

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

In the spring of 2007, the New York City Department of Education announced an ambitious plan to change the way it distributes resources across its more than 1,400 schools. The plan, known as the “Fair Student Funding” initiative, is intended to change funding methods in two ways: first, by allocating money based upon characteristics of the student body that capture differences in the cost of providing appropriate educational services; second, by allocating dollars rather than specific resources, primarily teacher positions, and allowing principals greater discretion in the deployment of those resources. The overarching goal is to improve equity, particularly vertical equity, in the distribution of resources and, ultimately, to improve the efficiency of how resources are used to promote student performance. These reforms will be implemented gradually. For 2007-2008, the new formulae will only be used to distribute a portion of newly available funds, and substantial hold-harmless provisions significantly limit the impact on overall funding.

Given this dramatic policy change, it is a particularly good time to examine the current distribution of resources across schools in New York City and to consider what we know about the intradistrict allocation of resources. The purpose is two fold. First, we hope to provide a context for understanding funding reform, both through empirical analyses of funding in New York City and by drawing on the lessons from previous reforms and research. Second, we hope to provide benchmarks against which we can assess the impact of Fair Student Funding in the future, as it is implemented. Before doing so, however, we consider why – and how – the intradistrict allocation of resources matters. We then review previous evidence on the distribution of school resources in New York City and elsewhere, including typical allocation

methods and reform proposals. 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. Why is Intradistrict Resource Allocation Important?

Research examining the distribution of resources across schools, rather than districts, dates back over thirty years. In this time, however, relatively little research has focused on the processes and patterns of resource allocation across schools within districts due, in part, to the primacy of districts in funding K-12 education and to the scarcity of school-level data on resources. At the same time, school district consolidations have led to larger and larger school districts and an increasing share of the country's students attending schools in large districts. New York City, with almost 1.1 million students attending over 1,400 schools, is an extreme example. 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,<sup>1</sup> 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, driven, perhaps, by differences in students, teachers, or politics. Further, there is some concern that the within-district variation is perverse, for example, allocating more of some resources, such as more experienced or educated teachers, to schools with fewer poor children, fewer minority children or fewer immigrants. Understanding the allocation of resources to schools is important for two reasons. First, to the extent that education is, in fact, produced by

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<sup>1</sup> 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.

*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 also aid in the development of school finance policies that provide resources more appropriately targeted to schools in which students are having trouble reaching performance targets.

Examining educational spending at the school level takes on particular significance in the wake of the many court rulings, including the *CFE v. New York State* decision, addressing the adequacy of education funding. Implementation of court-mandated remedies in these cases has largely focused on how these additional resources will be distributed across districts within states rather than across schools within the large urban districts present in so many states. Ignoring the intradistrict distribution of resources may, however, limit the success of these court decisions in improving the adequacy of educational opportunities for students in impoverished schools. Focusing on total or average resources at the district level implicitly assumes that the average resources reach all schools more or less evenly within a district, which is frequently untrue in practice.

Notice, however, that the mere presence of disparities may not be problematic. Instead, the critical question for policymaking is how and whether resources vary with the needs of the students or reflects legitimate political or educational purposes. Research using a variety of methods has demonstrated that students with different characteristics may require differing levels of resources to meet performance goals. In particular, poor, disabled, and English language learning students require more resources (cost more) to educate, although exactly how much

more is not agreed upon (see, for example, Duncombe and Yinger, [2000]; Chambers, et. al., [2004], Picus, Odden and Fermanich, [2003]). At the same time, differences in the resources provided may reflect legitimate differences in the community demand for public services. Understanding whether and how resources *should* vary across schools within a district is important and difficult, requiring a sophisticated understanding of public preferences, cost differentials, the mobility of teachers, students and taxpayers, and the like. Doing so is outside the scope of this paper. Thus, the analyses in this paper are best viewed as descriptive examining whether schools serving students with different levels of need receive different levels of resources and exploring the ways that resources change in response to changes in needs.

### III. 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.

While comparisons of intradistrict and interdistrict disparities are rare, cross-district analyses of school-level disparities sometimes find greater disparities within than between

districts.<sup>2</sup> 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.<sup>3</sup> 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, we may be particularly concerned if intradistrict studies find that schools with the highest concentrations of students with special needs systematically receive fewer or lower quality resources. The available research suggests that higher concentrations of student needs, such as poverty, are sometimes associated with higher levels of per-pupil spending. Our review of previous research finds that significant positive relationships between *total* expenditures and student poverty are common while significant negative relationships are not. The results are more mixed for *instructional* expenditures, but several studies also find higher instructional spending in higher poverty schools for example, Schwartz, 1999; Rubenstein, Stiefel and Schwartz, 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

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<sup>2</sup> 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.

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

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, 2003; Rubenstein, Stiefel and Schwartz, 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 formulas explicitly designed to achieve such a distribution. Instead, as discussed further below, it is the *de facto* result of allocation formulas that distribute primarily teacher positions rather than dollars to schools combined with teacher sorting across schools.

California's class size reduction program of the late 1990s provides an opportunity to directly observe potential trade-offs between teacher quantity and teacher characteristics. Following a state-funded class size reduction effort in grades K-3, the gap between schools serving the highest and lowest proportions of low-income students with respect to the percentage of K-3 teachers who were fully credentialed increased from two percentage points to 17 percentage points. Similar, though less dramatic widening of gaps occurred in the percentage of novice teachers, those with only a bachelor's degree, and at other grade levels (Reichardt, 2000). Note that these analyses are the result of teacher movement both within and across districts. Approximately twice as many teachers moved across districts as compared to those changing schools within a district. While Krueger (2003) estimates that the long-term monetary benefits of class-size reduction are greater than the costs (using effect size estimates from Tennessee's STAR experiment), Harris (2002) argues that these estimates do not consider changes in teacher distribution resulting from large scale class size reduction. He suggests that raising teacher

salaries to improve teacher quality may be a more cost-effective approach to raising student performance.

As the largest district in the nation, and one in which detailed school site resource data has been publicly available since 1995-96, New York City has increasingly become a focus of research on school-level resources. 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, the existing studies on school-level resource disparities in New York City and elsewhere have reached remarkably similar conclusions. First, though evidence directly comparing school-level and district-level disparities is limited, the resource disparities found across schools within districts are often large and, in some cases, may be larger than the more widely-recognized disparities across districts. Second, these disparities are generally perversely related to school and student characteristics; schools with greater student needs often find themselves disadvantaged relative to other schools in the same district, particularly in terms of the quality of teacher resources. Third, these patterns are not caused by an intentional targeting of “quantity vs. quality” resources to lower-need schools. Instead, these resource disparities are frequently the result of intradistrict funding formulas that allocate positions, rather than dollars,



to schools, and teacher sorting patterns that allow higher paid teachers to systematically opt into lower-need schools without financial ramifications for the schools to which they transfer.

## B. Current Intradistrict Allocation Mechanisms

Relatively little attention has been paid in the literature to the mechanics of intradistrict resource allocation. Within-district allocation formulas typically differ from across-district formulas in several important respects. First, the formulas used to distribute funding from states to districts are often well-publicized and are the products of annual budgetary bargaining between state legislatures and governors. Intradistrict formulas are often produced within school district bureaucracies and are subject to little publicity or public debate. Second, state allocation formulas typically distribute resources in inverse relation to district-level ability-to-pay-measures (property wealth and/or income) and often have explicit equity and adequacy goals (see Yinger, 2004, for an overview of issues in the design of state funding formulas). Because all schools within a district are supported by the same tax base, intradistrict formulas do not distribute resources to offset wealth or income differentials across school communities. Third, state funding formulas most commonly focus exclusively on the distribution of dollars across districts, while intradistrict formulas may distribute a combination of dollars, personnel positions and other resources.<sup>4</sup>

Though each district develops its own methods for allocating resources to schools, typical systems – including New York City prior to Fair Student Funding implementation - often share a number of commonalities. 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

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<sup>4</sup> A related issue is that state revenue forecasts and political bargaining determine the education budget constraint available for distribution to school districts. School districts, though, are more likely to first 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.

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 positions<sup>5</sup>. 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 formulas 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, 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 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

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<sup>5</sup> 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).

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.

The consistent intradistrict disparities found around the United States have spurred interest in alternative methods of distributing resources to schools. In particular, an approach known as Weighted Student Funding (WSF) has generated considerable attention. Districts including Edmonton, Cincinnati, Seattle, Oakland, San Francisco, and Houston have implemented versions of the approach (Archer, 2004), while New York City is prepared to embark on WSF reforms under the auspices of its “Fair Student Funding” initiative. Seattle defines three basic principles for its formula (Nielsen, 2005):

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

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

varying intensity, poverty), delivering higher per-pupil funding to schools with higher shares of students with special needs.<sup>6</sup>

Little evidence is currently available, though, on how WSF affects the equity of intradistrict resource distribution or, ultimately, student performance. In one of the few empirical studies examining implementation of WSF, Miles and Roza (2006) compare school-level resources in Houston and Cincinnati before and after the districts moved from a traditional position-based system to a WSF system. They report that both districts drove more resources to schools with greater student needs (as defined in each district's formula), thereby improving vertical equity. They find gains and losses for individual schools averaging approximately \$250 per pupil in both districts, though many schools saw their budgets increase or decrease by substantially larger amounts.

Most weighted student formulas require schools to budget staff at average district salaries, rather than the actual salaries of the school's staff. Differences between actual and average salaries are made up (or kept) by the district. This provision significantly blunts the impact of weighted student funding on equity since, as noted above, average salaries vary significantly across schools and, in particular because average teacher salaries are lowest in schools with the highest proportions of students with special needs. Charging schools for the actual salaries of teachers in the school, rather than average district salaries, may provide greater equity as schools would be forced to make trade-offs between more staff and higher-paid staff. Such plans are likely to be politically controversial as schools with fewer high-need students may lose funding to schools with more high-need students (Committee for Economic Development,

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<sup>6</sup> A separate "Foundation Allocation" provides base funding for school operations.

2004).<sup>7</sup> Equally challenging will be ensuring fair treatment of teachers -- particularly more highly educated and experienced teachers who will ‘cost more’ than inexperienced, novice teachers. These reforms do, however, hold considerable promise for achieving greater equity in the allocation of resources across schools.

### III. Evidence on New York City

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 (tax levy and operating, primarily). 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 Sample

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

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<sup>7</sup> The Houston Independent School District in 2003 abandoned its plans to phase in budgeting for actual salaries in its weighted student formula (Committee for Economic Development, 2004).

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 spending in two ways: total spending per pupil and total spending per general education pupil excluding full-time special education spending and pupils.<sup>8</sup> In addition, 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.

Elementary schools are defined as those that have 4<sup>th</sup> grade pupils enrolled in the year examined while middle schools are those that have 8<sup>th</sup> grade pupils enrolled. A small number of schools have enrollment in both 4<sup>th</sup> and 8<sup>th</sup> 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.

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. The average school enrolled 789 students and spent \$11,441 per general education and part-time special education pupil. 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 4<sup>th</sup> grade reading exams and 9.1 percent on 8<sup>th</sup> grade reading

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<sup>8</sup> Specifically, total spending per pupil includes spending on general and special education programs in the numerator and general and special education pupils in the denominator. General education spending and enrollment numbers include part-time special education students. Part-time special education (PTSE) pupils spend most of their school day in general education classrooms but receive "pull-out" services such as resource room or consultant teacher. In 2001, the DOE stopped reporting separate spending figures for PTSE pupils.

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 1000 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 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 formulas 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 all students, including students receiving full-time special education services. Column 2 removes full-time special education students and their funding from the denominator and numerator respectively. Column 3 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.<sup>9</sup> Column 4 displays federal Title I funding, which is explicitly intended to be targeted to schools serving high concentrations of students from low-income families. Column 5 examines other funding sources, which include a variety of state and federal categorical programs. The per pupil funding in columns 3, 4, and 5 add up to per pupil funding in column 2.

Examining total funding (column 1) we see that the student need factors most commonly included in funding formulas – full-time and part-time special education eligibility, limited English proficiency – 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 \$69. Additionally, schools with higher percentages of free-lunch eligible pupils and more low-performing 4<sup>th</sup> grade students also receive higher 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). The exceptions are factors for recent immigrants and medium sized schools, for which middle schools receive more funding than elementary schools. Note that these factors explain approximately 61 percent of the cross-school variation in total spending.

Column 2 removes full-time special education students and their associated funding from the analysis. We find similar patterns to those in column 1 though, not surprisingly, full-time

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<sup>9</sup> The New York City data do not permit us to disaggregate local tax levy funds from state operating aid.



special education is no longer related to funding. We also find a different pattern in middle schools, with much higher per-pupil funding in middle schools with higher percentages of full-time special education students, and as in column 1, more funding in middle schools for recent immigrants and for medium-sized schools. In general, the magnitude of the funding increases is larger in column 2 than in column 1.

In column 3 we turn to tax levy and state operating funds. While many of the relationships are similar to those in columns 1 and 2 (for example, a positive association between funding and part-time special education 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 61 percent of the variation in total funding, they explain only 33 percent of the variation in tax levy and state operating aid funds (column 2 is also substantially lower than column 1 at 42 percent). 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.<sup>10</sup> This pattern suggests that most 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 4 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 4<sup>th</sup> and 8<sup>th</sup> grades. The positive relationship with poverty is smaller for the

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<sup>10</sup> Other models with additional variables, such as student racial characteristics, did not increase the explanatory power.

middle schools than for elementary schools. As in column 1, the variables explain a relatively large share of the funding differences (65 percent), though only poverty and student performance have significant relationships.

Finally, in column 5 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 five 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.

### C. Changes in Funding Patterns over Time

These funding patterns apply to the 2004 school year, but it is worth examining whether they are consistent across years, and how these relationships might have changed over time. Full tables for 2000-2001, 2001-2002 and 2002-2003 replicating the 2003-2004 models are presented

in the appendix. The basic patterns described previously largely hold in each year – for example the negative relationship between tax levy and state operating with poverty – though the magnitudes differ somewhat. Title I funding in particular exhibits more relationships with factors aside from poverty and student performance in the other years. For example, there is a positive relationship between resource room eligibility and Title I in 2001, positive relationships with middle school special education in each year, a negative relationship with limited English proficiency in 2001 and 2003, and a positive relationship with immigrant status in middle schools for 2002 and elementary schools in 2003.

While low 4<sup>th</sup> grade performance is related to higher funding from all sources in 2004, we find less consistent relationships in the other years, particularly for the tax levy and state operating funds. We do, however, find a strong positive relationship between the percentage of low performing 8<sup>th</sup> graders and funding from all sources except Title I in 2001 and 2002. These patterns suggest that the district may have focused on increasing resources in low performing middle schools in the earlier years and low performing elementary schools in more recent years. Finally, we find inconsistent relationships between medium-sized schools and funding. In 2004 medium sized elementary schools received lower funding from all sources but Title I, while medium sized middle schools received higher funding. We find similar relationships in every year except 2001, when medium sized middle schools received substantially lower funding. It is not clear whether these differences are due to explicit changes in the formula or to other factors. It is also worth noting that in no year do the models explain more than 36 percent of the variation in the distribution of tax levy and state operating aid funds, and that the percentage has declined slightly over the years.

The previous discussions examine correlates of funding in individual years, but changes in funding in relation to changes in student and school characteristics can shed important light on how well allocations respond to 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, unchanging school characteristics (for example, location, or unchanging family characteristics). 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 changes are not highly responsive to 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 general funding for increases in the proportion of students with limited English proficiency (column 2) and of responsive Title I funding as per-pupil Title I funds increase with increases in the percentage of free-lunch eligible students (column 4). Interestingly, increases in low-performing students are associated with lower total per-pupil funding, 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 decline 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 will really be significant, relative to the inertia in resources over time. Given the mixed evidence in Table 3 about funding changes and changes in characteristics of schools, 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. For total spending and for general plus part-time special education funding, one-dollar of funding last year is associated with 77 cents and 84 cents of spending this year respectively, a quite large relationship. The relationship 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 other factors, as compared to the previous analyses. Notably, the percentage of students eligible for free lunch 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 prior funding may be strongly negatively related to free-lunch eligibility, but that new funds are distributed more heavily to schools with high poverty. The magnitude of the increase is smaller for middle schools, however, and the relationship is negative with overall funding for middle schools, 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 (but higher funding in middle schools (columns 1 and 2), as well as higher tax levy and state operating aid for all schools (column 3). As in the earlier results, resource room students are related to higher general spending (column 2).

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 student performance remains positively associated with Title I funding, 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

Four findings are particularly relevant for policymaking:

- 1) In general, per pupil funding is related to the factors included in school funding formulae and articulated as policy objectives, but much less strongly than one might hope. This means that there is lots of room for FSF to improve matters.
- 2) The regressions indicate that a good deal of the variation in spending across schools is not explained by variation in the factors that are “supposed” to generate differences. (The R squares are not high.) This pattern is more profound for tax levy and operating funds. (R squares are particularly low.) If

FSF uses the same factors to distribute funds, then this should improve with FSF.

- 3) Funding does not respond “crisply” to changes in characteristics of schools, even over a three year period (2001 – 2004). In fact, last year’s levels account for quite a lot of this year’s funding. Put differently, there seems to be a good deal of “inertia” in funding with sluggish responses to changes in school needs. FSF could be one way to increase responsiveness.
- 4) The relationship between funding and the percentage of the students who are poor (based upon their free lunch eligibility) is noteworthy. While 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 “supplanting”, other sources of funding counter the negative relationship in operating and tax levy funds. As described thus far, FSF would mean that all funds would be directed more generously to schools with more poor students.

Finally, the analyses in this paper provide a benchmark against which to evaluate changes that FSF bring. If FSF succeeds in achieving the articulated objectives, we should expect higher R-squares in regression analyses of expenditures, indicating that there is less “unexplained” variation in spending across schools; we should also expect stronger and more consistently positive relationship between spending and the representation of poor students; and we should expect funding to respond more quickly to changes in school characteristics. Of course, other changes might emerge. Discussions about FSF formula have considered – as we have here -

differences between middle and elementary schools. At this point, whether, and how large, these differences should be is unclear; it is clear, however, that with FSF the eventual distribution is more likely to reflect specific and intentional policy initiatives.



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

	N	Mean	Std. Dev.	Minimum	Maximum
Total Spending per Pupil : All Students	911	12,783.00	2,459.86	3,462.74	24,593.34
Total Spending per Pupil : GE+PTSE	911	11,441.39	1,832.19	3,190.99	22,160.42
Tax Levy + 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 <sup>th</sup> Grade Enrollment	911	0.75	0.43	0.00	1.00
Has 8 <sup>th</sup> Grade Enrollment	911	0.33	0.47	0.00	1.00

Notes: 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, as shown in Table 1. The average school enrolled 789 students and spent \$11,441 per pupil. Of the \$11,441 spent per pupil, \$9,082 (71.0%) came from local tax levy and state operating funds, \$791 (6.2%) from Title 1, with the remaining \$1,567 coming from other sources (see Appendix for details).

On average, 5.5% of students enrolled in our sample schools performed at the lowest level on State 4<sup>th</sup> grade reading exams and 3.0% on 8<sup>th</sup> grade State reading exams. Average poverty levels in our sample schools, as measured by percent eligible for free lunch, are 72.3%. The average racial breakdown of students in the schools in our sample is 34.5% black, 38.4% Hispanic, 15.1% white, and 12.0% Asian. Almost 7% of students receive part-time special education (or resource room) services, while 6.0% are in full-time special education and 12.5% are Limited English Proficient

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

	(1)	(2)	(3)	(4)	(5)
	Total Spending	General + PTSE	Tax Levy + St Operating	Title I Only	Other Sources
Pct Resource Room	68.94*** (23.50)	89.32*** (21.19)	65.50*** (18.29)	-3.43 (4.37)	27.25*** (5.92)
Middle_Pct Res Room	-12.90 (38.27)	-22.90 (34.50)	-19.01 (29.78)	11.13 (7.11)	-15.03 (9.64)
Pct Special Education	278.72*** (16.45)	16.09 (14.84)	9.16 (12.81)	4.21 (3.06)	2.72 (4.15)
Middle_Pct Special Ed	14.64 (32.82)	102.91*** (29.59)	72.94*** (25.54)	10.58* (6.10)	19.39** (8.27)
Pct LEP	22.41*** (7.40)	22.14*** (6.68)	5.65 (5.76)	-1.77 (1.38)	18.26*** (1.87)
Middle_Pct LEP	-20.18 (18.95)	-23.82 (17.08)	-22.21 (14.75)	3.66 (3.52)	-5.27 (4.77)
Pct Free Lunch Eligible	12.00*** (3.09)	15.36*** (2.78)	-6.39*** (2.40)	15.28*** (0.57)	6.47*** (0.78)
Middle_Pct Fr Lnch Elig	-1.87 (6.27)	-4.78 (5.65)	4.20 (4.88)	-4.09*** (1.16)	-4.89*** (1.58)
Pct Recent Immigrant	-20.07 (14.66)	-27.77** (13.22)	-10.88 (11.41)	1.66 (2.72)	-18.55*** (3.69)
Middle_Pct Recent Imm	48.99* (26.92)	62.58** (24.27)	31.09 (20.95)	5.41 (5.00)	26.08*** (6.78)
Pct Level 1, 4th Grd Read	35.55*** (12.62)	38.79*** (11.38)	21.36** (9.82)	5.89** (2.34)	11.54*** (3.18)
Pct Level 1, 8th Grd Read	-14.74 (16.56)	2.45 (14.93)	-18.34 (12.89)	11.30*** (3.08)	9.49** (4.17)
Enrollment	-3.05*** (0.43)	-2.90*** (0.39)	-2.37*** (0.34)	-0.02 (0.08)	-0.52*** (0.11)
Middle_Enrollment	1.27* (0.65)	1.24** (0.59)	1.00** (0.51)	-0.00 (0.12)	0.25 (0.16)
Medium-Sized School	-625.75*** (206.94)	-708.80*** (186.58)	-559.81*** (161.06)	-53.25 (38.44)	-95.75* (52.14)
Middle_Medium-Sized	1,018.69** (418.98)	868.08** (377.76)	796.38** (326.09)	-109.65 (77.83)	181.35* (105.57)
Large Sized-Schools	27.21 (414.93)	-62.39 (374.10)	22.88 (322.94)	-84.27 (77.08)	-1.00 (104.55)
Middle_Large-Sized	9.17 (708.19)	-229.66 (638.51)	-124.15 (551.18)	-104.60 (131.56)	-0.91 (178.44)
Middle School	348.39 (219.41)	301.52 (197.82)	442.29*** (170.76)	-46.45 (40.76)	-94.32* (55.28)
Constant	10,025.17*** (533.44)	10,003.88*** (480.95)	9,373.36*** (415.18)	-210.65** (99.10)	841.17*** (134.41)
Observations	911	911	911	911	911
R-squared	0.61	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) Total Spending is spending per pupil for all students. General+PTSE, Tax Levy+ State Operating, Title I Only, and Other Sources are spending per General Education and PTSE student. iv) 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) Total	(2) General + PTSE	(3) Tax Levy + St Operating	(4) Title I Only	(5) Other Sources
Pct Resource Room	65.13*** (19.27)	56.42*** (17.54)	45.23*** (15.29)	0.55 (4.96)	10.64 (7.27)
Middle_Pct Res Room	23.76 (40.33)	51.51 (36.71)	57.37* (32.00)	1.53 (10.39)	-7.39 (15.21)
Pct Special Education	113.28*** (16.55)	-10.85 (15.06)	-4.36 (13.13)	1.39 (4.26)	-7.88 (6.24)
Middle_Pct Special Ed	-25.77 (36.83)	-1.49 (33.52)	-41.35 (29.22)	21.28** (9.48)	18.58 (13.88)
Pct LEP	15.31 (13.99)	23.55* (12.73)	-4.30 (11.10)	2.34 (3.60)	25.51*** (5.27)
Middle _ Pct LEP	-29.13 (32.33)	-11.04 (29.43)	20.04 (25.65)	-2.41 (8.33)	-28.68** (12.19)
Pct Free Lunch Eligible	6.00 (6.04)	4.13 (5.50)	-1.13 (4.79)	4.21*** (1.56)	1.05 (2.28)
Middle_Pct Fr Lnch Elig	12.68 (10.30)	10.28 (9.37)	11.96 (8.17)	0.37 (2.65)	-2.05 (3.88)
Pct Recent Immigrant	-42.60* (22.69)	-20.59 (20.65)	-14.90 (18.00)	-0.72 (5.84)	-4.97 (8.55)
Middle_Pct Recent Imm	15.89 (47.06)	-29.96 (42.84)	-79.56** (37.34)	23.33* (12.12)	26.27 (17.74)
Pct Lvl 1, 4th Grd Read	-14.70** (5.86)	-3.96 (5.34)	-3.81 (4.65)	-2.15 (1.51)	1.99 (2.21)
Pct Lvl 1, 8th Grd Read	-12.46* (6.89)	-7.33 (6.27)	-5.05 (5.47)	-3.52** (1.77)	1.24 (2.60)
Enrollment	-5.74*** (0.53)	-4.95*** (0.48)	-2.84*** (0.42)	-0.56*** (0.14)	-1.55*** (0.20)
Middle_Enrollment	2.28*** (0.83)	2.08*** (0.76)	0.79 (0.66)	0.39* (0.21)	0.90*** (0.31)
Medium-Sized School	-422.11** (183.31)	-336.33** (166.86)	-258.37* (145.45)	-46.33 (47.20)	-31.63 (69.11)
Middle_Medium-Sized	-2,426.61*** (533.98)	-2,141.60*** (486.07)	-1,552.32*** (423.69)	-239.29* (137.50)	-349.99* (201.33)
Large Sized-Schools	-123.04 (291.68)	-15.22 (265.51)	88.66 (231.44)	-49.73 (75.11)	-54.15 (109.97)
Middle_Large-Sized	-2,799.59*** (719.87)	-2,544.54*** (655.28)	-2,074.85*** (571.18)	-168.62 (185.37)	-301.06 (271.41)
Middle School	535.49 (375.68)	353.45 (341.97)	-21.07 (298.09)	106.16 (96.74)	268.36* (141.64)
Constant	13,494.71*** (1,087.26)	12,088.87*** (989.71)	10,137.32*** (862.69)	374.37 (279.98)	1,577.18*** (409.93)
Observations	1783	1783	1783	1783	1783
R-squared	0.96	0.94	0.93	0.89	0.87
School and Year FE	Yes	Yes	Yes	Yes	Yes

Notes: i) Standard errors in parentheses. ii) \* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%. iii) Total Spending is spending per pupil for all students. General+PTSE, Tax Levy+ State Operating, Title I Only, and

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Other Sources are spending per General Education and PTSE student. iv) Small schools is the omitted size category. Elementary is the omitted grade category. v) Expenditures and revenues measured in 2004 dollars.

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

	(1)	(2)	(3)	(4)	(5)
	Total	General + PTSE	Tax Levy + St Operating	Title I Only	Other Sources
Lagged Dependent Var	0.77***	0.84***	0.34***	0.56***	0.77***
	(0.02)	(0.03)	(0.03)	(0.02)	(0.02)
Pct Resource Room	22.73	34.09***	-7.91**	5.06	22.73
	(13.97)	(11.75)	(3.98)	(4.66)	(13.97)
Middle_Pct Res Room	27.30	0.08	12.43*	7.60	27.30
	(22.80)	(19.28)	(6.54)	(7.60)	(22.80)
Pct Special Education	-17.11*	-29.21***	6.19**	1.30	-17.11*
	(9.69)	(8.23)	(2.77)	(3.19)	(9.69)
Middle_Pct Special Ed	48.22**	27.46*	6.27	15.96**	48.22**
	(19.57)	(16.56)	(5.59)	(6.45)	(19.57)
Pct LEP	2.19	-7.03*	0.09	9.36***	2.19
	(4.38)	(3.69)	(1.25)	(1.49)	(4.38)
Middle _ Pct LEP	8.45	8.79	2.59	-0.83	8.45
	(11.21)	(9.50)	(3.21)	(3.70)	(11.21)
Pct Free Lunch Eligible	0.19	-1.56	10.02***	1.01	0.19
	(1.88)	(1.55)	(0.69)	(0.64)	(1.88)
Middle_Pct Fr Lnch Elig	-9.82***	-9.04***	-2.73**	-1.07	-9.82***
	(3.79)	(3.21)	(1.09)	(1.27)	(3.79)
Pct Recent Immigrant	-0.43	5.29	-0.03	-6.59**	-0.43
	(8.63)	(7.29)	(2.47)	(2.89)	(8.63)
Middle_Pct Recent Imm	16.20	2.13	4.53	11.51**	16.20
	(15.90)	(13.43)	(4.54)	(5.28)	(15.90)
Pct Lvl 1, 4th Grd Read	34.05***	22.09***	4.12*	9.66***	34.05***
	(7.40)	(6.26)	(2.13)	(2.45)	(7.40)
Pct Lvl 1, 8th Grd Read	19.13*	4.52	10.14***	6.96**	19.13*
	(9.78)	(8.29)	(2.81)	(3.24)	(9.78)
Enrollment	-0.89***	-0.96***	0.03	-0.08	-0.89***
	(0.26)	(0.22)	(0.07)	(0.09)	(0.26)
Middle_Enrollment	0.32	0.42	-0.00	-0.04	0.32
	(0.38)	(0.32)	(0.11)	(0.13)	(0.38)
Medium-Sized School	-194.57	-100.51	-51.01	-40.33	-194.57
	(122.70)	(103.88)	(34.98)	(40.44)	(122.70)
Middle_Medium-Sized	239.34	297.20	-192.96***	128.01	239.34
	(252.19)	(213.50)	(72.22)	(83.37)	(252.19)
Large Sized-Schools	-5.10	154.84	-101.55	-42.10	-5.10
	(243.06)	(205.71)	(69.79)	(80.55)	(243.06)
Middle_Large-Sized	-222.54	-200.77	-164.93	110.25	-222.54
	(419.98)	(355.39)	(120.59)	(139.24)	(419.98)
Middle School	-57.57	8.30	-32.18	-72.10*	-57.57
	(130.53)	(110.75)	(37.37)	(43.13)	(130.53)
Constant	3,559.40***	2,987.74***	-44.55	191.56*	3,559.40***
	(379.26)	(336.40)	(93.36)	(110.10)	(379.26)
Observations	894	894	894	894	894

R-squared	0.75	0.71	0.70	0.71	0.75
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Notes: i) Standard errors in parentheses. ii) \* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1% . iii) Total Spending is spending per pupil for all students. General+PTSE, Tax Levy+ State Operating, Title I Only, and Other Sources are spending per General Education and PTSE student. iv) Small schools is the omitted size category. Elementary is the omitted grade category.

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## **Appendix A: Variable definitions**

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

**Middle School:** A dichotomous variable that takes a value of 1 if 8<sup>th</sup> 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.<sup>11</sup>

**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.

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<sup>11</sup> 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 4<sup>th</sup> 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 8<sup>th</sup> 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).

## Appendix B: Additional Regressions Results

Table B1: School Spending Regressions, New York City Elementary and Middle Schools, 2000-01

	(1)	(2)	(3)	(4)	(5)
	Total	General + PTSE	Tax Levy + St Operating	Title I Only	Other Sources
Pct Resource Room	104.28** (41.06)	70.51* (38.28)	38.70 (30.41)	11.54** (5.12)	20.27** (10.02)
Middle_Pct Res Room	-7.42 (62.81)	8.48 (58.57)	5.48 (46.53)	5.51 (7.83)	-2.51 (15.33)
Pct Special Education	241.67*** (18.11)	47.92*** (16.89)	49.77*** (13.42)	-1.50 (2.26)	-0.35 (4.42)
Middle_Pct Special Ed	117.31*** (40.89)	173.94*** (38.13)	138.58*** (30.29)	21.94*** (5.10)	13.42 (9.98)
Pct LEP	23.85** (10.57)	22.18** (9.86)	7.93 (7.83)	-3.67*** (1.32)	17.93*** (2.58)
Middle _ Pct LEP	94.66*** (23.03)	88.88*** (21.47)	67.22*** (17.06)	8.24*** (2.87)	13.42** (5.62)
Pct Free Lunch Eligible	11.76*** (4.44)	12.24*** (4.14)	-6.58** (3.29)	11.95*** (0.55)	6.87*** (1.08)
Middle_Pct Fr Lnch Elig	-27.66*** (9.02)	-23.82*** (8.41)	-9.05 (6.68)	-5.86*** (1.12)	-8.92*** (2.20)
Pct Recent Immigrant	-26.62 (21.37)	-26.96 (19.92)	-9.50 (15.83)	-1.42 (2.66)	-16.04*** (5.22)
Middle_Pct Recent Imm	-32.21 (46.93)	-21.45 (43.76)	-26.02 (34.76)	4.89 (5.85)	-0.32 (11.46)
Pct Lvl 1, 4th Grd Read	9.93 (11.33)	18.80* (10.56)	9.04 (8.39)	2.77* (1.41)	6.99** (2.76)
Pct Lvl 1, 8th Grd Read	24.34** (12.14)	30.87*** (11.31)	19.74** (8.99)	2.05 (1.51)	9.07*** (2.96)
Enrollment	-2.26*** (0.53)	-2.21*** (0.49)	-1.52*** (0.39)	-0.05 (0.07)	-0.64*** (0.13)
Middle_Enrollment	0.43 (0.84)	0.21 (0.78)	0.07 (0.62)	-0.09 (0.10)	0.23 (0.20)
Medium-Sized School	-875.36*** (295.23)	-884.30*** (275.28)	-612.86*** (218.68)	-55.70 (36.82)	-215.73*** (72.06)
Middle_Medium- Sized	-2,064.12*** (610.76)	-1,750.38*** (569.48)	-1,400.46*** (452.40)	-192.04** (76.18)	-157.88 (149.08)
Large Sized-Schools	-563.98 (528.19)	-543.83 (492.49)	-305.51 (391.24)	-69.73 (65.88)	-168.59 (128.93)
Middle_Large-Sized	-1,765.76* (954.96)	-1,428.57 (890.42)	-1,295.74* (707.35)	-63.14 (119.11)	-69.68 (233.10)
Middle School	-58.43 (345.85)	-129.57 (322.48)	-14.87 (256.18)	-78.43* (43.14)	-36.27 (84.42)
Constant	11,632.55***	11,261.39***	10,015.70***	-51.68	1,297.37***

	(795.63)	(741.86)	(589.33)	(99.24)	(194.21)
Observations	872	872	872	872	872
R-squared	0.54	0.41	0.36	0.58	0.44

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Notes: i) Standard errors in parentheses. ii) \* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1% . iii) Total Spending is spending per pupil for all students. General+PTSE, Tax Levy+ State Operating, Title I Only, and Other Sources are spending per General Education and PTSE student. iv) Small schools is the omitted size category. Elementary is the omitted grade category. v) Expenditures and revenues measured in 2004 dollars.

Table B2: School Spending Regressions, New York City Elementary and Middle Schools, 2001-02

	(1)	(2)	(3)	(4)	(5)
	Total	General + PTSE	Tax Levy + St Operating	Title I Only	Other Sources
Pct Resource Room	59.66** (23.18)	38.87* (21.21)	35.22** (17.03)	-0.11 (3.74)	3.75 (7.50)
Middle_Pct Res Room	-32.41 (26.07)	-17.86 (23.85)	-31.41 (19.16)	3.02 (4.21)	10.52 (8.44)
Pct Special Education	274.47*** (14.60)	56.41*** (13.35)	56.91*** (10.73)	-2.44 (2.36)	1.95 (4.72)
Middle_Pct Special Ed	-63.94* (33.07)	9.50 (30.25)	-16.24 (24.29)	16.12*** (5.34)	9.63 (10.70)
Pct LEP	25.64*** (8.41)	28.29*** (7.69)	9.97 (6.18)	-1.38 (1.36)	19.69*** (2.72)
Middle _ Pct LEP	10.36 (17.71)	-1.16 (16.20)	7.04 (13.01)	-2.98 (2.86)	-5.22 (5.73)
Pct Free Lunch Eligible	8.70*** (3.24)	8.37*** (2.97)	-9.40*** (2.38)	11.90*** (0.52)	5.86*** (1.05)
Middle_Pct Fr Lnch Elig	-17.80*** (6.45)	-13.85** (5.90)	-4.89 (4.74)	-2.52** (1.04)	-6.44*** (2.09)
Pct Recent Immigrant	-30.84* (16.84)	-33.20** (15.40)	-14.34 (12.37)	1.60 (2.72)	-20.45*** (5.45)
Middle_Pct Recent Imm	109.30*** (36.56)	122.46*** (33.45)	79.00*** (26.86)	17.84*** (5.91)	25.62** (11.83)
Pct Lvl 1, 4th Grd Read	17.06* (9.46)	24.61*** (8.65)	11.31 (6.95)	2.28 (1.53)	11.01*** (3.06)
Pct Lvl 1, 8th Grd Read	65.77*** (14.95)	74.47*** (13.68)	65.87*** (10.99)	-0.40 (2.42)	9.01* (4.84)
Enrollment	-1.87*** (0.41)	-1.94*** (0.38)	-1.29*** (0.30)	-0.03 (0.07)	-0.63*** (0.13)
Middle_Enrollment	-0.21 (0.65)	-0.14 (0.60)	-0.39 (0.48)	-0.04 (0.11)	0.28 (0.21)
Medium-Sized School	-635.12*** (222.51)	-722.37*** (203.54)	-571.90*** (163.48)	-53.27 (35.94)	-97.20 (71.99)
Middle_Medium- Sized	998.20** (462.58)	1,035.22** (423.15)	803.42** (339.87)	28.90 (74.71)	202.91 (149.66)
Large Sized-Schools	-487.79 (408.92)	-524.33 (374.06)	-342.92 (300.44)	-67.70 (66.04)	-113.71 (132.30)
Middle_Large-Sized	362.42 (736.79)	264.50 (673.98)	202.41 (541.33)	-4.09 (119.00)	66.19 (238.38)
Middle School	-281.01 (241.40)	-249.37 (220.82)	-223.34 (177.36)	-6.79 (38.99)	-19.24 (78.10)
Constant	10,752.48*** (489.79)	10,484.65*** (448.03)	9,623.12*** (359.86)	-323.67*** (79.10)	1,185.19*** (158.46)

Observations	897	897	897	897	897
R-squared	0.58	0.40	0.34	0.57	0.41

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Notes: i) Standard errors in parentheses. ii) \* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1% . iii) Total Spending is spending per pupil for all students. General+PTSE, Tax Levy+ State Operating, Title I Only, and Other Sources are spending per General Education and PTSE student. iv) Small schools is the omitted size category. Elementary is the omitted grade category. v) Expenditures and revenues measured in 2004 dollars.

Table B3: School Spending Regressions, New York City Elementary and Middle Schools, 2002-03

	(1)	(2)	(3)	(4)	(5)
	Total	General + PTSE	Tax Levy + St Operating	Title I Only	Other Sources
Pct Resource Room	85.26*** (23.76)	83.74*** (22.33)	50.64*** (17.37)	5.57 (4.80)	27.53*** (6.99)
Middle_Pct Res Room	18.85 (38.02)	3.61 (35.74)	17.75 (27.79)	-0.92 (7.68)	-13.22 (11.19)
Pct Special Education	284.93*** (16.48)	26.63* (15.50)	33.28*** (12.05)	-6.95** (3.33)	0.30 (4.85)
Middle_Pct Special Ed	47.27 (32.78)	137.61*** (30.82)	107.44*** (23.96)	14.70** (6.63)	15.46 (9.65)
Pct LEP	24.01*** (8.75)	29.30*** (8.23)	16.91*** (6.40)	-7.73*** (1.77)	20.13*** (2.58)
Middle _ Pct LEP	-29.08 (18.99)	-40.97** (17.85)	-27.99** (13.88)	3.10 (3.84)	-16.08*** (5.59)
Pct Free Lunch Eligible	18.45*** (3.07)	19.00*** (2.89)	-6.54*** (2.24)	16.53*** (0.62)	9.02*** (0.90)
Middle_Pct Fr Lnch Elig	-11.51* (6.80)	-11.44* (6.39)	-3.52 (4.97)	-2.61* (1.37)	-5.30*** (2.00)
Pct Recent Immigrant	-25.35 (16.41)	-35.12** (15.42)	-17.87 (11.99)	7.37** (3.32)	-24.62*** (4.83)
Middle_Pct Recent Imm	87.23** (36.82)	103.29*** (34.61)	62.48** (26.92)	2.62 (7.44)	38.19*** (10.84)
Pct Lvl 1, 4th Grd Read	11.86 (11.60)	18.39* (10.90)	7.48 (8.48)	5.88** (2.34)	5.02 (3.41)
Pct Lvl 1, 8th Grd Read	6.18 (13.86)	21.42 (13.03)	9.96 (10.13)	3.85 (2.80)	7.61* (4.08)
Enrollment	-2.76*** (0.42)	-2.69*** (0.39)	-1.78*** (0.31)	-0.11 (0.08)	-0.81*** (0.12)
Middle_Enrollment	1.13* (0.63)	1.12* (0.59)	0.76* (0.46)	-0.08 (0.13)	0.44** (0.19)
Medium-Sized School	-652.32*** (217.27)	-731.19*** (204.25)	-574.61*** (158.82)	-40.08 (43.92)	-116.49* (63.96)
Middle_Medium-Sized	562.20 (428.08)	389.01 (402.43)	283.11 (312.92)	31.60 (86.53)	74.30 (126.02)
Large Sized-Schools	-21.45 (414.22)	-140.12 (389.41)	-149.96 (302.79)	-26.53 (83.73)	36.38 (121.94)
Middle_Large-Sized	-407.77 (702.58)	-653.95 (660.49)	-580.55 (513.58)	49.53 (142.01)	-122.93 (206.84)
Middle School	358.04 (239.40)	306.44 (225.05)	416.66** (175.00)	-67.73 (48.39)	-42.50 (70.48)
Constant	9,280.78*** (569.49)	9,383.99*** (535.37)	8,659.02*** (416.29)	-317.15*** (115.11)	1,042.12*** (167.65)
Observations	901	901	901	901	901
R-squared	0.62	0.42	0.34	0.60	0.50

Notes: i) Standard errors in parentheses. ii) \* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%. iii) Total Spending is spending per pupil for all students. General+PTSE, Tax Levy+ State Operating, Title I Only, and Other Sources are spending per General Education and PTSE student. iv) Small schools is the omitted size category. Elementary is the omitted grade category. v) Expenditures and revenues measured in 2004 dollars.



