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Why Do Some Schools Get More and Others Less?
An Examination of School-Level Funding in New York City

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I. Introduction

While an extensive research base has accumulated examining intergovernmental grants from states to school districts, relatively little research has focused on the processes and patterns of resource allocation across schools within districts. This is due primarily to the primacy of states and districts in generating revenue for K-12 education and to the scarcity of school-level data on resources. School district consolidations, though, have led to larger school districts and an increasing share of the country's students attending schools in these districts. New York City, with almost 1.1 million students attending over 1,400 schools, is an extreme example, but the one hundred largest school districts in the United States together serve almost one-quarter of the total students enrolled in public schools (U.S. Department of Education, 2002). Put another way, only 11 states outside of New York have a larger student enrollment than New York City alone. Like many large urban districts, New York City's student population is disproportionately low-income, African-American and Latino,¹ making intradistrict resource allocation critical to the equitable and adequate provision of educational opportunities.

There is considerable evidence that resources vary across schools within these larger districts. Unlike differences across districts, which in large part are related to variations in district fiscal capacity, community tastes, and student demographics, differences across schools are likely determined by the latter two factors as well as teacher preferences and local community political strength. There is some concern, moreover, that the within-district variation does not accomplish publicly stated goals of equity or adequacy in resource distribution; instead, allocations often result in certain resources, such as more experienced or educated teachers, concentrated in schools with fewer poor children, fewer minority children or fewer immigrants.

¹ In 2002-2003, 28.3 percent of students in the 100 largest U.S. 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 and 19.2 percent and 37 percent for all districts.

Understanding the allocation of resources to schools is important for at least three 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, moving beyond district-level analyses to school-level analyses will more accurately assess the resources actually available to students in their schools. Better understanding of current resource allocation can 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.

Third, the consistent intra-district disparities found around the United States have spurred interest in alternative methods of distributing resources to schools, such as Weighted Student Funding (WSF). Districts including Edmonton (Ontario), Cincinnati, Seattle, Oakland, San Francisco, and Houston have implemented versions of the approach (Archer, 2004), while New York City - the focus of our study - is prepared to embark on WSF reforms under the auspices of its “Fair Student Funding” initiative. To better understand how these reforms might affect intra-district resource allocation, though, it is critical that we first understand the dynamics of intra-district funding patterns in large school districts.

In this paper we consider why – and how – the intra-district allocation of resources matters. The present research adds to our understanding of intra-district resource allocation in several ways. First, we examine not only what factors appear to be related to higher or lower total funding levels, but also how these intra-district patterns differ by source of funding. Examining sources of funding is critical to fully understanding how and why resources are distributed as they are. As described further below, different funding sources often bring with

them different allocation formulae and restrictions; thus, understanding how these sources interact is important for understanding how resources reach schools. The ways in which the distribution formulae for each revenue source do or do not interact with those of other funding sources may be key to understanding how the overall resource distribution differs from the intent of these individual distribution formulae. Prior research, though, has largely focused on total resource allocations, thus overlooking how multiple revenue sources affect these patterns.

Second, we take advantage of the panel nature of our data to examine how within-district resource allocation changes over time, controlling for numerous observed and unobserved factors, including previous funding. These analyses shed light on the dynamics of resource allocation over time and provide valuable insight on the potential for future funding reforms.

The paper proceeds as follows. The next section reviews the literature on the intra-district distribution of school resources, including typical district-to-school allocation methods. Next, we present new empirical analyses examining the distribution of resources by funding source across schools in New York City. We conclude with a discussion of policy implications.

II. Previous Research on Intradistrict Resource Allocation

A. Documenting Intradistrict Disparities

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 distribution of resources at the school level. 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 sizeable in large districts with numerous schools.

Comparisons of intra-district and inter-district disparities are rare, but, when attempted, the cross-district analyses of school-level disparities sometimes find greater disparities within than between districts.² For example, Hertert (1995) finds that differences within districts are sometimes greater than average spending differences across districts in California, though the results vary depending on the sample of schools and districts examined.³ 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).

Resource inequalities across schools may be acceptable or even desirable if they drive additional resources to the students who most need them. Conversely, if intradistrict studies find that schools with the highest concentrations of students with special needs systematically receive fewer or lower quality resources, state and federal equity and adequacy goals for intergovernmental grants may be subverted. The available research suggests that higher concentrations of student needs, such as poverty, are sometimes associated with higher levels of per-pupil spending, at least when all sources of revenue are jointly analyzed (total expenditures). Significant positive relationships between *total* expenditures and student poverty are common while significant negative relationships are not. The results are more mixed for *instructional*

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. 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 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.

expenditures, but several studies also find higher instructional spending in higher poverty schools, for example, Schwartz, 1999; Rubenstein, et. al, 2007.

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. 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 less experienced and less educated and, thus, lower paid. This finding has been replicated across many years and a wide variety of districts (see, for example, Owen, 1972; Summers and Wolfe, 1976. Ginsburg, et al., 1981; Stiefel, Rubenstein and Berne, 1998; Roza and Hill, 2004; Rubenstein, et. al, 2007). This pattern, though, is not based on research suggesting that students with special needs benefit from having more teachers but with lower qualifications, nor is it the result of allocation formulae explicitly designed to achieve such a distribution. Instead, as discussed further below, it is the *de facto* result of allocation formulae that distribute primarily teacher positions rather than dollars to schools combined with teacher sorting across schools.

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. Work by Iatarola and Stiefel (2003) and by Rubenstein, Stiefel and Schwartz (2007) has found, similar to other large cities, 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, with similar results for schools with higher proportions of non-white students in both elementary and middle schools. 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.

In sum, we are able to draw several conclusions from the existing research base on school-level resource disparities in large districts. 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 an intentional targeting of “quantity vs. quality” resources to lower-need schools. Instead, these resource disparities are frequently the result of intra-district funding formulae 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.

B. Current Intradistrict Allocation Mechanisms

Relatively little attention has been paid in the literature to the mechanics of intra-district resource allocation. Within-district allocation formulae typically differ from across-district formulae in several important respects. First, the formulae 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. Intra-district formulae are often produced within school district bureaucracies and are subject to little publicity or public debate. Second, state allocation formulae 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 formulae). Because all schools within a district are supported by the same tax base, intra-district formulae do not distribute resources to offset wealth or income differentials across school communities. Third, state funding formulae most commonly focus exclusively on the distribution of dollars across districts, while intra-district formulae may distribute a combination of dollars, personnel positions and other resources.⁴

Though each district develops its own methods for allocating resources to schools, typical systems often share a number of commonalities (See Miller and Rubenstein, 2007; Iatarola?). Most schools do not receive lump sum budgets with which to purchase a mix of resources, but instead receive teacher position allocations, based largely on each school's enrollments and district class size requirements. Thus, for example, a school with 100 first graders and a first grade maximum class size of 20 would receive five teacher positions⁵. Most teachers filling these positions are likely to already be working at the school, and the district pays these teachers' salaries and benefits based on each teacher's place on the negotiated salary schedule. Other resources may flow to the school through flat "overhead" allocations for administration and building services, through specialized formulae targeting students with special needs (e.g., students with limited English proficiency and those eligible for free lunch), school characteristics (for example, new schools or schools not making Adequate Yearly Progress under the No Child Left Behind law), or specific school services or programs (for example, art, guidance services,

⁴ 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 first to 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.

⁵ In practice, teacher allocations may be somewhat more complex, often including 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).

security). Schools may also benefit from resources budgeted at the district level but providing services directly in schools, such as itinerant teachers working in a number of schools (Miller, Roza and Swartz, 2005). Roza and Swartz (2007) suggest that resources reported in typical school budgets may account for only 54-62 percent of a district's total budget.

Several issues are worth noting here. First, when schools receive positions rather than budgets to hire teachers, 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. To the extent that more senior teachers receive preference for openings in schools perceived as being easier educational environments, position-based budgeting helps to promote the concentration of more senior teachers in schools where the needs may be lower because schools are not required to fit total salaries within a defined budget constraint. Similarly, higher staff turnover in lower-performing schools adds to the concentration of the newest teachers in those schools, but the lower salaries these teachers earn do not necessarily provide additional resources for the school. Second, schools with higher proportions of students with physical and learning disabilities often receive more positions per student than other schools, owing to smaller class sizes or higher use of para-professionals in special education. Third, while base resources may or may not be explicitly distributed in relation to other socio-economic characteristics of students, other funds, such as federal Title I funds, typically are.

While the research described above has documented resource disparities across schools within New York City, previous research has not examined differences in the allocation of resources by source within the district. Funding for schools in New York City combines allocations from numerous sources, including federal Title I funds, state operating aid, state

categorical aid and locally-raised revenue. Understanding the interactions between these funding sources is important to better understand the factors that lead to inequitable resource distributions and to design policies aimed at reducing these disparities. This analysis is also useful for thinking about the potential effects of the Fair Student Funding initiative, which will initially focus only on a portion of total funding (primarily tax levy and state operating aid).

III. Evidence on New York City

In this section we add to the previous research by examining the distribution of funding by source in New York City. Additionally, we analyze distribution patterns for multiple years to assess how these patterns may be changing over time.

A. Data and Methods

Our dataset includes elementary and middle schools in New York City from school years 2000-01 to 2003-04. The New York City Department of Education (DOE) produces Annual School Reports (ASR), supplying information on student performance and demographics, teacher characteristics, and school and grade-level enrollment, and School Based Expenditure Reports (SBER), providing information on expenditures and sources of funds. We combine these datasets to match each school in the ASR with school finance data from the SBER.

We measure total spending as spending per general education pupil, excluding full-time special education spending and pupils.⁶ Importantly for the goals in this paper, we construct a set of variables representing sources of funding for general education programs per general education pupil, including spending from Tax Levy and State Operating Aid, Title 1, and all others sources. An appendix contains additional details on data definitions.

⁶ Part-time special education pupils, who spend most of their school day in general education classrooms but receive "pull-out" services such as resource room or consultant teacher, are included in these enrollment and expenditure figures. In 2001, the DOE stopped reporting separate spending figures for PTSE pupils.

Elementary schools are defined as those that have 4th grade pupils enrolled in the year examined while middle schools are those that have 8th grade pupils enrolled. A small number of schools have enrollment in both 4th and 8th grades. These schools are retained and identified for our analysis as both elementary and middle schools. Citywide special education schools, universal pre-K programs, and high schools are excluded.

Our analyses center on a series of models that regress school-level per-pupil funding variables on school-level characteristics. Our base model is specified as:

$$(1) \quad Y_i = B_0 + B_1 \text{Prog}_i + B_2 \text{Socio}_i + B_3 \text{Perf}_i + B_4 \text{Size}_i + B_5 \text{Middle}_i + B_6 \text{Prog}_i * \text{Middle}_i + B_7 \text{Socio}_i * \text{Middle}_i + B_8 \text{Perf}_i * \text{Middle}_i + B_9 \text{Size}_i * \text{Middle}_i + e_i,$$

where i indexes schools, Y is a school level funding measure; Prog is a vector of variables capturing the percentage of students served by programs that impose higher costs on schools such as part-time or full-time special education and English language services; Socio is a vector of variables capturing the socioeconomic characteristics of students that have been associated with higher costs at the district level, such as the percentage of students who are poor, and the percentage of students who are recent immigrants; Perf is a vector of test scores (4th or 8th grade reading test scores)⁷ that could imply more resources for lower performing schools⁸; Size is a vector of variables representing school size and capturing the impact of returns to scale (enrollment, indicators for ‘small,’ ‘medium,’ and ‘large’ schools⁹); Middle is a dichotomous

⁷ We define a school as ‘elementary’ based on the presence of a fourth grade; middle schools are defined by the presence of an eighth grade. New York State administered statewide tests in fourth and eighth grades in these years.

⁸ For example, low performing schools in New York identified as Schools Under Registration Review are eligible for state funding.

⁹ We define small school as having fewer than 500 students, medium sized schools as having 500 to 1,000 students and large schools as having more than 1,000 students. These variables are included as a straightforward method to

variable indicating that a school is a middle school; B_7 through B_9 are coefficients on interactions between the middle school variable and the other school characteristics; and e_i is an error term with the usual properties.

Table 1 presents descriptive statistics on the variables included in our analyses. In the 2003-04 school year, New York City's 911 elementary and middle schools educated 718,589 students. Of these schools, 33 percent had an eighth grade and 75% had a fourth grade.. The average school enrolled 789 students and spent \$11,441 per general education and part-time special education pupil.¹⁰ Of the \$11,441 spent per pupil, \$9,082 (71.0 percent) came from local tax levy and state operating funds, \$791 (6.2 percent) from Title 1, with the remaining \$1,567 coming from other sources (see Appendix for details).

On average, 7.4 percent of students enrolled in our sample schools performed at the lowest level on New York State 4th grade reading exams and 9.1 percent on 8th grade reading exams. The average poverty rate in our sample schools, as measured by the percentage of students eligible for free lunch, is 72.3 percent. The average racial breakdown of students in the schools in our sample is 34.5 percent black, 38.4 percent Hispanic, 15.1 percent white, and 12.0 percent Asian. Almost 7 percent of students receive part-time special education (or resource room) services, while 6.0 percent are in full-time special education and 12.5 percent have limited English proficiency. Over half of schools enroll between 500 and 1,000 students, which we define as a “medium-sized” school.

B. Cross-Sectional Analysis of Funding Patterns

Table 2 presents correlates of per-pupil expenditures by school for elementary and middle schools in the 2003-2004 school year. The first column lists numerous factors expected to be

capture non-linearities in the allocation of resources in which schools receive base allocations related to enrollment ranges.

¹⁰ Inclusion of full-time special education students and spending increases average spending to \$12,783 per pupil.

related to school spending. Some of these, for example, the percentage of students receiving special education, resource room and language services, and students from low-income families (indicated by free lunch eligibility) are student needs that are often explicitly included in funding formulae and that require higher levels of funding. School-level factors, such as size (measured by school enrollment) and grade level (elementary or middle), may also affect average per-pupil spending. We include interactions between an indicator variable for middle schools and the other variables, to assess whether distribution patterns differ between middle schools and elementary schools.

Each column represents a different funding source or combination of sources for the New York City schools. Column 1 includes funding from all sources for general education and part-time special education students. Column 2 includes only tax levy and state operating aid for general education and part-time special education students. These are the basic state and local funding sources for general school and district operations and thus comprise the largest share of the total funding from column 2.¹¹ Column 3 displays federal Title I funding, which is explicitly intended to be targeted to schools serving high concentrations of students from low-income families. Column 4 examines other funding sources, which include a variety of state and federal categorical programs. The per pupil funding amounts in columns 2, 3, and 4 add up to per pupil funding in column 1.

Examining total funding column 1 we see that several of the student need factors most commonly included in funding formulae – full-time and part-time special education eligibility, limited English proficiency, free lunch eligibility – do, in fact, generate higher levels of per-pupil funding. A one-percentage point increase in the percentage of students receiving resource room (part-time special education) services, for example, is related to higher total funding per pupil of

¹¹ The New York City data do not permit us to disaggregate local tax levy funds from state operating aid.

\$89. Additionally, schools with higher percentages of low-performing 4th grade students also receive higher per-pupil funding while those with more recent immigrants receive lower per-pupil funding. The analysis also uncovers some evidence of economies of scale as schools with larger enrollments have lower per-pupil funding, and medium-sized schools have lower funding than do small schools, though we do not find lower spending when schools cross into the “large” category. Middle schools, by and large, are allocated funding on the same basis as elementary schools as evidenced by the statistically insignificant coefficients that capture the differences between middle schools and elementary schools (variables that interact with a middle school dummy variable). The exceptions are factors for special education students and medium sized schools, for which middle schools receive more funding than elementary schools. Note that these factors explain approximately 42 percent of the cross-school variation in total spending.

In column 2 we turn to tax levy and state operating funds. While many of the relationships are similar to those in column 1 (for example, a positive association between funding and low-performing students), we do find some differences. First, while there was a positive relationship between free lunch eligibility and total funding in the previous two analyses, we find a negative relationship for tax levy and state operating aid, indicating that schools with higher percentages of students from poverty receive *lower* per-pupil funding from these sources. Second, while the factors included in the total funding model explain 42 percent of the variation in total funding, they explain only 33 percent of the variation in tax levy and state operating aid funds. This is a surprising result; our models include most of the common observable school and student factors typically associated with variations in spending, yet they explain only one-third of the variation in this funding source.¹² This pattern suggests that most

¹² Other models with additional variables, such as student racial characteristics, did not increase the explanatory power.

tax levy and state operating funds are distributed in relation to less-easily observed factors and are more difficult to explain using the available data.

Column 3 examines Title I funding and, as expected, we find a positive relationship between funding and poverty, and a positive relationship between funding and low student performance at both 4th and 8th grades. The positive relationship with poverty is smaller for the middle schools than for elementary schools. The variables explain a large share of the funding differences (65 percent), though only poverty and student performance have significant relationships.

Finally, in column 4 we examine other funding sources and again find higher funding in schools with more students receiving part-time special education services, students with limited English proficiency, and low-performing students, and middle schools with more full-time special education students. We also see a positive relationship between funding and student poverty for elementary schools but less so for middle schools. Surprisingly, there is a strong negative relationship between other funding sources and the percentage of recent immigrants at the elementary school level, but a positive relationship at the middle school level. The equations explain just over half of the variation in these other funding sources.

Taken together, the four equations present some interesting patterns. Total funding appears to be distributed in a manner consistent with policy goals: schools with higher percentages of students with special needs such as learning or physical disabilities, language needs and lower-performance receive higher per-pupil funding, in total and from specific funding sources. The relationship with poverty is more complex and potentially more troubling. While schools with higher poverty receive higher funding from Title I and other sources, this higher funding is partially offset by significantly lower funding from tax levy and state operating

aid. Moreover, the allocation of total resources and, especially, general operating aid, appears to be largely unexplained by the school characteristics included in our models.

C. Changes in Funding Patterns over Time

Changing school demographics, along with revised funding formulae, are likely to alter the level and composition of funding each school receives. The previous discussions examine correlates of funding in individual years, but funding adjustments in relation to changes in student and school characteristics can shed important light on how well allocations respond to the changing circumstances of schools. In table 3 we present models similar to those above using pooled data for 2001 and 2004. The equations include school fixed effects to control for all unobserved, time-invariant school characteristics (for example, location, or static school demographics). The regression coefficients therefore express the relationship between changes in funding between the two years and changes in values of the independent variables. If allocations are responsive to changing school characteristics, many coefficients should be statistically and substantively significant.

In general we find weaker relationships than in the cross-sectional models, suggesting that funding patterns are not highly responsive to observable changes in school and student characteristics. The strongest relationships are for resource room, in which increases in the percentage of resource room students are strongly related to increases in funding from general (but not categorical) sources. There is also some evidence of increases in other categorical funding for increases in the proportion of students with limited English proficiency (column 4) for elementary but not middle schools, and of Title I funding increases (column 3) as the percentage of free lunch eligible students increases. Interestingly, increases in low-performing students are associated with lower total Title I funding in eighth grade, though there are no

significant differences when special education students are excluded from the analysis. Finally, enrollment has a significant negative relationship with funding from all sources, suggesting that as school enrollments fall, per-pupil funding (not simply total funding) also declines. The decrease is smaller in middle schools, however.

It is well known in studies of public budgeting that the best predictor of funding levels in a given year is the funding level in the previous year and there is considerable skepticism that any funding formula changes can effectively re-allocate resources given the inertia typically found in resource allocation decisions. With that in mind, we now examine the extent to which current year funding reflects previous year funding and how changes in students and schools affect funding. Table 4 examines this question by including per pupil funding in 2003 as a dependent variable explaining per pupil funding in 2004. The coefficient on the lagged spending variable indicates the percentage of each dollar of funding in 2004 explained by funding in 2003, holding other factors constant. Not surprisingly, previous funding is a strong predictor; one-dollar of funding last year is associated with 84 cents of spending this year, a quite large relationship. The relationships for Title I and other funding are similarly high (though Title I is only 56 cents). For tax levy and general operating aid, however, one dollar of funding in 2003 is associated only with 34 cents of spending in 2004, suggesting a much larger degree of variability in the distribution of these funds from year to year. Note, also, that the explanatory power of these models is considerably higher than the previous cross-sectional analyses that did not include prior year spending, ranging from 70 to 75 percent.

We also find some interesting differences in the coefficients as compared to the previous analyses. Notably, the percentage of students from poverty is related to *higher* elementary spending from tax levy and state operating funds once we control for spending in the previous

year. This result suggests that while prior funding may be strongly negatively related to free-lunch eligibility, new funds are distributed more heavily to schools with high poverty. The magnitude of the increase is smaller and the relationship is negative with overall funding for middle schools, however, suggesting, again, that general aid is sometimes distributed in inverse relation to poverty. In contrast to the earlier results, higher percentages of students in special education are related to lower overall funding in elementary grades (column 1), as well as higher tax levy and state operating aid for all schools (column 2). As in the earlier results, resource room students are related to higher total spending (column 1).

While the previous analyses found that poverty and, to some extent, student performance had the strongest relationships with Title I funding, we find different patterns when we control for prior year spending. While low student performance remains positively associated with Title I funding in both elementary and middle schools, a number of other factors also appear positively related: limited English proficiency, and special education and immigrant status in the middle schools, though not in elementary schools. These relationships suggest that, once we account for Title I funding from the previous year, student needs other than poverty and performance are related to the level of per-pupil Title I funding schools receive.

IV. Conclusions and Discussion

The analyses presented above help to shed light on the dynamics of resource allocation within a big-city school district. While most previous research has examined the distribution of funding from states to school districts, the present study examines the allocation of resources within school districts to individual schools. It also adds to previous literature on intra-district resource allocation by examining how interactions between multiple funding sources affect

resources at the school level, and by examining how responsive allocations are to changes in school circumstances.

Several findings from these analyses are particularly relevant for policymaking. First, while per-pupil funding is related to the factors included in school funding formulae and articulated as policy objectives, the relationships between observable school characteristics, particularly student needs, are not as strong as one might expect. The regression analyses indicate that a good deal of the variation in spending across schools is not explained by variation in the factors that might be expected to generate differences. This pattern is most pronounced for tax levy and operating funds, which have particularly low R squares.

Second, funding does not respond crisply to changes in characteristics of schools, even over a three year period (2001 – 2004). In fact, previous year funding levels account for a large share of current year funding. Put differently, a good deal of “inertia” is apparent in funding, with sluggish responses to changes in school needs. Given that a large share of school resources fund teacher salaries and benefits, and that teachers, particularly in low poverty and higher performing schools, are unlikely to exhibit much movement from year to year, this pattern may be expected.

It is common for school districts facing lost state education funding to be “held harmless” from the effects of revised funding formulae or the effects of changing demographics such as shrinking student populations (see for example, Waters, et. al, 1997; Hoxby, 2001). Such “off-formula” funding can leave large allocations unexplained by observable school characteristics, as in our cross-sectional models. Little is known about the effects of hold harmless provisions within school districts, but our results suggest that “off-formula” funding may be an important part of each school’s resource envelope. Indeed, hold harmless provisions may become

increasingly important when they are used in the implementation of intra-district funding reforms (see, for example, New York City Department of Education, 2008). While hold harmless provisions may serve a critical function in cushioning schools from sudden dramatic changes in funding levels in the short term, they can also undermine the equity and efficiency goals of the reform if they become entrenched either officially or on a *de facto* basis.

Third, the relationship between funding and the percentage of the students who are poor (based upon their free lunch eligibility) is noteworthy. While per-pupil Title I funding is larger in schools with higher percentages of students receiving free lunch, this is not also true for operating and tax levy funds for elementary schools. Although a negative relationship suggests that Title I allocations do not meet the comparability requirement of Title I, which requires that state and local funds must be comparable in Title I and non-Title I schools, other sources of funding appear to counter the negative relationship in operating and tax levy funds.¹³

Finally, the analyses in this paper provide a benchmark against which to evaluate future changes in funding formulae. Funding reforms have often been proposed in times of increasing budgetary resources, with formula changes focusing on new, rather than existing, resources. In times of cutback budgeting, though, cuts may be applied selectively, with less emphasis on maintaining existing funding patterns (Berne and Stiefel, 1993). While a fiscal downturn raises the likelihood of flat or reduced spending levels overall, it may also increase the probability that the allocation of resources to individual schools will more closely align with school needs rather than historical precedents. If reforms succeed in achieving the articulated objectives, we should expect higher R-squares in regression analyses of expenditures, indicating less “unexplained” variation in spending across schools; we should also expect stronger and more consistently

¹³ Note that Title I regulations allow districts to use district average teacher rather than actual teacher salaries at the school-level in meeting the comparability requirement (Roza and Hill, 2004; Liu, 2007).

positive relationships between spending and the representation of students from poverty or those with special needs. Ultimately, though, these results suggest that marginal changes in resource allocation formulae or those that focus only on new or limited resources are unlikely to substantially change existing resource allocation patterns. Moreover, in an era of increasingly constrained resources, it may not be possible to implement funding reforms that focus only on “new” money. Indeed, funding cuts may become more the norm than funding increases.

Table 1: New York City Public Schools., Means of Selected Variables, 2003-04

	N	Mean	Std. Dev.	Minimum	Maximum
Total Spending per Pupil	911	11,441.39	1,832.19	3,190.99	22,160.42
Tax levy and state operating	911	9,082.86	1,466.48	2,872.84	19,994.35
Title I only	911	791.68	482.58	12.35	3,101.04
Other sources	911	1,566.85	559.95	291.46	3,706.73
Average full-time teacher salary	909	52,188.64	4,618.77	28,703.15	67,876.80
Pct teachers fully licensed	907	98.23	2.77	75.00	100.00
Pct teachers with Master's or higher	907	79.24	10.18	37.50	100.00
Pupil-Teacher Ratio	909	14.08	2.28	7.04	24.52
Pct Resource Room	911	6.93	3.13	0.00	24.80
Pct Special Ed	911	6.04	4.69	0.00	31.67
Pct LEP	911	12.52	10.59	0.00	92.30
Pct Free Lunch Eligible	911	72.30	24.11	0.00	100.00
Pct Recent Immigrant	911	8.09	5.95	0.00	91.80
Pct Black	911	34.45	30.18	0.00	96.80
Pct Hispanic	911	38.42	26.27	2.30	98.50
Pct Asian or Other	911	12.02	16.36	0.00	92.60
Pct White	911	15.11	22.17	0.00	92.40
Pct Level 1, 4th Grade Reading	681	7.39	6.10	0.00	34.80
Pct Level 1, 8th Grade Reading	300	9.05	7.44	0.00	35.00
Enrollment	911	788.79	365.67	120.00	2,262.00
Fewer than 500 Students	911	0.21	0.40	0.00	1.00
500-1000 Students	911	0.54	0.50	0.00	1.00
Over 1000 Students	911	0.25	0.44	0.00	1.00
Has 4 th Grade Enrollment	911	0.75	0.43	0.00	1.00
Has 8 th Grade Enrollment	911	0.33	0.47	0.00	1.00

Table 2: School Spending Regressions, New York City Elementary and Middle Schools, 2003-04

	(1) Total	(2) Tax Levy + St Operating	(3) Title I Only	(4) Other Sources
Pct Resource Room	89.32*** (21.19)	65.50*** (18.29)	-3.43 (4.37)	27.25*** (5.92)
Middle_Pct Res Room	-22.90 (34.50)	-19.01 (29.78)	11.13 (7.11)	-15.03 (9.64)
Pct Special Education	16.09 (14.84)	9.16 (12.81)	4.21 (3.06)	2.72 (4.15)
Middle_Pct Special Ed	102.91*** (29.59)	72.94*** (25.54)	10.58* (6.10)	19.39** (8.27)
Pct LEP	22.14*** (6.68)	5.65 (5.76)	-1.77 (1.38)	18.26*** (1.87)
Middle_Pct LEP	-23.82 (17.08)	-22.21 (14.75)	3.66 (3.52)	-5.27 (4.77)
Pct Free Lunch Eligible	15.36*** (2.78)	-6.39*** (2.40)	15.28*** (0.57)	6.47*** (0.78)
Middle_Pct Fr Lnch Elig	-4.78 (5.65)	4.20 (4.88)	-4.09*** (1.16)	-4.89*** (1.58)
Pct Recent Immigrant	-27.77** (13.22)	-10.88 (11.41)	1.66 (2.72)	-18.55*** (3.69)
Middle_Pct Recent Imm	62.58** (24.27)	31.09 (20.95)	5.41 (5.00)	26.08*** (6.78)
Pct Level 1, 4th Grd Read	38.79*** (11.38)	21.36** (9.82)	5.89** (2.34)	11.54*** (3.18)
Pct Level 1, 8th Grd Read	2.45 (14.93)	-18.34 (12.89)	11.30*** (3.08)	9.49** (4.17)
Enrollment	-2.90*** (0.39)	-2.37*** (0.34)	-0.02 (0.08)	-0.52*** (0.11)
Middle_Enrollment	1.24** (0.59)	1.00** (0.51)	-0.00 (0.12)	0.25 (0.16)
Medium-Sized School	-708.80*** (186.58)	-559.81*** (161.06)	-53.25 (38.44)	-95.75* (52.14)
Middle_Medium-Sized	868.08** (377.76)	796.38** (326.09)	-109.65 (77.83)	181.35* (105.57)
Large Sized-Schools	-62.39 (374.10)	22.88 (322.94)	-84.27 (77.08)	-1.00 (104.55)
Middle_Large-Sized	-229.66 (638.51)	-124.15 (551.18)	-104.60 (131.56)	-0.91 (178.44)
Middle School	301.52 (197.82)	442.29*** (170.76)	-46.45 (40.76)	-94.32* (55.28)
Constant	10,003.88*** (480.95)	9,373.36*** (415.18)	-210.65** (99.10)	841.17*** (134.41)
Observations	911	911	911	911
R-squared	0.42	0.33	0.65	0.52

Notes: i) Standard errors in parentheses. ii) * significant at 10%; ** significant at 5%; *** significant at 1%. iii) Small schools is the omitted size category. Elementary is the omitted grade category.

Table 3: School Spending Regressions, NYC Elementary and Middle Schools, 2001 and 2004, Pooled

	(1)	(2)	(3)	(4)
	Total	Tax Levy + St Operating	Title I Only	Other Sources
Pct Resource Room	56.42*** (17.54)	45.23*** (15.29)	0.55 (4.96)	10.64 (7.27)
Middle_Pct Res Room	51.51 (36.71)	57.37* (32.00)	1.53 (10.39)	-7.39 (15.21)
Pct Special Education	-10.85 (15.06)	-4.36 (13.13)	1.39 (4.26)	-7.88 (6.24)
Middle_Pct Special Ed	-1.49 (33.52)	-41.35 (29.22)	21.28** (9.48)	18.58 (13.88)
Pct LEP	23.55* (12.73)	-4.30 (11.10)	2.34 (3.60)	25.51*** (5.27)
Middle_Pct LEP	-11.04 (29.43)	20.04 (25.65)	-2.41 (8.33)	-28.68** (12.19)
Pct Free Lunch Eligible	4.13 (5.50)	-1.13 (4.79)	4.21*** (1.56)	1.05 (2.28)
Middle_Pct Fr Lnch Elig	10.28 (9.37)	11.96 (8.17)	0.37 (2.65)	-2.05 (3.88)
Pct Recent Immigrant	-20.59 (20.65)	-14.90 (18.00)	-0.72 (5.84)	-4.97 (8.55)
Middle_Pct Recent Imm	-29.96 (42.84)	-79.56** (37.34)	23.33* (12.12)	26.27 (17.74)
Pct Lvl 1, 4th Grd Read	-3.96 (5.34)	-3.81 (4.65)	-2.15 (1.51)	1.99 (2.21)
Pct Lvl 1, 8th Grd Read	-7.33 (6.27)	-5.05 (5.47)	-3.52** (1.77)	1.24 (2.60)
Enrollment	-4.95*** (0.48)	-2.84*** (0.42)	-0.56*** (0.14)	-1.55*** (0.20)
Middle_Enrollment	2.08*** (0.76)	0.79 (0.66)	0.39* (0.21)	0.90*** (0.31)
Medium-Sized School	-336.33** (166.86)	-258.37* (145.45)	-46.33 (47.20)	-31.63 (69.11)
Middle_Medium-Sized	-2,141.60*** (486.07)	-1,552.32*** (423.69)	-239.29* (137.50)	-349.99* (201.33)
Large Sized-Schools	-15.22 (265.51)	88.66 (231.44)	-49.73 (75.11)	-54.15 (109.97)
Middle_Large-Sized	-2,544.54*** (655.28)	-2,074.85*** (571.18)	-168.62 (185.37)	-301.06 (271.41)
Middle School	353.45 (341.97)	-21.07 (298.09)	106.16 (96.74)	268.36* (141.64)
Constant	12,088.87*** (989.71)	10,137.32*** (862.69)	374.37 (279.98)	1,577.18*** (409.93)
Observations	1783	1783	1783	1783
R-squared	0.94	0.93	0.89	0.87
School and Year FE	Yes	Yes	Yes	Yes

Notes: i) Standard errors in parentheses. ii) * significant at 10%; ** significant at 5%; *** significant at 1%. iii) Small schools is the omitted size category. Elementary is the omitted grade category. iv) Expenditures measured in 2004 dollars.

Table 4: School Spending Regressions, NYC Elementary and Middle Schools, 2003-04, Lagged Spending

	(1)	(2)	(3)	(4)
	Total	Tax Levy + St Operating	Title I Only	Other Sources
Lagged Dependent Var	0.84*** (0.03)	0.34*** (0.03)	0.56*** (0.02)	0.77*** (0.02)
Pct Resource Room	34.09*** (11.75)	-7.91** (3.98)	5.06 (4.66)	22.73 (13.97)
Middle_Pct Res Room	0.08 (19.28)	12.43* (6.54)	7.60 (7.60)	27.30 (22.80)
Pct Special Education	-29.21*** (8.23)	6.19** (2.77)	1.30 (3.19)	-17.11* (9.69)
Middle_Pct Special Ed	27.46* (16.56)	6.27 (5.59)	15.96** (6.45)	48.22** (19.57)
Pct LEP	-7.03* (3.69)	0.09 (1.25)	9.36*** (1.49)	2.19 (4.38)
Middle_Pct LEP	8.79 (9.50)	2.59 (3.21)	-0.83 (3.70)	8.45 (11.21)
Pct Free Lunch Eligible	-1.56 (1.55)	10.02*** (0.69)	1.01 (0.64)	0.19 (1.88)
Middle_Pct Fr Lnch Elig	-9.04*** (3.21)	-2.73** (1.09)	-1.07 (1.27)	-9.82*** (3.79)
Pct Recent Immigrant	5.29 (7.29)	-0.03 (2.47)	-6.59** (2.89)	-0.43 (8.63)
Middle_Pct Recent Imm	2.13 (13.43)	4.53 (4.54)	11.51** (5.28)	16.20 (15.90)
Pct Lvl 1, 4th Grd Read	22.09*** (6.26)	4.12* (2.13)	9.66*** (2.45)	34.05*** (7.40)
Pct Lvl 1, 8th Grd Read	4.52 (8.29)	10.14*** (2.81)	6.96** (3.24)	19.13* (9.78)
Enrollment	-0.96*** (0.22)	0.03 (0.07)	-0.08 (0.09)	-0.89*** (0.26)
Middle_Enrollment	0.42 (0.32)	-0.00 (0.11)	-0.04 (0.13)	0.32 (0.38)
Medium-Sized School	-100.51 (103.88)	-51.01 (34.98)	-40.33 (40.44)	-194.57 (122.70)
Middle_Medium-Sized	297.20 (213.50)	-192.96*** (72.22)	128.01 (83.37)	239.34 (252.19)
Large Sized-Schools	154.84 (205.71)	-101.55 (69.79)	-42.10 (80.55)	-5.10 (243.06)
Middle_Large-Sized	-200.77 (355.39)	-164.93 (120.59)	110.25 (139.24)	-222.54 (419.98)
Middle School	8.30 (110.75)	-32.18 (37.37)	-72.10* (43.13)	-57.57 (130.53)
Constant	2,987.74*** (336.40)	-44.55 (93.36)	191.56* (110.10)	3,559.40*** (379.26)
Observations	894	894	894	894
R-squared	0.71	0.70	0.71	0.75

Notes: i) Standard errors in parentheses. ii) * significant at 10%; ** significant at 5%; *** significant at 1%. iii) Small school is the omitted size category. Elementary is the omitted grade category. iv) Expenditures measured in 2004 dollars.

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Appendix A: Variable definitions

Elementary School: A dichotomous variable that takes a value of 1 if 4th grade enrollment in the current year is greater than 0.

Middle School: A dichotomous variable that takes a value of 1 if 8th grade enrollment in the current year is greater than 0.

Total Expenditures Per Pupil: Total direct and allocated spending per pupil (general education, part-time and full-time special education), including classroom instruction and school administration, district and superintendency costs, and allocations of systemwide obligations.

Total Expenditures Per General Education Pupil: Total direct and allocated spending on general education programs per general education pupil (including part-time special education pupils), including classroom instruction and school administration, district and superintendency costs, and allocations of systemwide obligations.

Tax Levy and State Operating Aid Per General Education Pupil: Total direct and allocated spending on general education programs from local tax levy and state operating aid sources per general education pupil, including classroom instruction and school administration, district and superintendency costs, and allocations of systemwide obligations.

Title I Aid Per General Education Pupil: Total direct and allocated spending on general education programs from Title I funds per general education pupil, including classroom instruction and school administration, district and superintendency costs, and allocations of systemwide obligations.

Other Aid Per General Education Pupil: Total direct and allocated spending on general education programs from all other sources per general education pupil, including classroom instruction and school administration, district and superintendency costs, and allocations of systemwide obligations.¹⁴

Enrollment: Number of pupils enrolled as of October 31.

Small School: A dichotomous variable that takes a value of 1 if a school has fewer than 500 pupils.

¹⁴ These other aid streams include: Title 2 (includes Early Grade Class Size Reduction: Federal), Vocational and Applied Technology, Title V Part A, State Legislative Grant, Federal Magnet Grant, Teacher Support Aid, Mandated Summer Program (Ch. 683), Private Grants, State Substance Abuse Prevention Program, Title IV Drug Free Schools, State Incentive Grant, Individuals w/ Disabilities Education Act (IDEA), State Reading Program, Federal English-Language Learner, Title III (a.k.a. Federal Bilingual Program, Title 7), Educationally Related Support Service, State Magnet Grant, State Bilingual Program, Attendance Improvement/Dropout Prevention, Employment Preparatory Education Program, State Pre-K/Superstart, Pupils with Compensatory Educational Needs, Early Grade Class Size Reduction: State, Superstart Plus, Federal/State School Lunch, Summer Feeding, Universal Services Fund (Tech) [a.k.a. Title II Pt. D], Disaster Relief (World Trade Center): Federal, Disaster Relief (World Trade Center): State and Other Sources, Capital Projects, and Building Code Maintenance, Other Federal Grants, and Other State Grants.

Medium School: A dichotomous variable that takes a value of 1 if a school has between 500-1000 pupils.

Large School: A dichotomous variable that takes a value of 1 if a school has more than 1000 pupils.

Percent of Pupils Achieving Level 1 in Grade 4 Reading: Percent of pupils achieving Level 1 (of 4, with 4 being highest) on the 4th grade New York State reading exam.

Percent of Pupils Achieving Level 1 in Grade 8 Reading: Percent of pupils achieving Level 1 (of 4, with 4 being highest) on the 8th grade New York State reading exam.

Percent Free Lunch Eligible: Percentage of pupils eligible for free lunch.

Percent Resource Room: Percentage of pupils receiving part-time education services, including resource room and consultant teacher.

Percent Special Education: Percentage of pupils in self-contained special education classrooms.

Percent Immigrant: Percentage of pupils who immigrated to the US within the last three years.

Percent Limited English Proficient: Before 2002-03, percentage of pupils who score below 40% on the Language Assessment Battery; in 2002-03 and after, percentage of pupils who perform below Proficient on the New York State English as a Second Language Achievement Test (NYSESLAT).