FROM DISTRICTS TO SCHOOLS: THE DISTRIBUTION OF RESOURCES ACROSS SCHOOLS IN BIG CITY SCHOOL DISTRICTS

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Abstract: This paper explores the determinants of resource allocation across schools in large districts and examines options for improving resource distribution patterns. Previous research on intra-district allocations consistently reveals resource disparities across schools within districts, particularly in the distribution of teachers. While overall expenditures are sometimes related to the characteristics of students in schools, the ratio of teachers per pupil is consistently larger in high-poverty, high-minority and low-performing schools. These teachers, though, generally have lower experience and education levels – and consequently, lower salaries – as compared to teachers in more advantaged schools.

We explore these patterns in New York City, Cleveland and Columbus, Ohio by estimating *de facto* expenditure equations relating resource measures to school and student characteristics. Consistent with previous research, we find schools that have higher percentages of poor pupils receive more money and have more teachers per pupil, but the teachers tend to be less educated and less well paid, with a particularly consistent pattern in New York City schools. The paper concludes with policy options for changing intradistrict resource distributions in order to promote more efficient, more equitable or more effective use of resources. These options include allocating dollars rather than teacher positions to schools, providing teacher pay differentials in hard-to-staff schools and subjects, and adapting current district-based funding formulas to the school (and student) level.

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From Districts to Schools: The Distribution of Resources
Across Schools in Big City School Districts

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I. Introduction

Research examining the distribution of resources across schools, rather than districts, dates back over twenty years. Nevertheless, due to a general lack of data on resources at the school level, and a common focus on school districts as the primary funding units for education, the processes and patterns of school-level (intra-district) resource allocation have received relatively scant attention. 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 158 schools each (U.S. Department of Education, 2001). And, resources vary across schools within these districts, driven, perhaps, by differences in students, teachers, or politics. Further, there is some concern that the within-district variation is pernicious, allocating more resources to schools with fewer poor children, fewer minority children or more immigrants, for example. Since schools rather than districts actually "produce" education, it is critical to move beyond district-level analyses to more accurately assess the resources actually reaching students in classrooms and develop school finance policies that provide resources appropriate to student need.

In this paper, we review the existing literature providing evidence on the distribution of resources across schools within districts, focusing on understanding "what is," and then turn our attention to a discussion of what "should be." We then analyze the way that resources are distributed to schools in New York City and in two large Ohio districts. Based on the findings in the literature and the specific results of our empirical work, we discuss a number of possible

policy initiatives on school allocations. The first section of the paper summarizes the literature, the second section presents school-level allocation information for New York City, Columbus and Cleveland, Ohio using both dispersion measures and regression analyses. The third section analyzes several possible policy initiatives.

II. What Do We Know About Intradistrict Resource Allocation and School Based Finance?

This review is organized around two major questions that have been addressed in the literature and are relevant to school finance decision-making. First, what do we know about the distribution of resources across schools and, second, what do we know about alternatives for school-based financing systems? In answering this second question, we discuss the particular challenges posed by teacher allocation and workplace rights in school based financing.

A. Distribution of Resources across Schools[1]

Although research on the intradistrict distribution of resources dates back over 25 years (Summers and Wolfe, 1976, Ginsburg, et. al., 1981), the research base has been slow to accumulate. The available evidence, though, provides some insight into the distribution of resources across schools, which is often masked in analyses using district-level averages. While the research varies in its focus on schools across districts versus schools within districts, and the objects of analysis (e.g., expenditures versus teacher resources), some common themes emerge.

First, focusing exclusively on the distribution of resources across districts is likely to hide substantial variations across schools within and between districts. Studies conducted at the national, state and district level consistently find large resource disparities across schools, often larger than those found across districts (see for example, Hertert, 1995 in California; Owens and

Maiden, 1999, in Florida; Rubenstein, 1998, in Chicago; Schwartz, 1999, in Ohio). Table 1 summarizes the results of studies examining the dispersion of total expenditures and instructional expenditures. Most report a coefficient of variation of between .10 and .20. While no generally accepted benchmark exists for an "acceptable" dispersion, many studies have adopted a standard of .10 or below (Odden and Picus, 2000). Almost all the studies reviewed here exceed that benchmark – the distribution of spending across schools within districts is clearly uneven.[2]

Second, although school spending tends to increase with poverty and student needs, the distribution of some resources, such as teachers with master's degrees, often penalize schools with high proportions of poor, minority and/or low performing students. Table 2 summarizes the previous findings on the relationship between expenditures and student characteristics. The results are noticeably mixed, but most studies that find significant relationships report higher per-pupil expenditures in schools with greater student needs and higher proportions of minority students. That said, the strength of the relationships differ across studies, indicating that, although there is some consensus that schools educating more poor children may need higher expenditures, there seems to be no consistent standard indicating *how much more*.

Turning to teachers specifically, Table 3 summarizes relationships between teacher resources and student needs and shows a much more consistent pattern. Schools with greater student needs and larger minority representation tend to have more teachers or instructional staff per pupil, but salaries are lower, and the teachers less educated, less experienced, and less likely to be certified. Put differently, studies consistently find less experienced and educated teachers along with lower average teacher salaries in high poverty, high minority, and low performing schools (see for example, Ginsburg, et al, 1981 in New York State; Stiefel, Rubenstein and

[1] A more detailed review of the studies summarized in Tables 1-3 is available from the authors.

Berne (1998) in Chicago, New York City, Rochester and Fort Worth; Rubenstein, 1998 in Chicago; Roza and Hill, 2003, in Baltimore City, Baltimore County, Cincinnati and Seattle; Iatarola and Stiefel, 2003, in New York City). At the same time, these studies also typically find that high-need schools have *more* teachers per pupil. Thus, the positive relationship between expenditures and poverty may reflect a larger number of teachers offsetting lower salaries in high poverty schools.

Third, these school-level disparities often appear to result not from purposeful policy decisions, but rather from the policies governing the distribution of teachers across schools. Since most districts are governed by uniform teacher salary schedules and union contracts, the salary differences described above result from the sorting of more experienced and educated teachers into schools with fewer poor children or "easier to educate" students. Teacher transfers and quits may exacerbate these differences as teachers, particularly those with the most skills, are more likely to leave urban schools with many poor students (Lankford, Loeb and Wyckoff, 2002; Roza and Hill, 2003).

Finally, while a large body of research has examined the effects of state-to-district funding formulae, and while these formulae are often relatively transparent, little scholarly research has examined the methods that large districts use to distribute resources to school sites, and even less research is available that considers the principles that districts *should* employ to distribute resources. How much more (or less) should a large school receive than a small school? How should funding respond to changes in the composition of a school's student body, for example to increases in the representation of poor children? In the next section, we discuss some of the recently proposed mechanisms for school-based financing.

[2] The coefficient of variation ranges from 0 to 1where a 0 indicates perfect equality. See Berne and Stiefel (1984) for more detail on calculating and interpreting measures of dispersion.

B. Funding Schools Directly: Alternative School-Based Financing Systems

Motivated, in large part, by the uneven resource distribution within school districts found in the research literature, several researchers have advocated moving the basic unit of support in education funding formulae from the district to the school. The general strategy is to create greater equity within the school district by specifying funding levels at the school level, leaving relatively little discretion to local school districts to reallocate at the local level. Interestingly, some have argued that moving funding and discretion to the school, and away from the district, may increase efficiency as well – by decreasing wasteful central administrative expenses, perhaps, or by allowing school personnel who are 'closer to the ground' to choose resource allocation. As discussed below, greater school-based discretion will be complicated, to some extent, by the legitimate needs and rights of teachers and other school personnel.

Studying the Illinois experience, Hess (1995) proposes a school-based funding system in which 85 percent of district funds are allocated to the school site, state property taxes support a high foundation funding level, and local revenues are used only for enhancements. Simulations indicate that such a system would be very equitable: the school-level range would be no more than 1.45:1 across all schools. Clark and Toenjes (1996) find that moving toward school level funding would increase school spending while decreasing district-level spending. More specifically, they found that in Texas, only an average of 68 percent of operating expenditures occurs at the school site. They estimate that if 90 percent of operating expenditures were allocated directly to schools, school-level expenditures would increase by almost one-third ($1,290 per pupil), while a more modest allocation of 75 percent would increase school-level spending by $416 per pupil and reduce district-level expenditures by approximately 20 percent.

Guthrie (1997) examines the "mechanical budgeting procedures" typically used to allocate resources to schools within large districts, based primarily on staffing patterns driven by student enrollment. He notes that, although the distribution of teacher positions is intended to promote equity, teachers' choices of schools can result in large differences in spending within districts. Guthrie proposes a school-based financing system, with 90% pass-through of funds to the school site, including capital outlays and discretion for purchasing and other resource allocation decisions.

Perhaps the most extensive discussion of school-based financing models is found in Odden and Busch (1998), which reviews three existing examples of school-based financing: charter schools, the Australian model and the British model.[3] Beginning with charter schools, Odden and Busch note that under most state funding formulae, districts lose state funding for each student transferring to a charter school while local spending is not directly affected. Thus charters could be treated as districts with no property wealth, an approach currently used by some states. Other states require the school district to contribute (typically average local per-pupil spending or a percentage of the average).

Some type of school-based financing has been employed in both Australia and Britain. Victoria, Australia for example, budgets 87 percent of funding to the school site. Core funding is provided primarily as staff positions, though a change to a dollar-based formula was under consideration at the time of publication. Schools are able 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, where school-based financing has been in place for most schools since the late 1980s, funds flow through Local Education Agencies (LEAs). The local contribution is

relatively small (approximately 20 percent of total expenditures) leading to a high level of equalization. Funding to LEAs is determined by a base per-pupil funding level for primary and secondary schools, with additional funding for student needs, scarcity, free lunch provision and an area cost differential. Approximately 85 percent of the budget is allocated directly to schools as a lump sum. LEAs are required to determine funding formulae, with at least 80 percent based on "age weighted pupil units," though LEAs can develop their own formulae for the calculating these pupil units. Schools are charged for actual teacher salaries.

Odden and Busch draw on the lessons from these examples to develop a proposal for a school-based funding system in the United States. Districts would be required to identify functions to be devolved to schools and those to be retained by the district, determine the portion of resources to fund the devolved functions and develop formulae to allocate the resources to schools. The state would retain authority to structure the ways in which districts can develop these school funding formulae.

In Odden (2001) he argues that states in the U.S. should follow England's lead in creating need-based school (rather than district) funding formulae. The formulae could include a base amount per pupil, with adjustments for student needs, grade level differences and particular school needs. He also describes a "hybrid" approach, with specific base funding allocations for each group of 500 students. For example, such a system would provide one principal, instructional facilitators, professional development, additional teachers for planning time, and extra resources for struggling students, all for approximately average current spending.

Notice, however, that there is almost no research available that estimates the impacts of school-based financing on outcomes, spending or distributions. Even empirical evidence on the impacts of increasing school-level spending discretion is limited. One exception, Stiefel,

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

Schwartz, Portas and Kim (2003), examines the effect of New York City's Performance Driven Budgeting (PDB) Initiative on performance and spending using panel data on 609 schools between 1995-1996 and 1998-99. The authors find a positive effect of PDB on some student test scores, providing some evidence that school-based budgeting increased achievement, although they found no impact on the level of spending and a small effect on resource allocation.

Ensuring an equitable distribution of teachers while protecting teachers' workplace rights presents one of the most vexing challenges for school-based financing systems. As described earlier, much of the disparity in resources across schools may be attributable to the sorting of teachers across schools and the resulting strong correlations between teacher characteristics and student characteristics. These patterns typically result not from a belief that, for example, lower-income students are best taught by the newest teachers, but by complicated patterns of teacher sorting across schools. School and/or district preferences for teachers with certain characteristics, as well as teacher preferences for a particular mix of salary and working conditions, play important roles in the matching process (Lankford, Wyckoff and Loeb, 2002). Teacher preferences, in particular, may often work against recruitment efforts in urban districts, and against schools within districts serving students who may be perceived as being more "difficult."[4]

Intra-district allocation formulae based on teacher positions complicate efforts to enhance school-level resource equality. For example, a school might receive one teacher position for every 18 students in the early grades and for every 21 students in the middle grades, with additional per-pupil allocations for other direct costs. Thus, schools may compete for the most educated and experienced (i.e., highest-paid) teachers with no financial penalty. Odden and

Busch (1998) recommend that schools be charged actual teacher salaries, but with a seven-year phase-in period. Similarly, Roza and Hill (2003) recommend that actual, rather than average, teacher salaries be reported, if not budgeted, at the school level. Ultimately, though, they recommend that states fund children, rather than districts or schools, with funding following children to their schools.

III. New Evidence on the Allocation of Resources within School Districts: New York City, Cleveland and Columbus, Ohio

Much of the early work on intradistrict allocations has relied upon univariate measures of dispersion (such as the coefficient of variation), and subsequent work typically focused on bivariate relationships. We follow some of the more recent research and estimate a set of multivariate regression models linking school resources to a set of relevant school characteristics. Using data on New York City's public schools we estimate a set of *de facto* spending equations that summarize the distribution of resources across school in the districts, specifically with an eye toward understanding how that distribution is shaped by the factors often used in school finance formulae. While we focus on the New York City results for 2001, we performed similar analyses for 1999 and estimated de facto spending models for two comparison cities - Columbus and Cleveland, Ohio - in order to assess the extent to which the New York City results are unique.

More specifically, we estimate *de facto* spending models for two expenditure variables: total expenditures per pupil and direct classroom expenditures per-pupil. And, since previous research suggests that overall expenditure patterns may differ from teacher distribution patterns

[4] Levin and Quinn (2003) argue, though, that structural impediments, including vacancy notification requirements, union transfer regulations, and late budgets, rather than teacher preferences for higher pay or "easier assignments,

we also estimate models using the pupil-teacher ratio (defined as the number of teachers per 1,000 pupils)[5], the percentage of teachers who are licensed, the percentage of teachers who hold MA degrees and teacher salary expenditures per pupil (which reflect, in part, these characteristics of the teachers). While these are controversial (indeed, the debate over their relationship to student performance has been the subject of much literature over the years), these are the few variables available to capture differences in teacher characteristics and teacher licensure is required by the state.

Several variables capture student characteristics in our regression models: the percentages of students eligible for the federal free lunch program (proxy for poverty), receiving resource room services, in special education, who have limited English proficiency and immigrant students. To measure the representation of low performing students we include the percentage of students performing at the lowest performance level (one) on the statewide English Language Assessment test (there are four performance levels). Finally, we adjust for school size using school enrollment and a set of categorical variables for 'small, 'medium', and 'large' schools.[6] We focus on a set of models estimated using a rich specification of variables in New York City, then estimate a set of more parsimonious models that include only school characteristics also available in Ohio, to facilitate comparisons across districts.

A. The Distribution of Resources in New York City Schools

In the 2000-01 school year, New York City educated more than three-quarters of a

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are the most significant barriers to effective teacher hiring in urban schools.

[5] We use this as a rough proxy for class size since no class size data are available.

[6] We define small school as having less than 500 students, middle sized schools have 500 to 1,000 students and large schools have more than 1,000 students.

million students in more than nine hundred elementary and middle schools.[7] For our analysis, we distinguish two groups of schools – first, the set of 650 schools that include a 4th grade, which we will refer to as an elementary school, although these schools may include some middle school grades. Second, we investigate the set of 249 schools that serve 8th grade students, which we will refer to as middle schools, although these schools may serve some non-traditional middle school grades. In order to facilitate comparisons across years we limit our analyses to schools that operated continuously since 1998-99.

As shown in table 4, the average New York City elementary school enrolled about 800 students, while middle schools average almost 1,000 students. In 2001, New York City elementary and middle schools spent about $11,000 per student on average, ranging from a low of about $4,000 to a high of $22,000 in elementary schools and almost twice that much in middle schools.[8] On average, a little over half of per pupil spending goes to the classroom. Teacher quality varies across schools: while over three quarters of teachers are licensed and close to that percentage MA degrees in the average school, there are schools where less than a third of the teachers hold these qualifications. This is reflected in a $30,000 range in the average teacher salary. The range in the number of teachers per 1,000 pupils is also very wide, ranging from as little as 3 teachers per 1,000 pupils to many as 200.

The range in performance is also quite wide. While some schools have no 4th graders performing at the lowest level (level 1) in reading others report all of their students at that level. On average 14% of the students in elementary schools and 19% in middle schools perform at

[7] Data were obtained from the New York City Department of Education (DOE): Annual School Reports (ASR), the School Based Expenditure Reports (SBER), school level test data and individual student level data. See http://www.nycenet.edu/ for publicly available data on school reports and expenditures.

[8] Total expenditure includes direct services to schools, district and system-wide costs and pass throughs. Direct services encompass classroom instruction, instructional support services, school leadership, ancillary support services, building services and district support. Classroom instruction comprises teachers and other educational and

level 1. As is well-known, New York City schools educate large populations of poor and minority students (table 4). What is less well known, however, is the wide variation in the population of schools within the City, which includes schools that are almost entirely black, Hispanic, or poor, for example, and others have virtually none of these groups. Further, there is substantial variation in the percentage limited English proficient, immigrant, and students in part-time special education.

We next turn to estimating whether, and to what extent, these differences correlate with differences in spending. To begin, we consider whether our results are consistent with the results from the existing literature: Do poor schools receive more money per pupil, reflecting higher teacher-pupil ratios but lower teacher qualifications and lower salaries? As shown in tables 5 and 6, our estimates for New York City schools in 2001 suggest that this is, in fact, the case. Columns (1) and (2) in each of these tables provide regression results for total and for classroom expenditure per pupil. As expected, there is a consistent positive relationship between poverty and spending. Schools with higher percentages of poor students by and large have higher expenditure per pupil, both in elementary school and middle school (although the middle school results in 2001 are not statistically significant). Results for 1999, shown in appendix tables A1 and A2, show the same pattern – poverty is significantly and positively related to spending.

Spending generally increases with the percentage of students who are in special education and resource room (i.e., receive part-time special education services) although the coefficients are not consistently significant, and with higher percentages of students with limited English proficiency. The representation of immigrants is generally not related to spending levels. We also find weak evidence that more money flows to schools with higher percentages of low-

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classroom staff, textbooks, librarians and library books, instructional supplies, curriculum development, contracted instructional services and summer and evening school.

performing students, while overall, per pupil spending decreases with school size.

Columns (3), (4) and (5) in each table present results for teacher characteristics. As expected, schools with higher representation of poor children have lower percentages of teachers who are licensed and hold MA degrees and their teachers are paid less on average. We find mixed evidence, though, regarding the relationship between other school and student characteristics. While schools with higher percentages of students in resource room tend to have more qualified and better paid teachers, we do not find the same relationship to the representation of special education students. We also find no consistent relationship between teacher characteristics and the percentage of students with limited English proficiency, but in contrast to the spending equations, there is a consistent positive relationship between immigrant representation and teacher characteristics (though not uniformly significant). Thus, even though the relationship between students with limited English proficiency and teacher characteristics displayed no obvious pattern, schools with a high representation of immigrant students (some of who have limited English proficiency) consistently have better qualified, better paid teachers.

In 2001 a puzzling relationship appears between teacher characteristics and student performance: schools with higher percentages of low performers get teachers who are less qualified yet better paid. However, the coefficient on low performers in the salary equation is insignificant, which suggests that, as expected, schools with more low performers get more money but less qualified teachers – recall that these are likely to be schools for which it is difficult to attract highly qualified teachers when they cannot offer higher salaries than other schools. In 1999, however, there was a consistently negative and significant relationship between schools with low performers and all three teacher characteristics, such that low performing schools got less qualified teachers and paid them less than other schools did (see appendix).

Finally, notice that these equations 'perform' relatively well. Clearly, these equations do not fully capture the factors driving disparities in resources, since R-Square is not close to1, but they do explain roughly two-thirds of the variation in resources across elementary schools and more than forty percent of the variation at the middle school level. The teacher characteristics equations perform less well, in general, though the teacher-pupil equations have a relatively high explanatory power.

Overall, schools that have higher proportions of poor pupils receive more money and have more teachers per pupil but the teachers tend to be less educated and less well paid. Schools with higher proportions of students with special needs (students in need of full- or part-time special education or language services) also get more funds and teachers, but only the students in resource room seem to be allotted more educated, highly paid teachers. Immigrant students tend to attract such teachers as well. Low performers tend to have more teachers, but with lower qualifications. Finally, as school size increases, spending per pupil and the teacher-pupil ratio decrease, while there is a complex relationship between school size and teacher characteristics, which depends on enrollment and school level.

B. The Distribution of Resources in Cleveland and Columbus Public Schools

Because school-level resource data were unavailable for other New York State cities, we investigate the distribution of resources in Columbus and Cleveland, Ohio, both large, major urban districts that may, in some respects, be more similar to the large urban districts in upstate New York than is New York City.[9] Do we observe the same relationships in large cities in Ohio or are they specific to New York City? In order to compare New York City and Ohio results, we

[9] Data from the Ohio Department of Education (ODE). Data are for school year 1996-97, the most recent year for which teacher characteristics data are reported at the school level.

re-estimate the New York City models using the variables that are available in Ohio.[10] We first, , compare these new New York City results to the previous ones for 2001, in order to confirm that the relationships described above still hold with a smaller set of variables. Results are reported in Appendix Tables A3 for elementary schools and A4 for middle schools. The odd-numbered columns report the results with the original, more comprehensive set of variables and the even-numbered columns report the results with the reduced set of variables. The relationships between the resource variables and school characteristics are largely the same, although the school size results are inconsistent.

Table 7 presents descriptive statistics for Columbus and Cleveland schools in 1997. Although undoubtedly large by Ohio standards, both are substantially smaller than New York City with about 62,000 students in 134 Cleveland schools and about 71,000 students in 112 Columbus schools. Average schools in the Ohio cities are noticeably smaller, than the average 800-student New York school – elementary schools in Columbus average fewer than 400 students, and only about 500 in Cleveland. Middle schools show the same pattern. Per pupil spending is much lower in Columbus ($5,400 and $6,440 in elementary and middle schools respectively) and Cleveland ($6,800 and $7,200 respectively) in 1997 than in New York City, even adjusting for inflation between 1997 and 1999, and there is a much smaller range.[11] Notice, however, the share of per pupil spending for instruction is much higher in these two Ohio districts than in New York City. While the percentage of teachers who hold MA degrees is much lower in Columbus and Cleveland, the average salary (a little above $40,000) is not much lower than it is in New York City (about $44,000)..

Overall performance in Ohio is low. Roughly 30% of the students pass the 4th grade

[10] Ohio student variables include only the percent free lunch and no data on teacher licensure or teacher-pupil ratio.
[11] Total expenditure includes spending on instruction, operations, administration, pupil support and staff support.

reading test while about 25% pass the 6th grade reading test in Columbus and only 14% do so in Cleveland,[12] and a wide range of performance as in New York City. Columbus is not as poor as New York City, while Cleveland is poorer (85% and 83% respectively) and a wide range is evident in Table 5. The overall minority representation is lower in Ohio, especially in Columbus, and, in contrast to New York City, the nonwhite population in Columbus and Cleveland is predominantly black.

We now turn to our analyses of the Ohio schools (Tables 8 and 9). In Ohio, as in New York City, schools with high proportions of poor students tend to have higher spending and teachers who are less educated and less well paid, though the results are often not statistically significant. The one exception is school with an 8th grade in Cleveland, where poorer schools have better paid teachers.

The coefficients on the performance variables must be interpreted carefully for comparison purposes: the New York City models include the percentage of students who perform at level 1 on the reading test, so it is the percentage of *low* performers; the Ohio models include the percentage of students who pass the reading test, which is the percentage of "*higher*" performers. Thus opposite signs on the coefficients on these variables would indicate a relationship in the same direction across the states. The results are mixed. Overall, a higher-performing pool of 4th grade students is associated with lower average school spending in schools in both states. Conversely, in middle schools, better performance and more money go hand in hand in three out of the four cases in Ohio, though again the results are not statistically significant.

The results regarding teacher characteristics are again somewhat mixed. Schools with higher proportions of "better" students have higher proportions of more educated teachers in

[12] The percentage of students passing the *6th* grade reading exam is used to measures performance in middle schools.

New York City and we find a similar pattern in Ohio for middle schools but not for elementary schools. The relationship between performance and teacher salary is also mixed: in Columbus and in middle schools in Cleveland, schools with more students who pass the reading test have higher average teacher salaries, which is analogous to the New York City results in elementary schools. But in elementary schools in Cleveland and in middle schools in New York City, the reverse is true, such that no clear pattern emerges.

The relationships between enrollment and the resource variables are different in the middle schools than in the elementary schools, and they also differ across the three cities. The relationships in small schools are the same in New York City and Columbus: smaller schools spend less, acquire more highly educated teachers and pay them more as the schools become larger. The reverse relationships appear in Cleveland. No pattern emerges in the medium-sized schools. In the large schools, both in New York City and Cleveland (there are no large schools in Columbus), larger size is associated with higher spending and teacher salaries, along with more teachers with an MA in Cleveland and fewer such teachers in New York City.

Overall, the comparison of the three cities confirms that there is a trade-off in which, as poverty increases, schools receive more funds but exhibit lower teacher quality and teacher salaries. High-performing students tend to attend elementary schools with lower spending and middle schools with more highly educated teachers. No clear pattern emerges in the relationship between school characteristics and teacher salaries and the relationship between school size and resources is complex. These results suggest that although there are common traits across the two very different states compared here, New York City does have some unique features. This makes it harder to draw broad conclusions across jurisdictions. Considering that New York City is the largest and possibly most diverse school system in the country, the lack of consistent patterns

may not be particularly surprising.

III. Conclusions and Policy Options

As both the literature review and the empirical work make clear, intradistrict resource disparities are present in New York City and are common in other large school districts. Researchers and reformers have identified a number of ideas about how to allocate funding at the school level in order to promote adequate achievement and/or equitable financing. Some are based on findings in the literature, such as the persistent finding that, in urban districts, dollars per pupil and teachers per pupil are higher in schools with higher percentages of poor children, while teacher experience, education, certification and salaries are lower. Other ideas and recommendations are based on analogies with state financing systems, theories about how teacher markets work, or are simply ideas that make sense to the analysts but have not been tried. Below we describe a number of these ideas with comments on theoretical and practical issues they raise.

1. *Provide schools with budgets in dollars rather than positions*.

The research cited above almost uniformly identifies substantial expenditure differences across schools, largely caused by systematic differences in the characteristics (and, due to uniform teacher salary schedules, salaries) of the teachers working in those schools. Allocating dollars rather positions would force schools to make difficult trade-offs between teacher characteristics and staffing ratios since schools would be unable to simultaneously hire the most expensive teachers and reduce class sizes. Such a plan would work on the demand side, making more expensive teachers relatively less attractive to schools, all things being equal. With a uniform salary schedule, it would do little to make difficult assignments more attractive to

teachers, however. This proposal has raised concerns that more experienced teachers will have difficulty finding assignments as schools systematically opt for less expensive beginning teachers, and that students may suffer if they lose more experienced and educated teachers.

Odden and Busch (1998) found little evidence of problems, though, as England moved to a system of allocating actual teacher salaries, and report that head teachers found the new discretion "invigorating." To prevent drastic changes in schools' staffing patterns, the system was phased in over seven years (Odden and Busch, 1998; Odden and Picus, 2000). In addition, accountability systems may keep schools focused on outcomes, possibly reducing the likelihood that schools will simply try to save money without considering the effects of such savings on the performance of students.

2. Provide differential pay for qualified teachers in hard-to-staff subjects, schools and grades.

Providing differential pay could help to address the undersupply of teachers in certain schools or grades caused by many teachers choosing to work in schools they perceive as being less demanding. Since collective bargaining rules often provide more senior teachers with first choice of open positions (Levin and Quinn, 2003), more experienced teachers have a strong incentive to leave schools with lower non-pecuniary benefits. Differential pay has been proposed, and sometimes used, to attract teachers to shortage areas, such as special education, bilingual education, math and science. Providing additional pay to teachers at certain schools – or perhaps in grades with "gatekeeper" examinations – may be more controversial and difficult to implement, particularly within the constraints of existing collective bargaining agreements. There is also limited empirical evidence to estimate the pay differential that would be necessary to significantly increase teacher supply at certain schools within districts. This proposal also

implies that, if combined with proposal 1 above, substantial funding differentials would be required for hard-to-staff schools.

3. *Adopt a "weighted" student-based funding formula in which dollars follow students.*

Under such a system, each student could be classified by a number of cost factors such as poverty status, English proficiency, disability, and other special needs, and a funding weight would be attached to each. The weights would then generate additional funding over and above a base funding level, with the weights estimated based on the cost of providing such students the opportunity to meet state standards. Schools would receive a "student budget" according to the needs of the students they attract. Student-based financing would offer significant advantages in districts with substantial choice programs, including public school choice, charter schools or voucher programs (Rubenstein and Picus, 2003). Though they have not been implemented, these ideas are not new. For example, Coons, Clune and Sugarman (1970) proposed funding using a "Family Power Equalizing" approach modeled on "District Power Equalizing" formula. Under this proposed voucher funding plan, a child's funding could be based not only on student needs but on family effort, similar to district tax effort, thereby providing an additional level of equalization for family income. Such a system would, of course, encourage disparities in resources across schools, though these disparities would be intended to benefit schools enrolling high proportions of students with special needs. As in district-based formulae, determination of the appropriate weights would be problematic. One option is to use the weights implied by empirical results, such as our results above. It is unclear, though, whether these weights would allow substantial performance increases in under-performing schools. Also, this does not consider that there can be savings to arranging students in certain ways – for example, grouping

bilingual students together might result in lower costs as compared to the sum of each student's additional cost.

4. *Adapt district-based funding formulae, such as the Regents current funding proposal, to the school-level*

Under such a plan, money would be targeted to schools, rather than districts or students. As outlined in Odden and Busch (1998), this proposal would not require abandonment of school districts, but rather a re-thinking of their role. The system could also provide schools with substantial new discretion and resources. Odden and Busch point out that a side effect of school-based funding in England and Australia was heightened awareness of funding inequities. Since schools would be funded using a formula that accounts for their mix of students (rather than the district's mix of students), school-level disparities could be reduced or, at the very least, become more transparent. Again, much of the actual effect may be dependent on the details, such as the choice of position or dollar funding, and the selection of appropriate student weights. A school rather than district-based system could even promote change on the revenue side of the funding equation, by facilitating, for example, statewide tax-base sharing.

In the end, the "system" in place now seems, inadvertently, to "dictate" a particular way to educate poor students, which involves providing smaller class sizes (or at least more teachers per student), but at the same time providing teachers with fewer qualifications such as experience, master's degrees, or certification. It is not at all clear that we know enough about how to educate poor students to impose this "technology" on schools and thus, perhaps, we should allow schools to make more of their own tradeoffs.

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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	.10	.88 E
		.14	.07	.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)		.11 to .12		
Owens and Maiden, 1999	0.69	.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
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	- *		

(a) Includes district fixed effects

Table 3: Summary of Multivariate Teacher Characteristic Results:

	Low-income	LEP	Immigrant	Special Ed.	Race
Pupil-Teacher Ratio					
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
Teacher Salary					
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	- *
Teacher Experience					
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				
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

(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

(e) E indicates elementary, M middle, and H high school, B indicates black, A Asian and NW non-white.

Table 4. Descriptive statistics NYC 2001

	Elementary Schools N=650 (i)			Middle Schools N=249		
Variable	Mean	Minimum	Maximum	Mean	Minimum	Maximum
Total expenditure per pupil	$10,833	3,975	21,472	$11,029	6,037	41,339
Classroom expenditure per pupil	$5,785	847	12,077	$5,818	3,634	19,962
Percent licensed teachers	85.25	30.00	100.00	76.67	43.70	100.00
Percent teachers with MA	75.70	31.50	100.00	71.06	32.40	95.50
Teachers per 1000 pupils	78.93	2.49	167.08	79.71	50.76	204.72
Teacher salary	$43,581	30616	57147	$44,172	31591	65748
Enrollment	809	94	2134	995	90	2385
Small school dummy	0.16	0	1	0.17	0	1
Medium school dummy	0.59	0	1	0.29	0	1
Large school dummy	0.25	0	1	0.54	0	1
Percent at level 1 in grade 4 reading	13.59	0.00	100.00			
Percent at level 1 in grade 8 reading				18.85	0.00	50.00
Percent free lunch	74.54	6.70	100.00	74.46	9.20	100.00
Percent resource room	5.72	1.30	16.60	7.23	0.30	27.50
Percent special education	5.21	0.00	34.20	7.06	0.00	21.50
Percent immigrants	6.68	0.00	25.50	6.36	0.00	93.10
Percent limited English proficiency	12.54	0.30	47.40	13.05	0.20	91.50
Percent black	34.82	0.20	97.30	37.37	1.00	96.30
Percent Hispanic	37.05	1.40	97.80	38.53	2.60	96.50
Percent other nonwhite	11.46	0.00	91.50	9.37	0.00	87.50
Percent female	49.05	42.60	62.80	49.37	39.70	70.30

(i) except percent licensed teachers, N=648; percent teachers with MA, N=648 in 2001.

Table 5. Selected Coefficients, NYC *de facto* resource regressions, Elementary Schools, 2001

	(1) Total expenditure per pupil	(2) Classroom expenditure per pupil	(3) Percent licensed teachers	(4) Percent teachers with MA	(5) Teacher salary	(6) Teachers per 1000 pupils
% free lunch	11.9574***	9.4521***	-0.1688***	-0.2080***	-59.8378***	0.1720***
	(2.6146)	(1.4829)	(0.0194)	(0.0179)	(10.6089)	(0.0201)
% resource Room	102.8058***	35.6196	0.9768***	0.9347***	192.9016*	0.2229
	(35.6479)	(22.7524)	(0.2125)	(0.1842)	(106.9152)	(0.2574)
% special Education	221.9947***	76.1430***	-0.1548*	-0.1046	-100.6979***	1.1580***
	(11.0914)	(6.7700)	(0.0866)	(0.0686)	(38.7547)	(0.0963)
% LEP	18.6207**	10.4545**	-0.2093***	-0.0197	10.8500	0.0747
	(7.2445)	(4.6329)	(0.0537)	(0.0461)	(22.4440)	(0.0570)
% immigrant	-14.7270	0.9160	0.8736***	0.7077***	34.1881	0.1007
	(12.1991)	(7.6530)	(0.0958)	(0.0915)	(43.9352)	(0.1060)
% level 1, 4th grade reading	20.3470***	16.0514***	-0.0910	-0.0786	5.1493	0.2106***
	(6.9846)	(4.4059)	(0.0582)	(0.0480)	(21.4501)	(0.0588)
Enrollment	-2.0404***	-0.8778***	0.0014	-0.0018	-0.0879	-0.0122***
	(0.3287)	(0.1935)	(0.0024)	(0.0019)	(1.0925)	(0.0027)
Medium size Dummy	-589.2608**	-258.7050*	-2.3341*	-0.8677	-346.0150	-2.8725
	(230.3695)	(135.0134)	(1.3702)	(1.2695)	(697.7894)	(1.9285)
large size Dummy	-386.8471	-218.4640	-2.8412	0.0867	244.7451	-3.8374
	(343.3813)	(205.7591)	(2.3577)	(2.0866)	(1,155.5246)	(2.9367)
Observations	650	650	648	648	650	650
R-squared	0.59	0.40	0.38	0.43	0.13	0.45

Robust standard errors in parentheses. *, **, *** indicate significance at the 10, 5 and 1% respectively.

Table 6. Selected Coefficients NYC *de facto* resource regressions, Middle Schools, 2001

	(1) Total expenditure per pupil	(2) Classroom expenditure per pupil	(3) Percent licensed teachers	(4) Percent teachers with MA	(5) Teacher salary	(6) Teachers per 1000 pupils
% free lunch	-1.6537	1.7599	-0.2686***	-0.2431***	-99.3124***	0.1342**
	(9.6725)	(4.7825)	(0.0384)	(0.0349)	(20.7929)	(0.0519)
% resource Room	28.2379	-9.6432	0.0490	0.1341	-117.9869	0.0836
	(108.8313)	(44.9354)	(0.2031)	(0.2426)	(126.5936)	(0.4694)
% special Education	236.3565***	98.2297***	0.2642	-0.0690	105.5463	1.0197***
	(69.5486)	(29.7449)	(0.1868)	(0.1344)	(78.6637)	(0.3341)
% LEP	91.2771*	42.7104*	0.0965	0.0663	22.1022	0.3593*
	(47.2520)	(22.7905)	(0.1134)	(0.0849)	(57.9697)	(0.2110)
% immigrant	-53.1890	-12.0468	0.2722	0.3475**	43.4215	-0.0934
	(50.6605)	(23.3365)	(0.1983)	(0.1660)	(81.3256)	(0.2182)
% level 1, 8th grade reading	13.3481	6.6808	-0.2031***	-0.2150***	17.2639	0.0629
	(18.4661)	(7.6333)	(0.0753)	(0.0586)	(30.0613)	(0.0897)
Enrollment	-2.3092***	-0.7886***	0.0007	0.0009	0.1669	-0.0086***
	(0.6667)	(0.2699)	(0.0028)	(0.0023)	(1.2920)	(0.0030)
Medium size Dummy	-1,193.5663	-197.5263	-4.3291	0.4715	867.8135	-3.4393
	(1,000.8302)	(450.7360)	(3.0989)	(2.6422)	(1,441.2383)	(5.0132)
large size Dummy	-1,369.5679	-483.0787	-4.9612	-1.3139	1,422.9493	-8.8379**
	(835.1705)	(376.0434)	(3.7590)	(3.4003)	(1,720.8868)	(4.2833)
Observations	249	249	249	249	249	249
R-squared	0.40	0.34	0.31	0.43	0.17	0.41

Robust standard errors in parentheses. *, **, *** indicate significance at the 10, 5 and 1% respectively.

Table 7. Descriptive statistics Ohio 1997

Columbus

	Elementary Schools N=91			Middle Schools N=25		
Variable	Mean	Minimum	Maximum	Mean	Minimum	Maximum
Total expenditure per pupil	$5,387	3045	8165	$6,440	5007	9034
Instructional expenditure per pupil	$3,459	1218	4919	$3,848	2970	5466
Percent teachers with MA	34.83	6.30	83.30	39.82	14.70	68.00
Teacher salary	$42,154	33992	52005	$43,277	39079	47927
Enrollment	370	208	751	545	345	820
Small school dummy	0.90	0	1	0.28	0	1
Medium school dummy	0.10	0	1	0.72	0	1
Large school dummy	0.00	0	0	0.00	0	0
Percent passing grade 4 reading	32.88	3.00	73.80			
Percent passing grade 6 reading				25.29	4.50	60.20
Percent free lunch	60.88	22.86	100.00	52.42	23.00	79.92
Percent black	53.50	6.50	99.70	53.29	13.50	95.40
Percent other nonwhite	5.10	0.00	41.20	5.03	1.30	10.20

Cleveland

	Elementary Schools N=79			Middle Schools N=22		
Variable	Mean	Minimum	Maximum	Mean	Minimum	Maximum
Total expenditure per pupil	6819	5085	11905	7145	3992	9148
Instructional expenditure per pupil	5023	3091	9037	4759	2744	6410
Percent teachers with MA	45.15	18.30	68.20	38.79	16.70	62.90
Teacher salary	43147	37943	46687	40295	33865	47975
Enrollment	501	189	861	734	376	1166
Small school dummy	0.53	0	1	0.18	0	1
Medium school dummy	0.47	0	1	0.68	0	1
Large school dummy	0.00	0	0	0.14	0	1
Percent passing grade 4 reading	28.10	4.90	58.90			
Percent passing grade 6 reading				13.60	3.60	61.20
Percent free lunch	84.72	54.95	100.00	83.26	63.08	100.00
Percent black	68.97	7.20	99.80	73.76	32.80	99.50
Percent other nonwhite	8.27	0.00	57.20	7.87	0.20	41.80

Table 8. Selected Coefficients, Columbus *de facto* resource regressions, 1997

		Elementary Schools (N=91)		
	(1)	(2)	(3)	(4)
	Total expenditure per pupil	Instructional expenditure per pupil	Percent Teachers With MA	Teacher salary
% free lunch	8.7192	5.2571	-0.3311***	-54.6557**
	(5.3673)	(4.6962)	(0.1016)	(25.0993)
% passing 4th grade reading	2.4008	-0.7597	-0.0996	19.9676
	(8.6751)	(6.5789)	(0.1332)	(37.3653)
Enrollment	-4.3273***	-1.0713	-0.0415*	0.8124
	(1.1492)	(0.8522)	(0.0211)	(5.7995)
medium size dummy	334.0073	-85.5090	11.6748**	-2,104.0488
	(257.7100)	(203.6342)	(5.0711)	(1,682.9133)
R-squared	0.25	0.08	0.18	0.13
		Middle Schools (N=25)		
% free lunch	26.6440	12.8447	-0.0173	-50.7803
	(17.6818)	(13.0869)	(0.2131)	(47.8374)
% passing 6th grade reading	18.0641	1.3203	0.3924	26.1794
	(11.2170)	(7.5386)	(0.2599)	(56.3964)
Enrollment	-4.2272**	-1.7452	0.0351	4.9291
	(1.5383)	(1.0199)	(0.0216)	(4.1815)
medium size dummy	-594.0858	-388.5687	-1.6869	-3,083.6613**
	(363.6546)	(263.1607)	(5.3318)	(1,228.2255)
R-squared	0.69	0.55	0.42	0.42

Robust standard errors in parentheses. *, **, *** indicate significance at the 10, 5 and 1% respectively.

Table 9. Selected Coefficients, Cleveland *de facto* resource regressions, 1997

		Elementary Schools (N=79)		
	(1)	(2)	(3)	(4)
	Total Expenditure per pupil	Instructional expenditure per pupil	Percent teachers with MA	Teacher salary
% free lunch	15.1146	13.0243	-0.0530	-0.9970
	(12.6857)	(12.7656)	(0.1161)	(22.9012)
% passing 4th grade reading	-18.4989	-18.9150	-0.1259	-30.8471
	(12.7495)	(12.3087)	(0.1218)	(20.0629)
Enrollment	-3.2205**	-1.9195	0.0392***	3.3471
	(1.3238)	(1.4125)	(0.0112)	(2.6115)
medium size dummy	7.0423	-1.9703	-7.1432**	-538.4934
Constant	7,667.8235***	5,413.1745***	36.9200***	42,674.1701***
	(1,482.0005)	(1,492.7280)	(13.3889)	(2,339.1897)
R-squared	0.20	0.13	0.13	0.07
		Middle Schools (N=22)		
% free lunch	42.8768	32.5553	-0.1580	49.5781
	(30.4504)	(25.0987)	(0.2931)	(62.4523)
% passing 6th grade reading	2.6954	-5.3269	0.5055**	200.9779***
	(27.3803)	(20.8369)	(0.2069)	(43.8971)
enrollment	1.0577	1.1591	-0.0054	0.6908
	(3.3620)	(2.9776)	(0.0267)	(6.7382)
medium size dummy	-288.0216	-266.3059	10.7003	2,784.4063
	(1,316.5300)	(1,028.4479)	(11.2422)	(2,584.3089)
large size dummy	-934.2031	-596.1000	5.8134	1,973.0123
	(2,116.4080)	(1,906.8715)	(17.9803)	(4,406.9062)
R-squared	0.14	0.14	0.51	0.60

Robust standard errors in parentheses. *, **, *** indicate significance at the 10, 5 and 1% respectively.

APPENDIX: SUPPLEMENTARY REGRESSION RESULTS

Table A1. Selected Coefficients, NYC *de facto* resource regressions, Elementary Schools, 1999

	(1) Total expenditure per pupil	(2) Classroom expenditure per pupil	(3) Percent licensed teachers	(4) Percent teachers with MA	(5) Teacher salary	(6) Teachers per 1000 pupils
% free lunch	10.0551***	7.7619***	-0.1331***	-0.1317***	-53.7242***	0.1433***
	(1.9682)	(1.0260)	(0.0186)	(0.0188)	(8.4938)	(0.0149)
% resource Room	92.3807***	32.1302**	0.8991***	0.8228***	272.9963***	0.2020
	(22.9342)	(12.5115)	(0.1713)	(0.1498)	(62.1859)	(0.1678)
% special Education	188.1311***	62.1293***	-0.2110***	-0.0004	-87.8543***	0.8954***
	(9.4539)	(4.2879)	(0.0683)	(0.0598)	(22.9853)	(0.0601)
% LEP	9.8931**	7.9451***	-0.2813***	-0.0590	1.9009	0.0616*
	(4.3519)	(2.8260)	(0.0486)	(0.0428)	(14.8619)	(0.0361)
% immigrant	-3.4905	3.9427	0.6792***	0.4881***	90.2038***	-0.0200
	(8.4642)	(4.7486)	(0.0766)	(0.0762)	(33.1787)	(0.0655)
% level 1, 4th grade reading	-0.7659	-0.5873	-0.2603***	-0.1875***	-82.7109***	0.0846***
	(4.9626)	(2.6150)	(0.0475)	(0.0443)	(16.2067)	(0.0325)
Enrollment	-1.1408***	-0.5001***	0.0042**	0.0011	0.6884	-0.0076***
	(0.2186)	(0.1329)	(0.0017)	(0.0017)	(0.7258)	(0.0017)
Medium size Dummy	-530.9843***	-261.2498***	0.6045	-1.2546	672.5207	-3.8053***
	(166.0014)	(96.9766)	(1.2404)	(1.2263)	(497.8358)	(1.4267)
large size Dummy	-469.9638**	-222.4564*	-0.4774	-0.1756	768.5119	-3.2014*
	(231.5447)	(134.5684)	(1.9526)	(2.0147)	(804.0265)	(1.8830)
Observations	650	650	643	644	650	650
R-squared	0.68	0.46	0.51	0.39	0.34	0.54

Robust standard errors in parentheses. *, **, *** indicate significance at the 10, 5 and 1% respectively.

Table A2. Selected Coefficients, NYC *de facto* resource regressions, Middle Schools, 1999

	(1) Total expenditure per pupil	(2) Classroom expenditure per pupil	(3) Percent licensed teachers	(4) Percent teachers with MA	(5) Teacher salary	(6) Teachers per 1000 pupils
% free lunch	7.4038*	5.0459**	-0.1946***	-0.1906***	-89.7640***	0.1546***
	(4.3230)	(2.1957)	(0.0384)	(0.0389)	(14.0393)	(0.0356)
% resource Room	102.5222	60.0595*	1.1996***	0.8286***	69.3083	1.1260*
	(65.3608)	(31.6779)	(0.2534)	(0.2170)	(89.9283)	(0.6589)
% special Education	169.6007***	67.6699***	0.0488	0.0445	20.7122	0.8553***
	(23.8709)	(11.3562)	(0.1515)	(0.1516)	(59.5941)	(0.1981)
% LEP	12.0650	3.0713	-0.1496*	-0.0225	-28.1773	0.0163
	(10.7313)	(6.0539)	(0.0789)	(0.0704)	(28.4805)	(0.0951)
% immigrant	-32.3722**	-1.6308	0.0976	0.2477**	39.8151	-0.0207
	(13.8142)	(9.8367)	(0.1990)	(0.1128)	(67.2717)	(0.1004)
% level 1, 8th grade reading	1.8111	4.4144	-0.3223***	-0.1822**	-55.9391**	0.1785**
	(9.6592)	(5.3648)	(0.0765)	(0.0748)	(27.8586)	(0.0815)
Enrollment	-0.7058**	-0.2430	0.0058*	0.0075***	2.1274*	-0.0048*
	(0.3133)	(0.1778)	(0.0031)	(0.0026)	(1.0853)	(0.0025)
Medium size Dummy	-812.3131*	-196.6035	6.7721**	1.5452	1,719.3514	-4.2648
	(436.4277)	(226.7380)	(3.2854)	(3.0421)	(1,159.0001)	(4.0271)
large size Dummy	-1,009.1082**	-213.3723	5.9870	-0.5926	1,635.5787	-4.4723
	(460.3173)	(246.0637)	(4.2207)	(3.7664)	(1,538.0346)	(3.9464)
Observations	249	249	234	234	246	249
R-squared	0.48	0.35	0.47	0.40	0.40	0.37

Robust standard errors in parentheses. *, **, *** indicate significance at the 10, 5 and 1% respectively.

Table A3. Selected Coefficients, NYC *de facto* resource regressions, Elementary Schools, 2001, Basic and Parsimonious Models

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Total expenditure per pupil	Total expenditure per pupil	Classroom expenditure per pupil	Classroom expenditure per pupil	Percent teachers with MA	Percent teachers with MA	Teacher salary	Teacher salary
% free lunch	11.9574***	17.2646***	9.4521***	11.7983***	-0.2080***	-0.2183***	-59.8378***	-64.1049***
	(2.6147)	(3.4563)	(1.4829)	(1.5693)	(0.0179)	(0.0202)	(10.6089)	(10.1816)
% resrce rm	102.8058***		35.6196		0.9347***		192.9016*	
	(35.6479)		(22.7524)		(0.1842)		(106.9152)	
% special ed	221.9947***		76.1430***		-0.1046		-100.6979***	
	(11.0914)		(6.7700)		(0.0686)		(38.7547)	
% LEP	18.6207**		10.4545**		-0.0197		10.8500	
	(7.2445)		(4.6329)		(0.0461)		(22.4440)	
% immigrant	-14.7270		0.9160		0.7077***		34.1881	
	(12.1991)		(7.6530)		(0.0915)		(43.9352)	
% level 1, 4th grde reading	20.3470***	39.4029***	16.0514***	21.8884***	-0.0786	-0.1851***	5.1493	-4.4376
	(6.9846)	(10.8905)	(4.4059)	(4.9219)	(0.0480)	(0.0608)	(21.4501)	(21.2618)
enrollment	-2.0404***	-2.9617***	-0.8778***	-1.1372***	-0.0018	0.0008	-0.0879	0.2272
	(0.3287)	(0.4323)	(0.1935)	(0.2177)	(0.0019)	(0.0020)	(1.0925)	(1.1021)
Medium size dummy	-589.2608**	32.5689	-258.7050*	-57.1081	-0.8677	-2.3325*	-346.0150	-803.1165
	(230.3695)	(292.1538)	(135.0134)	(152.8273)	(1.2695)	(1.3461)	(697.7894)	(678.7947)
large size dummy	-386.8471	78.9874	-218.4640	-61.6206	0.0867	-1.1121	244.7451	-38.8042
	(343.3813)	(455.8046)	(205.7591)	(232.2126)	(2.0866)	(2.2643)	(1,155.5246)	(1,165.5356)
Observations	650	650	650	650	648	648	650	650
R-squared	0.59	0.29	0.40	0.27	0.43	0.34	0.13	0.11

Robust standard errors in parentheses. *, **, *** indicate significance at the 10, 5 and 1% respectively.

Table A4. Selected Coefficients, NYC *de facto* resource regressions, Middle Schools, 2001, Basic and Parsimonious Models

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Total expenditure per pupil	Total expenditure per pupil	Classroom expenditure per pupil	Classroom expenditure per pupil	Percent teachers with MA	Percent teachers with MA	Teacher salary	Teacher salary
% free lunch	-1.6537	18.0225**	1.7599	12.1799***	-0.2431***	-0.2152***	-99.3124***	-85.9416***
	(9.6725)	(7.8093)	(4.7825)	(3.5271)	(0.0349)	(0.0317)	(20.7929)	(18.7693)
% resrce rm	28.2379		-9.6432		0.1341		-117.9869	
	(108.8313)		(44.9354)		(0.2426)		(126.5936)	
% special ed	236.3565***		98.2297***		-0.0690		105.5463	
	(69.5486)		(29.7449)		(0.1344)		(78.6637)	
% LEP	91.2771*		42.7104*		0.0663		22.1022	
	(47.2520)		(22.7905)		(0.0849)		(57.9697)	
% immigrant	-53.1890		-12.0468		0.3475**		43.4215	
	(50.6605)		(23.3365)		(0.1660)		(81.3256)	
% level 1, 8th grde reading	13.3481	50.5449**	6.6808	20.4955**	-0.2150***	-0.2345***	17.2639	21.3667
	(18.4661)	(20.3864)	(7.6333)	(9.1654)	(0.0586)	(0.0576)	(30.0613)	(29.7935)
enrollment	-2.3092***	-2.7473***	-0.7886***	-0.9013***	0.0009	0.0021	0.1669	0.3114
	(0.6667)	(0.6816)	(0.2699)	(0.3028)	(0.0023)	(0.0024)	(1.2920)	(1.2593)
Medium size dummy	-1,193.5663	226.1369	-197.5263	399.9609	0.4715	-1.1493	867.8135	1,574.0731
	(1,000.8302)	(828.9487)	(450.7360)	(370.7228)	(2.6422)	(2.4195)	(1,441.2383)	(1,206.1667)
large size dummy	-1,369.5679	-319.4216	-483.0787	-11.4920	-1.3139	-2.3423	1,422.9493	2,065.7560
	(835.1705)	(716.6266)	(376.0434)	(320.9706)	(3.4003)	(3.3750)	(1,720.8868)	(1,565.5712)
Observations	249	249	249	249	249	249	249	249
R-squared	0.40	0.27	0.34	0.23	0.43	0.36	0.17	0.15

Robust standard errors in parentheses. *, **, *** indicate significance at the 10, 5 and 1% respectively.