound basic education" in New York City schools. In November 2004, a panel of special masters appointed by Judge Leland Degrasse estimated the additional operating cost at approximately $5.6 billion per year, an amount to which Judge Degrasse agreed in a February 2005 ruling. Relatively little attention has focused, though, on how these additional resources will be distributed across schools within the large urban school district that was of particular concern in this case.

Ignoring the intradistrict distribution of resources may, however, limit the success of these court decisions in improving the adequacy of educational opportunities for students in impoverished schools. Focusing on total or average resources at the district level implicitly assumes that the average resources reach all schools more or less evenly within a district, which is frequently untrue in practice. Notice, however, that the mere

[1] In 2002-2003, 28.3 percent of students in these districts were African-American, 33.2 percent were Latino and 46.3 percent eligible for free or reduced price lunch, as compared to national averages of 17 percent

presence of disparities may not be problematic. Instead, the critical question for policymaking is how and whether resources vary with the needs of the students. Research using a variety of methods has demonstrated that students with different characteristics may require differing levels of resources to meet performance goals. In particular, poor, disabled, and English language learning students require more resources (cost more) to educate, although exactly how much more is not agreed upon (see, for example, Duncombe and Yinger, [2000]; Chambers, et. al., [2004], Picus, Odden and Fermanich, [2003]). Our focus in this paper is on vertical equity – examining whether schools serving students with different levels of need receive different levels of resources – rather than adequacy – examining whether such students receive the level of resources needed to achieve pre-set performance goals. While the two concepts are closely related, there is at least some legal thought that they should be separately considered (Koski and Reich, 2005). While adequacy litigation has largely focused on district-level adequacy, the research base examining adequacy at the school-level is exceedingly thin. Moreover, as Koski and Reich point out, education's "positional good" aspects suggest that resource equity remains a critical policy concern.

In section II, we review the existing literature on the distribution of resources across schools within districts and identify the limitations of this research. In section III, based on the findings in the literature, we discuss a number of possible policy initiatives on school allocations. In section IV, we conclude with a summary and implications.

II. Previous Research on Intradistrict Resource Allocation

The growing focus on schools as the locus of accountability efforts, combined with better data availability, has led to increased attention in recent years to the level and

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and 19.2 percent and 37 percent for all districts.

distribution of resources at the school level. Table 1 summarizes the results of research quantifying school-level funding disparities and Table 2 summarizes multivariate studies relating school funding to student characteristics. Though a small amount of research on this topic dates back to the 1970s and 1980s (Owen, [1972]; Summers and Wolfe, [1976]; Ginsburg, et al., [1981]), most of the available evidence has accumulated since the mid-1990s. While disparities across schools within a small district are likely to be relatively modest, due in part to the ease of monitoring distribution in a small district and public participation in decision making, intradistrict disparities can be enormous in large districts with numerous schools.

A confluence of factors, not the least of which has been the increased availability of data on resources at the school level, has resulted in a growing research base documenting school-level resource disparities. A number of studies (for example, Summers and Wolfe, [1976]; Rubenstein, [1998]; Iatarola and Stiefel, [2003]) examine resource allocations across schools within a single large school district, while other work (such as Clark, [1998]; Stiefel, Rubenstein and Berne, [1998]) examines the distribution within (but not across) several large districts. Still other studies, such as Betts, Rueben and Dannenberg (2000), Burke (1999), and Hertert (1995), use school-level data to compare resources across schools in different districts.

While comparisons of intradistrict and interdistrict disparities are rare, cross-district analyses of school-level disparities sometimes find greater disparities within than between districts.[2] For example, Hertert (1995) compares per-pupil expenditures in

[2] The findings from these studies are often dependent on the methods and data used. For example, if analyses are not weighted by school enrollment, then very small schools with particularly high or low resource numbers could have a strong effect on intradistrict comparisons despite serving relatively few students. Some statistics will also make disparities between schools within a district look particularly large.

California across districts, across schools (ignoring districts) and across schools within districts, and finds that differences across schools are substantially greater than average spending differences across districts. She also finds average disparities within districts that are often greater than those across districts, though the results vary depending on the sample of schools and districts examined.[3] For example, the restricted range[4] of expenditures across districts in 1991 is $825 per pupil, while the average within-district restricted range is $1,220 per pupil. Burke (1999) examines within and between district disparities in teacher-pupil ratios for 1,204 large districts and finds that "the intra-district distribution of educational resources appears to be a more significant problem than inter-district allocation" (p. 447). Owens and Maiden (1999) examine the distribution of instructional expenditures across districts and schools in Florida and find substantially larger between-school disparities as compared to between-district disparities, though they do not examine disparities within districts.

Resource inequalities across schools may be acceptable or even desirable if they drive additional resources to the students who most need them. Conversely, we may be particularly concerned if intradistrict studies find that schools with the highest concentrations of students with special needs systematically receive fewer or lower quality resources. The available research suggests that higher concentrations of student needs, such as poverty, are sometimes associated with higher levels of per-pupil spending. Our review of the research finds a significant positive relationship between

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For example a range presents only data on schools at the extremes. To date, there is little research examining the sensitivity of results to these issues.

[3] Differences across districts are generally larger than those within when all districts are examined, but smaller when only districts with more than 1,500 students are included in the analysis. Similarly, within-district disparities are generally larger than those across districts when all schools in a district are examined, but smaller when only elementary schools are included.

total expenditures and student poverty in five of seven studies, with a significant negative relationship in none. The results are more mixed for instructional expenditures. For example, Owens and Maiden (1999) find a significant negative correlation between instructional expenditures and the percentage of African-American and free lunch-eligible students at the school level. On the other hand, Schwartz (1999) uses data on over 3,000 schools in Ohio for the 1995-96 school year and finds that, controlling for district fixed effects, higher student poverty is associated with higher spending, with an even stronger relationship when the sample is limited to the state's largest urban districts. These findings come with the caveat that expenditure data alone may mask a trade-off between quality and quantity of resources.

The growing availability of school-level personnel data has facilitated more extensive analysis of potential quality/quantity trade-offs by focusing on the number and type of staff employed across schools. Table 3 summarizes research examining the relationship between teacher resources and student characteristics at the school level. A common finding in research examining the distribution of teachers is that high-poverty schools have more teachers relative to pupils, but that these teachers are generally more inexperienced and less educated and, thus, lower paid. As early as the 1970s, Owen (1972) found lower per-pupil expenditures on teacher salaries and less experienced teachers in poor and high-minority neighborhoods within nine large cities, and Summers and Wolfe (1976) found significantly lower education levels and teacher exam scores in schools with higher poverty and higher proportions of black students in Philadelphia. Several years later, Ginsburg, et al (1981) examined the distribution of teacher inputs

[3]The restricted range is the difference between the districts or schools at the 5th and 95th percentile of per-pupil expenditures.

(professionals and paraprofessionals per 1,000 pupils, teacher education, experience, and salary) in relation to special needs students (minority, low-income, low test scores) for New York State schools for 1976-77 and found more professionals and paraprofessionals per student in high poverty and high minority schools, but that the teachers in these schools tended to have less experience and lower salaries.

More recent research suggests that these patterns persist in many cities. Stiefel, Rubenstein and Berne (1998) provide an overview of intradistrict resource allocation research in Chicago, New York City, Rochester and Fort Worth and report low variations in base funding across schools in each city, but also lower teacher salaries in high poverty schools, sometimes offset by more staff relative to pupils in those schools. Similarly, Rubenstein (1998) examines the distribution of budget dollars per pupil across Chicago schools, separated by funding source (General, Special Education, Desegregation, and state Chapter 1 funds) and school level (elementary vs. high schools). He finds significantly lower General Fund budgets but significantly higher total budgets per pupil and more teacher positions in high poverty elementary schools. At the same time, he finds lower average teacher salaries in high poverty elementary and high schools.

Betts, Rueben and Dannenberg (2000) compare California schools in 1997-1998 and find relatively little variation in average class sizes across schools but large differences in teacher qualifications, as measured by experience, education and credentialing. They also find relatively large variations in the number of AP courses offered and in the percentage of courses that satisfy public university entrance requirements. A 2005 study of California's 50 largest districts echoes this finding, showing that 31 of the districts have significantly lower average teacher salaries in

schools with the most African-American and Latino students, with no differences in average class sizes (Education Trust-West, 2005). Ingersoll (2002) using a national sample of data from the Schools and Staffing Survey (SASS) finds that teachers in high poverty, high minority schools tend to have lower qualifications and are far more likely to be assigned to teach subjects in which they have not majored.

Roza and Hill (2003) examine within-district differences in dollars spent per school for Baltimore City, Baltimore County, Cincinnati and Seattle and report that teachers in low poverty schools and those in high performing schools tend to have higher average salaries than do teachers in high-poverty and low-performing schools. They also find that schools with the most applicants for teacher positions have the highest paid teachers, because these schools have the most choices and therefore hire more experienced and educated teachers. The authors argue that the allocation of Title I resources to purchase teachers compounds the inequity because schools with lower-paid teachers subsidize schools with higher-paid teachers.

California's class size reduction program of the late 1990s provides an opportunity to directly observe potential trade-offs between teacher quantity and teacher characteristics. Following a state-funded class size reduction effort in grades K-3, the gap between schools serving the highest and lowest proportions of low-income students in the percentage of K-3 teachers who were fully credentialed increased from two percentage points to 17 percentage points. Similar, though less dramatic widening of gaps occurred in the percentage of novice teachers, those with only a bachelor's degree, and at other grade levels (Reichardt, 2000). Note that these analyses include teacher movement both within and across districts. Approximately twice as many teachers moved

across districts as compared to those changing schools within a district. While Krueger (2003) estimates that the long-term monetary benefits of class-size reduction are greater than the costs (using effect size estimates from Tennessee's STAR experiment), Harris (2002) argues that these estimates do not consider changes in teacher distribution resulting from large scale class size reduction. He suggests that raising teacher salaries to improve teacher quality may be a more cost-effective approach to raising student performance.

As the largest district in the nation, and one in which detailed school site resource data has been publicly available since 1995-96, New York City has increasingly become a focus of research on school-level resources. Iatarola and Stiefel (2003) explore the intradistrict equity of inputs and outputs, including expenditures, teacher resources, and performance across 840 elementary and middle schools in New York City in 1997–98. The results show that disparities in resources at the school level are generally greater than those reported for inter-district studies (particularly in middle schools). Similar to results in other cities, the authors also find that elementary schools with higher proportions of students with special needs (with the exception of immigrant status) tend to have more teachers per student, but lower salaries. They find similar results for schools with higher proportions of non-white students in both elementary and middle schools.

In other New York City work, Stiefel, Rubenstein and Schwartz (2004) estimate "de facto" spending models to assess the factors that appear to drive resource allocations across New York City elementary and middle schools. Consistent with previous studies, they find significantly higher teacher-pupil ratios in high poverty schools, but significantly lower salaries, less teacher experience, and lower percentages of teachers

with master's degrees and full licenses. Lankford, Loeb and Wyckoff (2002) use data for all of New York State to explore teacher sorting and report that urban areas generally have less qualified teachers than non-urban areas and that, within large urban districts, low-performing, poor and non-white children are more likely to have teachers who are not certified and who have failed certification exams. They conclude that teacher transfers and quits may exacerbate these differences as teachers, particularly those with the most skills, are more likely to leave those urban schools that have a larger share of many poor students.

In sum, the existing studies on school-level resource disparities in New York City and elsewhere have reached remarkably similar conclusions. First, though evidence directly comparing school-level and district-level disparities is limited, the resource disparities found across schools within districts are often large and, in some cases, may be larger than the more widely-recognized disparities across districts. Second, these disparities are generally perversely related to school and student characteristics; schools with greater student needs often find themselves disadvantaged relative to other schools in the same district, particularly in terms of the quality of teacher resources. Third, these patterns are not caused by the intentional targeting of resources to lower-need schools. As described in the next section, these resource disparities are frequently the result of intradistrict funding formulas that allocate positions, rather than dollars, to schools, and teacher sorting patterns that allow higher paid teachers to systematically opt into lower-need schools without financial ramifications for the schools to which they transfer. The next section addresses efforts and proposals to address these school-level disparities.

III. Proposed and Implemented Alternative School-Based Funding Systems

While the intradistrict distribution of resources has rarely occupied a spot high on state or district policy agendas, there have been selected efforts around the country to address this issue. We begin our discussion with an overview of the methods typically used to allocate resources to schools within large school districts, using New York City as an illustrative example. We then turn to initiatives designed to directly or indirectly provide a more equitable distribution of resources.

Current Intradistrict Allocation Mechanisms

Relatively little attention has been paid in the literature to the mechanics of intradistrict resource allocation. Within-district allocation formulas typically differ from across-district formulas in several important respects. First, the formulas used to distribute funding from states to districts are often well-publicized and are the products of annual budgetary bargaining between state legislatures and governors. Intradistrict formulas are often produced within school district bureaucracies and are subject to little publicity or public debate. Second, state allocation formulas typically distribute resources in inverse relation to district-level ability-to-pay-measures (property wealth and/or income) and often have explicit equity and adequacy goals (see Yinger, 2004, for an overview of issues in the design of state funding formulas). Because all schools within a district are supported by the same tax base, intradistrict formulas do not distribute resources to offset wealth or income differentials across school communities. Third, state funding formulas most commonly focus exclusively on the distribution of dollars across districts, while intradistrict formulas may distribute a combination of dollars, personnel positions and other resources.[5]

[5] A related issue is that state revenue forecasts and political bargaining determine the education budget constraint available for distribution to school districts. School districts, though, are more likely to first

Though we do not include a comprehensive overview of big-city allocation methods, New York City's formulas provide a useful illustration. Resources are largely distributed based on student enrollments and maximum class sizes. The vast majority of funding (82 percent of school-level allocations in FY 2005) is allocated through the Base Instructional Allocation,[6] which consists of three components:

1) a school overhead allocation to fund a principal, guidance counselors and selected other administrative personnel;

2) a base teacher allocation, which divides each school's general and special education register by maximum class sizes for each grade and program to calculate the number of teachers required[7]; and

3) a per capita allocation to fund other basic needs such as assistant principals, paraprofessionals, aides and instructional supplies.

The remainder of each school's allocation is provided through a series of specialized formulas targeting students with special needs (e.g., students with limited English proficiency and those eligible for free lunch), specific types of schools (e.g., new schools, schools under registration review[8]), certain grades (e.g., early grades class size reduction) and specific types of expenditures (e.g., school-based support teams).[9]

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determine expenditure needs, subtract estimated federal and state contributions, and then set the local contribution as the residual between these numbers. Of course, over time, district voters will influence how large the residual can be by voting their school board members (or mayors) in or out of office.

[6] See http://www.nycenet.edu/offices/d_chanc_oper/budget/dbor/allocationmemo/am.html for more details on New York City Department of Education allocation formulas.

[7] The base teacher allocation also includes adjustments for such factors as teacher prep and lunch periods, frequency of course offerings, and "breakage" (additional teachers needed when the student register does not divide evenly by the maximum class size).

[8] SURR schools are ones with low test scores over several years that are targeted by the state for special attention and increasingly harsh sanctions if they do not improve over time.

[9] Note that this description refers primarily to base funding, not to categorical programs which may focus on particular groups of students and have specialized funding formulas or requirements.

Several issues are worth noting here. First, under the base teacher allocation, schools receive positions rather than a budget to hire teachers. Therefore, all things being equal, schools with higher paid teachers do not face a tighter budget constraint than those with lower-paid teachers, and schools with lower-paid teachers do not have additional resources for other purposes. Second, schools with higher proportions of students with physical and learning disabilities receive more positions relative to students, owing to the smaller class sizes and higher use of para-professionals in special education. Third, base resources are not explicitly distributed in relation to other socio-economic characteristics of students, thus there is little consideration of important cost factors affecting individual schools in the base allocation.[10]

Efforts to Improve Intradistrict Equity

The lack of readily-accessible school-level spending data has, perhaps, frustrated interest in resource disparities within districts among taxpayers and families with children in schools. The broad availability of school report cards, typically providing detailed data on school performance, has coincided with an increased expectation of and demand for information on school resources, however. For example, the National Center for Education Statistics has called for reporting of school-level program costs, identifying a broad range of potential users. Among the possible uses of school-level resource data they list "1) as a basis for ensuring adequate and equitable funding of schools, including funding of various programs, and (2) for state accountability and assessment programs that relate school-level expenditures to student achievement scores or other effectiveness

[10] Here we use the term "cost" to reflect factors outside the control of individual schools that make it relatively more expensive to produce a given level of services. While labor market constraints are important determinants of cost differences across school districts, these differentials typically are not at work within a single district with a collectively bargained salary schedule. Thus, cost factors within a

criteria" (National Forum on Education Statistics, 2003). The availability of such data, though, remains uneven.

To date, the largest initiative to make such data available has been in California. Spurred in part by the Education Trust-West report (2005) identifying large gaps in teacher salaries across schools in California districts, California Senate Bill 687 (signed into law in September 2005) requires that School Accountability Report Cards provide, for individual schools, data on "estimated expenditures per pupil" that "reflect the actual salaries of personnel assigned to the schoolsite," as well as other teacher characteristics, including credentials and out-of-field teaching (SB 687, 2005). The law also requires reporting of district and state average teacher salaries for comparative purposes. The bill's sponsor explicitly noted the importance of "mak(ing) information available so as to guarantee equity and equality in per pupil spending" (Senate Committee Analysis, 2005). Thus, while the law imposes no requirement for an acceptable level of intradistrict spending disparities, it is intended to provide greater transparency on school-level differences which may ultimately lead to pressure for reform.

While California districts are now required by law to report school site expenditures, other states and districts have also made efforts in recent years to do so. A survey conducted by Education Week (Johnston, 2005) reported that 22 states and the District of Columbia collect school level financial information, though the types of data varied across states. New York City has, since 1996, released School Based Expenditure Reports that provide detailed school-level spending by program and function. These

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district may be largely related to student characteristics. See Schwartz, Stiefel and Bel Hadj Amor (2005) for an overview of school and district cost functions.

reports now include school-specific average teacher salaries, rather than sub-district averages (Feig, 2005).

Accurate reporting of school-level spending is complicated by several factors, however, including the reporting of actual rather than district-average teacher salaries and the allocation of shared district costs to the school site. Direct school spending may represent only a portion of total district spending benefiting individual schools. Expenditures for programs such as student support services, bilingual education, gifted education, and some special education programs, among others, may be reported centrally though they provide services directly to students. Using data from the Cross-City Campaign for Urban School Reform, Miller, Roza and Swartz (2005) report that between 38 percent and 95 percent of total district expenditures are reported in school-level budgets in ten large districts. Their findings suggest that transparency may play a direct role in improving equity between schools, as the study found that the more transparent school budgets were distributed more equitably than the more opaque centrally-reported budgets.

In addition, the common practice of reporting average rather than actual teacher salaries by school can hide substantial resource differences. Roza and Hill (2003) report that if all schools in the four districts they examine received funding for only an average teacher salary for each teacher position, schools above and below the salary average would lose or gain 4-6% of their budgets, with gains of over a half million dollars and losses close to $1 million for schools at the extremes. To the extent that districts use consistent allocation methods to allocate centrally-budgeted expenditures to schools, intradistrict equity can be effectively assessed within a single district. Unless multiple

districts use the same allocation methods, though, school-level expenditures across districts will not be comparable.

New District-to School Allocation Methods

Researchers have consistently found that the use of staff-based allocation systems (that ignore salary differences between staff) distribute resources across schools such that resulting distribution of expenditures is in highly unequal. This pattern has led to a search for alternative allocation mechanisms. The concept of weighted student funding (WSF) or student-based budgeting has been growing in popularity as a method to improve the distribution of funding across schools. Districts including Edmonton, Cincinnati, Seattle, Oakland, San Francisco, and Houston have implemented versions of the system (Archer, 2004). Seattle defines three basic principles for its formula (Nielsen, 2005):

- "Resources follow the student;
- Resources are denominated in dollars, not in FTE staff;
- The allocation of resources varies by the personal characteristic of each individual student."

These principles raise several issues worth noting. First, the formula differs dramatically from the traditional intradistrict formula in which a large share of resources are allocated as personnel positions. Second, while the weighted student formula is explicitly intended to promote equity in resource distribution, it focuses on *vertical* equity. That is, allocations vary based on student grade level and identified needs (for

bilingual education, special education of varying intensity, poverty), delivering higher per-pupil funding to schools with higher shares of students with special needs.[11]

While a weighted student formula would likely drive additional dollars to schools with the greatest needs, it is far from certain that such a system would successfully achieve a more equitable distribution of teachers across schools. Miles and Roza (2004) found substantial improvements in the vertical equity of dollars across schools in Houston and Cincinnati following implementation of weighted student funding, but the effects on the distribution of teachers were unclear. To the extent that schools are constrained by salary schedules that do not allow incentives for teaching in the neediest schools, we might expect little re-distribution of high-quality teachers to schools most in need, though the higher available funding in such schools may provide some incentive for teachers to take up the challenge (Ouchi, 2004). Additionally, schools with high proportions of high-cost students may also have the funding to hire additional staff, though not necessarily higher paid staff.

Most weighted student formulas require schools to budget staff at average district salaries, rather than the actual salaries of the school's staff. Differences between actual and average salaries are made up (or kept) by the district. Note that, as described above, the schools most likely to have lower-salaried teachers are those with the highest proportions of students with special needs. Charging schools for the actual salaries of teachers in the school, rather than average district salaries, may provide greater equity as schools would be forced to make trade-offs between more staff and higher-paid staff. Oakland, California, for example, has begun budgeting for actual salaries as part of its implementation of weighted student funding (Archer 2004). Such plans are likely to be

[11] A separate "Foundation Allocation" provides base funding for school operations.

politically controversial as schools with fewer high-need students may lose funding to schools with more high-need students (Committee for Economic Development, 2004).[12] They do, however, hold considerable promise for achieving greater equity in the allocation of resources across schools.

While weighted student formulas typically focus on the methods that districts use to allocate resources across schools, a number of researchers have advocated changing state funding formulas by moving the basic unit of support from the district to the school. Such a "school-based funding" system could largely remove the discretion of school districts to re-allocate funds across schools. For example, Guthrie (1997) has proposed a school-based financing system, with 90% pass-through of funds that usually go to districts to the school site, including capital outlays. Odden (2001) proposes that states in the U.S. follow England's lead in creating need-based school (rather than district) funding formulas. Similar to district-level weighted student formulas, these state formulas could include a base amount per pupil, with adjustments for student needs, grade level differences and particular school needs.

In Odden and Busch (1998) the authors review three existing examples of school-based funding: charter schools, the Australian model and the British model.[13] Victoria, Australia began school-based funding in 1993, with approximately 87 percent of funds budgeted at the school site. Schools have the ability to determine their own staffing mix (i.e., regular teachers, specialists, support staff) or convert a teacher position to a cash allotment to be used for other purposes. In England, school-based funding has been in place since the late 1980s, though funds flow through Local Education Agencies (LEAs).

[12] The Houston Independent School District in 2003 abandoned its plans to phase in budgeting for actual salaries in its weighted student formula (Committee for Economic Development, 2004).

Approximately 85 percent of the budget must be allocated to schools as a lump sum, with at least 80 percent of this amount allocated based on age and need-weighted student counts.[14]

Within a purely public school system, there are few differences between a school-based and student-based funding approach. There is no difference in the allocation of resources that can be achieved using a student-based formula rather than a school-based approach as long as both include only student characteristics in the formula. This last point is important. A student-based funding formula may include only student characteristics as cost factors, while school-level funding formulas often include school-level variables – such as school size. Thus, it is more generally the case that the student-based formula can be viewed as a special case of a school-based formula, as a mathematical property.[15] School-based formulas are more flexible and allow easily for adjustments to be made to reflect economies of scale (by including variables capturing

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[13] For other useful overviews of the Australian and British systems see Hill (1997) and Caldwell (1997).

[14] Most school funding is determined by student age rather than need.

[15] To see this, consider a simple student based formula as follows:

(1) $E_i = \mathbf{a} + \mathbf{b}POOR_i + \mathbf{c}LEP_i$

Here, E_i represents the amount of money allocated to student i, $POOR_i$ is an indicator variable that takes a value of one if the student is poor, LEP_i is an indicator variable that takes a value of one if the student is limited English proficient (LEP). In this formulation, **a** represents the amount of base funding each student is allocated, **b** captures the increment in spending given to poor students and **c** captures the increment in spending given to students who are LEP. Notice that the formula in (1) includes only variables that describe the student and his or her educational needs. That is, the amount the student is allocated depends only upon his or her own characteristics and does not vary with or depend upon the school attended. Consider next, a simple school level formula:

(2) $S_s = \alpha + \beta FRACTIONPOOR_s + \gamma FRACTIONLEP_s$

where S_s is the amount of spending school s receives per pupil; $FRACTIONPOOR_s$ is the fraction of the students attending school s that are poor; $FRACTIONLEP_s$ is the fraction of students in school s that are LEP. Here, α represents the base level of funding per pupil that school s receives, β is the increment in per pupil spending school s receives for every .01 increase in the fraction of students who are poor; γ is the increase in per pupil spending they receive for each .01 increase in the students who are LEP. This simple formulation includes only variables that capture characteristics of the students attending the school. The relationship between (1) and (2) is straightforward. If N students attend school s, then the average spending received by the students attending school s is can be found by averaging E_i from i=1,…,N, over N.

(3) $\frac{\Sigma E_i}{N} = \mathbf{a} + \mathbf{b}\frac{\Sigma POOR_i}{N} + \mathbf{c}\frac{\Sigma LEP_i}{N} = \mathbf{a} + \mathbf{b}FRACTIONPOOR_s + \mathbf{c}FRACTIONLEP_s$

Since $S_s \equiv \Sigma E_i/N$, (3) is the same as (2) if $\mathbf{a}=\alpha$, $\mathbf{b}=\beta$ and $\mathbf{c}=\gamma$.

the size of the group of students being served) or economies of scope (by including variables capturing the scope of services offered, such as grades served). To the extent that these economies of scale and scope are important, the school-based formula will allocate resources more efficiently.

Weighted student funding approaches are attractive for a variety of reasons, including the potential for improving transparency and vertical equity. Achieving these goals, particularly the latter, is largely dependent on numerous details, including teacher distribution and estimation of appropriate funding weights. In urban districts, teacher preferences and collectively bargained workplace rules, such as seniority transfer rights, work against schools within districts serving students who are more costly or difficult to educate up to standards (Lankford, Loeb and Wyckoff, 2002; Levin, Mulhern and Schunk, 2005). Accountability systems that include penalties for low-performing schools may also provide a strong disincentive for teachers to work in schools that face possible sanctions (Koski and Reich, 2006). Differential pay for teachers working in hard-to-staff schools could help to overcome possible resistance by teachers. Paying these bonuses directly from state, rather than local, funding may provide an opportunity to introduce these bonuses within current collective bargaining agreements (Ballou, 2004). It is unknown, though, how high the additional bonuses or salary differentials would need to be to have a meaningful impact on teacher sorting within districts, and limited evidence on wage differentials suggests they could be quite large (Odden and Kelly 2000; Hanushek, Kain, and Rivkin 2004). For example, Roza and Hill (2003) report that Maryland's $2,000 stipends for teachers with Advanced Professional certificates working

in low-performing schools did reduce the difference in average salaries between low-performing schools and the district average by 20 percent, but a large gap remained.

Estimating appropriate funding weights is complicated by a number of issues, including identification of student needs, accurate estimates of the costs associated with serving students with various types of needs, issues of marginal and average costs, particularly at different enrollment levels, and potential perverse incentives embedded in the formulas. For example, the marginal cost for serving the first student with limited English proficiency can be expected to be considerably higher than the cost for serving the tenth such student. Conversely, high concentrations of students with higher costs (for example, students from low-income families) could result in higher marginal costs per student. Using weights based only on average costs may result in over-funding or under-funding certain schools. Options to address these concerns include higher funding weights for schools with low incidence of certain student needs, or funding those schools on a cost reimbursement basis, as is often done with low-incidence special education services. Formulas based on minimum school enrollments could also reduce potential achievement gains from the growing movement toward smaller schools, unless formulas account for potential diseconomies from small size (Stiefel, Berne, Iatarola and Fruchter, 2000).

Enhanced transparency may also require us to confront difficult questions about how schools are organized. If, indeed, there are economies of scale from serving higher proportions of students with disabilities, gifted students, or students who are not native speakers of English, weighted student funding may provide an incentive for districts to create specialized schools and direct students with those needs to a limited set of schools

that provide those services. Such re-organization may serve to increase segregation of students across schools, however. Similarly, a transparent weighted student approach provides a fiscal incentive for schools to attract and identify eligible students who will bring with them higher levels of funding. To the extent that schools compete to attract these students by offering better services, both equity and adequacy for students with special needs may be enhanced. To the extent, though, that the formulas lead to over- or mis-identification of students with special needs, they could produce an inefficient and inequitable redistribution of resources across schools (Cullen, 1999).

Litigation

The majority of school finance litigation has focused on state formulas to distribute resources across school districts, but large urban school districts could themselves be the targets of litigation over the distribution of funding across individual schools. While litigation has been a primary and often successful tool for addressing funding inequities across school districts (Evans, Murray, and Schwab, 1997), its use has been much less prevalent for addressing disparities within districts. The reasons for this dearth of litigation are not clear, though possible explanations include the states' primary responsibility under state constitutions for providing education, and the historical difficulties in measuring intradistrict disparities and identifying their causes. The *Hobson v. Hansen* case in the 1960s and 1970s and *Rodriguez v. LAUSD* in the early 1990s are notable exceptions. While *Hobson v. Hansen* addressed a variety of issues, including the District of Columbia school system's use of ability grouping, an important aspect of the case was its focus on inequalities in per-pupil expenditures across schools within the district, and the relationship between spending and school racial composition

(Clune, 1972). The U.S. Court of Appeals ruled in 1971 that the district must equalize per-pupil teacher salary and benefit expenditures (though not total expenditures) in city elementary schools to within five percent of the citywide average (Michelson, 1972).

The second major intradistrict equity case, *Rodriguez v. LAUSD*, resulting in a 1992 consent decree, also focused on the distribution of teachers across schools. Plaintiffs in the *Rodriguez* case charged that poor and minority students in the Los Angeles Unified School District (LAUSD) were deprived of the equal protection of the laws under the California state constitution because schools serving higher proportions of poor and minority students had less experienced and educated teachers, and therefore lower teacher salaries and per-pupil expenditures, as well as higher levels of overcrowding, as compared to schools with higher income and more white students (Biegel and Slayton, 1997; Roos, 2000). As part of the consent decree, the LAUSD agreed to equalize non-categorical per-pupil spending in 90 percent of schools to within $100 of the district average (Bradley, 1994). The consent decree did not impose forced teacher transfers, but provided each school with a dollar budget with which to hire teachers. The agreement also forced cuts in schools with per-pupil spending well above the district average (Roos, 2000). Though limited evidence is available to assess the effects of the consent decree, Sugarman (2002) reports that the district has substantially equalized spending across schools, though high-poverty schools continue to have lower proportions of more experienced teachers, and additional money for non-teacher spending. Using 2003-2004 data, Education Trust-West (2005) found average salary differences between high and low poverty schools of $1,589-$1,826 in Los Angeles

elementary and middle schools, though high poverty high schools reported slightly higher salaries.

As in cases challenging state funding mechanisms, plaintiffs challenging intradistrict funding could bring suits based on state education clauses and/or equal protection claims, particularly if plaintiffs show disparate racial impact (Roos, 2000; Warner-King and Smith-Casem, 2005). Though equal protection claims in state-level litigation have had limited success, such claims could be more successful in intradistrict cases, such as the *Hobson* and *Rodriguez* cases. Roos (2000) argues that equal protection claims brought under state constitutions (rather than the 14th amendment of the U.S. constitution) may not have to show "intentional" discrimination. Warner-King and Smith-Casem (2005) point out that plaintiffs may be able to show equal protection violations if they demonstrate that funding formulas and teacher policies "predictably" lead to lower funding and less qualified teachers in schools serving more poor or minority students, even if there is no intent to discriminate. Moreover, districts may not be successful at defending these inequities as a function of "local control." The prospects of plaintiff success based on state education clauses is less clear, owing to the more idiosyncratic and state-specific nature of state-level cases focusing on these clauses.

IV. Summary and Conclusions

A number of conclusions are clear from the literature. First, there is a consistent pattern observed in large district school allocations. Schools with higher proportions of poor and non-white students have teachers who earn lower salaries driven by their lower levels of education and experience and lower credentials. This pattern emerges from district policies that largely allocate positions rather than dollars and teacher transfer

policies that allow senior teachers priority in hiring when vacancies arise. Second, much of the current thinking on how to change this pattern of teacher resources focuses on intradistrict student weighted formulas, intradistrict dollar rather than position budgets for schools, and funding for schools that by-passes or simply passes through districts from states. Third, the evidence on how resources are distributed after the initiation of changes in allocation formulas is thin. There are some indications that disparities in teacher qualifications between less and more "needy" schools decrease, but there is also evidence that the basic patterns still obtain to a large extent, possibly due to insufficient differentiation in pay for teachers in schools with more costly students.

There are also a number of implications for research on school-level resource allocations. The focus of most work has been on how current patterns affect vertical equity – that is how schools with students who are disproportionately poor, minority, English language learners or with disabilities fare in terms of receiving additional resources. The links to whether the resources are "adequate" to reach state or federally specified learning levels has largely not been made. To the extent that vertical equity is a goal of its own, as Koski and Reich argue (2006), the current evidence is informative. But to the extent that adequacy is an explicit policy goal, and particularly with accountability efforts directed primarily at schools, more work is needed to assess whether individual schools, as opposed to the districts in which they are housed, receive adequate resources to achieve ambitious achievement standards.

Finally, state courts have been a powerful force over the past four decades in promoting and effecting greater school finance equity across districts (Evans, Murray and Schwab, 1997). Remedies that focus exclusively on the allocation of funding across

districts, though, may fail to achieve their intended goal of providing adequate or equitable funding to students as resources are redirected within districts themselves. Because all schools within a single district share the same tax base, issues of fiscal neutrality have less relevance than in cross-district litigation. Vertical equity, or other concepts not yet fully explicated, may need to assume more prominent roles, however. Moving to intradistrict equity (or adequacy) may require additional legal theory, perhaps based once again on the state responsibility to ensure adequate opportunity to all students. As social scientists, we pass that baton to our colleagues in the legal profession.

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Table 1: Expenditures Per Pupil: Summary of Dispersion Measures				
Total Expenditures				
	Federal Range Ratio	Coefficient of Variation	Gini	McLoone
Hess, 1995	1.03 E 2.24 H			
Rubenstein, 1998		.19 E .14 H	.10 E .07 H	0.88 E 0.93 H
Stiefel, et al, 1998 (NYC)		.10 to .14		
Stiefel, et al, 1998 (Roch)		.15		
Iatarola and Stiefel, 2003		0.19 E 0.20 M		
Instructional/Operating Expenditures				
Hertert, 1995 (w/i district avg.)	0.66	0.18	0.10	0.88
Stiefel, et al, 1998 (Ft. Worth)		0.11 to 0.12		
Owens and Maiden, 1999	0.69	0.16		
Iatarola and Stiefel, 2003		0.13 E 0.16 M		

Table 2: Summary of Multivariate Expenditure Results					
Total Expenditures					
	Low-income	LEP	Immigrant	Special Education	Race
Summers and Wolfe, 1976	+ *				+ * B
Rubenstein, 1998	+ * E 0 H				
Schwartz, 1999 (a)	+ *				+ *
Schwartz and Stiefel, 2003	+ *	+ *	0	+ *	0
Iatarola and Stiefel, 2003	0	+ * E 0 M	- *	+ *	
Stiefel et. al. 2003	0	0	0	+ *	0 B L - * A
Stiefel, Rubenstein and Schwartz, 2004	+* E 0 M	+* E +* M	0 E 0 M	+* E +* M	
Instructional/Operating Expenditures					
Hertert, 1995					+ * E + * M 0 H
Owens and Maiden, 1999	- *				0 B + * L
Schwartz, 1999 (a)	+ *				+ *
Iatarola and Stiefel, 2003	- * E 0 M	0	- *		
Stiefel, Rubenstein and Schwartz, 2004	+* E 0 M	+* E +* M	0 E 0 M	+* E +* M	

(a) Includes district fixed effects

Note: E indicates elementary, M middle, and H high school, B indicates black, A Asian and NW non-white.

Table 3: Summary of Multivariate Teacher Characteristic Results:					
	Low-income	LEP	Immigrant	Special Ed.	Race
Pupil-Teacher Ratio					
Owen, 1972	+ *				0
Summers and Wolfe, 1976	- *				- * B
Ginsburg, et al, 1981	- *				- * NW
Clark, 1998	Mixed				
Rubenstein, 1998	- * E, 0 H				
Betts, et al, 2000(a)	0 E, -* M,H				
Iatarola and Stiefel, 2003	- *	- * E	+ *E , 0M	+* E, - *M	- NW
Schwartz and Stiefel, 2003	- *	- *	0	- *	0 B L, + * A
Stiefel, Rubenstein and Schwartz, 2004	-* E -* M	0 E -* M	0 E 0 M	-* E -* M	
Teacher Salary					
Owen, 1972	-*				-* NW
Summers and Wolfe, 1976 (b)	+ *				+ * B
Ginsburg, et al, 1981	- *				- * NW
Clark, 1998	Mixed				
Rubenstein, 1998	- * E, - * H				
Lankford, et al, 2002 (c)	-*				+*NW
Iatarola and Stiefel, 2003	- *	0	+ * E, 0 M	0 E, +* M	- *
Stiefel, Rubenstein and Schwartz, 2004	-* E -* M	0 E 0 M	0 E 0 M	-* E 0 M	
Teacher Experience					
Owen, 1972	-*				-* NW
Summers and Wolfe, 1976	0				0 B
Ginsburg, et al, 1981	- *				- * NW
Clark and Toenjes, 1996					
Betts, et al, 2000(a)	- * E, M, H				
Lankford, et al. 2002	-*				-* NW
Schwartz and Stiefel, 2003	0	0	0	+*	0 B L ,+ * A
Teacher Education					
Summers and Wolfe, 1976	- *				- * B
Ginsburg, et al, 1981	0				0 NW
Betts, et al, 2000(a)	- * E,M, H				
Stiefel, Rubenstein and Schwartz, 2004	-* E -* M	0 E 0 M	+* E +* M	0 E 0 M	
Teacher Certification/Licensure					
Betts, et al, 2000(a)	- * E				
Ginsburg, et al, 1981	- * M, 0 H				
Lankford, et al, 2002	-*				-* NW
Iatarola and Stiefel, 2003	- *	-*E, 0M	+ *	0 E, +* M	- *
Schwartz and Stiefel, 2003	0	-*	+ *	0	0 B L, + * A
Stiefel, Rubenstein and Schwartz, 2004	-* E -* M	-* E 0 M	+* E 0 M	-* E 0 M	
(a) Includes district fixed effects (b) Note: Where teacher-pupil ratio is used, sign has been reversed in table (c) Measured as salary per pupil (d) Based on aggregate results for NY State. Results vary within districts. Note: E indicates elementary, M middle, and H high school, B indicates black, A Asian and NW non-white.					