DETERMINANTS OF SCHOOL PERFORMANCE IN NEW YORK ELEMENTARY SCHOOLS: RESULTS AND IMPLICATIONS FOR RESOURCE USE

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Executive Summary

The objectives of this report are twofold: to identify the strengths and weaknesses of the production-function based approach to investigating school performance/efficiency in New York City using currently available school-level data; and to apply our findings to understanding the factors that determine differences in performance/efficiency across schools.

Our empirical strategy involves the use of a three-year panel of data (1996-97 through 1998-99) on New York City elementary schools that we examine as follows. First, we estimate alternative specifications of production functions, (output is defined as test scores), for different grades (4^{th} and 5^{th}), different tests (reading and math) and levels and changes in scores, and by using alternative econometric forms (fixed effects and residuals). Second, we compare alternative performance/efficiency measures with one another and create categories to distinguish low, middle and high performing schools using alternative measures. Finally, we examine the differences in resource use across the categories.

The regression results for estimating production functions show that when the *level* of the score is the dependent variable, the signs of coefficients are generally consistent with findings in previous studies and the fixed effects are jointly significant. For regressions when the *change* in scores is the dependent variable, as expected, there is less explanatory power and again, the fixed effects are jointly significant.

Pearson correlation coefficients between alternative measures of performance and efficiency show that for raw performance measures, using *levels* of scores, one would be fairly confident of obtaining similar groupings of schools regardless of subject or grade used. By using *changes* in scores, however, differences in groupings of schools depend on both subject and grade measured (e.g., reading or math; 3^{rd} to 4^{th} / 4^{th} to 5^{th}). When we apply other measures of efficiency (i.e., residuals or fixed effects), we find that none of the correlations is high enough to inspire confidence that the measures are similar. In summary, our findings suggest that there is no statistical way to choose a school performance/efficiency measure.

The variations in resource use across different classifications of schools change depending upon the measure of performance or efficiency used. For raw reading scores the results are the same as we reported last year.

Findings

For fixed effects in reading, we find the following:

- Low performing schools have higher percentages of special education, black and poor students.
- Low performing schools have lower percentages of limited English proficient, recent immigrant, and Hispanic students, but have percentages of resource room and Asian students that are equal to the high performing schools.
- Low performing schools have higher teacher/pupil ratios, have teachers who are proportionately less licensed, lower paid, and less experienced, but spend more per pupil.

.For fixed effects in changes in reading, we find the following:

- Results differ the most from the other tables.
- Low performing schools have higher percentages of special education, Asian and black students.
- High performing schools have higher percentages of Hispanic and limited English proficient students.
- Low performing schools have higher percentages of teachers who are licensed and are experienced.
- Low performing schools have teachers with similar salaries to those in high performing schools, but spend more per pupil.
- High performing schools are larger (i.e., enroll more students); this is the only time we find this result in any pronounced way
- If we use this information to assess efficient schools, we break many of the stereotypes about characteristics of high and low performance, especially with respect to Hispanic students and licensed teachers.

Conclusions

We conclude the following:

- Choices must be made about tests, grades and methods for measuring performance/efficiency.
- Raw scores are not measures of efficiency.
- Conceptually, fixed effects seem to be the best measure of efficiency at the school level.
- *Changes* in scores yield very different results from *levels* of scores in both raw and fixed effects classifications.
- Causality is difficult to model.
- Future research should explore longer time series, include middle and high schools, and use individual student data.
- Implications of the results of this study for ranking schools based on performance or efficiency are limited. The purpose of this study was not to determine ranking methods. We are much more confident that the results group schools reasonably well.

I. Introduction

This condition report is a continuation of previous work (Stiefel, Schwartz, Iatarola & Fruchter, 2000) in which the characteristics of New York City elementary and middle school students, teachers and resources by levels of performance as measured by raw reading and math test scores were documented. The findings were disheartening:

> …poorly performing New York City Schools overwhelmingly serve students of color who are poor, have consistently low attendance, and who are taught by teachers who have very limited experience, few if any credentials, and who earn the lowest average salaries. (p.15)

The study also noted "the next steps … will explore some of the underlying mechanisms structuring the relationships…" (p.16). In this report, the authors investigate the determinants of school performance using various forms of production functions for school outputs. Outputs are defined herein as test scores. We then use the results to identify characteristics of efficient and inefficient schools. Efficiency (i.e., gaining the most output from a given amount of resources) differs from unadjusted performance. Raw test scores, for example, are not measures of efficiency, although their levels and changes are important to track because ultimately it is these kinds of measures that schools hope to improve and produce at high levels.

Disentangling the direction of causality between performance and school and student characteristics is notoriously difficult. To address the difficulty, we use econometric methods and rich, school-level data. An important objective of our study is to identify the strengths and weaknesses of the production-function based approach to investigating school efficiency in New York City using currently available school-level data.

Previous production-function research generally has yielded little in the way of useful policy guidance, because the research has almost invariably relied upon district-level rather than school-level data. The aggregation problem associated with district-level data has seriously handicapped previous analyses. Therefore, the prospect of gleaning more useful insights using rich school-level data on New York City public schools is worth pursuing. In addition, at least two alternative methods of measuring efficiency using production functions are now available. It is also possible to learn how these methods differ using New York City school-level data. The result of our study is a set of recommendations regarding the use, application and limitations of these methods to school-level data, the direction for future research and data gathering, and where possible, policy recommendations.

II. Theory and Methods[1]

The *production function* measures the maximum amount of output that can be produced from a given quantity of inputs. In its general form it is represented as:

$$Q = f(X_1, X_2, ...X_n) \quad (1)$$

Where Q represents the quantity of output, X_1, X_2, ... X_n are the *n* inputs to production, and *f* ( ) is the transformation linking them.

Given data on the quantities of inputs consumed in production and on the quantities of output that are produced, their relationship can be estimated statistically and the results used to identify more efficient and less efficient schools. Essentially, schools that produce more output, given the level of inputs they use, are deemed more efficient; those that produce less output are considered less efficient.

Although district-level analyses have long dominated the research literature, this is due largely to limitations in the availability of data, rather than to conceptual or statistical limitations. School-level analyses are clearly preferable for estimating the efficiency of schools *per se*, rather than school *districts*. Thus, recent efficiency research increasingly relies upon school-level data to gauge performance of public schools.

While (1) can be estimated using a single cross-section of data on schools, using panel data (i.e., data on a cohort of schools over several time periods) provides greater opportunities to investigate school efficiency. To be concrete, a production function for education for school 's' at time 't' can be written as follows:

$$TS_{st} = \alpha_0 + \alpha_1 TS_{st-1} + \alpha_2 ST_{st} + \alpha_3 SC_{st} + \alpha_4 T + \alpha_5 S + \varepsilon_{st} \quad (2)$$

Where TS_{st} is the output of the school, TS_{st-1} is the output one period ago, ST_{st} is a vector of student characteristics, SC_{st} is a vector of school inputs (purchased or donated) and characteristics, T is a vector of time dummies, S is a vector of school dummies, ε_{st} is an error term (or several error terms) with the usual statistical characteristics, and 's' indexes schools and 't' indexes time.

In the parlance of econometrics, the coefficients on the school dummies, S, are known as "school fixed effects." School effects (S) differ from school inputs (SC) in that they represent unobservable or unmeasured and unchanging school characteristics, such as school culture, leadership style and efficiency.

School efficiency in (2) could be measured two ways: by using the school fixed effects (the α_5 coefficients on the school dummies) or by using the residuals (estimates of ε_{st} in equations that do not include fixed effects).

School fixed effects (α_5) measure the residual variation in school output unaccounted for by variation in inputs, peer characteristics, etc. that is systematically related to a given school. Thus, these can be viewed as measures of technical efficiency; more specifically, the relative efficiency of the schools in the sample *controlling for* differences in student and school characteristics. Note that not all of the residual variation is attributed to efficiency. Rather, the error term picks up the random variation.

A second choice for measuring efficiency is to leave out the school fixed effects (S), include more of the unchanging or slowly changing student and other characteristics, and use the residuals (estimates of ε_{st}) to measure efficiency, where positive residuals imply above average efficiency and negative ones below average. In previous works this measure was termed an "adjusted performance measure"(APM) (Stiefel, Rubenstein & Schwartz, 1999; Rubenstein, Schwartz & Stiefel, 1998). In this report, we estimate production functions with and without fixed effects and then compare the use of fixed effects and residuals as measures of school efficiency.

We have successfully constructed a three-year panel dataset (1996-97 through 1998-99) of New York City elementary schools; the entire work for this report uses these data. An important step in using the three-year panel is to define the unit of analysis more clearly. While school buildings might be viewed as the fundamental "production unit," our data are even more disaggregated; our performance variables include reading and math scores for 3rd through 8th grades. Therefore, we have choices about whether to analyze each grade's performance separately, to combine some grades, or to combine all grades. For this report, we focus on fourth and fifth grade performance as an indicator of elementary school outputs. While the grade span in schools labeled 'elementary' in New York City is not consistent, these two grades are present in the vast majority of the elementary schools. We neither wanted to lose the detail of our data by averaging scores across grades, nor cloud the meaning of our results by including schools (with averaged scores) with varying grade spans. Our strategy is to perform a statistical analysis that is as exhaustive as possible. To accomplish this, we use the three-year panel of data for all schools with fourth and fifth grades to evaluate how well a production function can be estimated with these data, and use the fixed effects and residuals from the estimated regressions to group schools and study their resource usage.

The first step is to estimate alternative specifications of production functions using level reading scores from 5th grade as well as the change in reading scores from the previous year's 4th grade to the current year's 5th grade as dependent variables, and school-level student and school inputs and characteristics as independent variables.[2] The basic set of variables we include in the

regressions are described in Table 1. Descriptive statistics for dependent and independent variables are reported in Tables 2 and 3. Although we are estimating the production of 5th grade reading scores and their change from the previous year's 4th grade reading scores, the independent variables on student characteristics and school inputs and characteristics are averages from the schools in which those grades are located. We do not have grade level values for these variables.

We estimate regressions with two different dependent variables, the *level* of performance in 5th grade reading and the *change* in reading performance between 4th and 5th grades, each with and without fixed effects. All equations include some independent variables in logarithmic form in order to allow curvature.[3]

From the estimated production functions, we use the fixed effects or residuals (in the regressions estimated without fixed effects) to categorize schools into low, middle and high performing groups. Since these measures are formed by holding constant the influence of student and school characteristics, they differ from the raw, unadjusted scores we used in previous studies, consequently so too do the groupings of schools. Finally, we provide statistics on the distribution of expenditures across various categories by group, and in this way observe if resource distribution varies by adjusted performance.

III. Data

Sources

This study uses a three-year panel of data (1996-97, 1997-98, and 1998-99) that predominantly comes from two sources produced by the New York City Board of Education (BOE): *School Based Expenditure Reports* (SBER) and *Annual School Reports* (ASR). The SBER provide rich and detailed data on school-level spending and a count of full-time equivalent (FTE) teachers for each school. The ASR provide school-level data on student and teacher characteristics. In addition to these two sources, the study uses data obtained directly from the BOE to augment measures of school-level student performance on citywide reading and mathematics exams.

Sample Size

In any year in the latter half of the 1990s New York City had over 1,100 schools. More than 850 are elementary and middle schools; the rest are high schools or citywide special education schools. Each year the number of schools varies for one reason or another. For example, new schools are established while others may be closed or reorganized. Reorganization

may involve splitting a school into multiple schools or, conversely, merging two or more schools into one. During the three-year period of our study (1997-1999), there are 984 elementary and middle schools.[4] To create a three-year balanced panel, we excluded 17 bridge[5] schools, 71 schools that were not operating for three consecutive years, and 4 schools that did not report spending and/or performance data for either their first year or last year of operation. After exclusions, our three-year (1997 through 1999) balanced panel data set includes 892 schools.[6]

We analyze school performance by grade. Therefore, we create a panel of schools that has both 4th and 5th grade reading and mathematics test results for each of the three years. By defining the panel as such, we manage to include most of New York City's public elementary schools.[7] Our 4th and 5th grade panel includes 626 of the 892 schools. We excluded 197 schools that did not have 4th and 5th grade reading and math scores in any year and 69 schools that have reading and math scores in only one or two of the three years.

Outputs: Student Performance on Standardized Tests (TS)

In this study we analyze two measures of school output, reading test scores and change in reading test scores from 4th to 5th grade.[8] Because both the test instrument and the standard deviation of scores change across time, we converted each school's average score (national curve equivalent or standardized score) to a Z score. This conversion standardizes scores across time and the resulting Z score represents how far above or below the average the school scores in relation to the standard deviation across all students.[9] Normally the average of the Z scores would equal zero for all students in a grade. Because we aggregate student performance to the school level, it differs slightly from zero as illustrated in the descriptive statistics reported in Table 2, where mean Z scores in 5th grade reading and change in reading from 4th to 5th grade are slightly above zero.

Student Characteristics (ST)

Student characteristics reflect those of an urban public school system with high levels of poverty and a diverse student population. (See Table 2.) On average, approximately 75% of the students are eligible for free lunch. A great majority of the students in elementary schools are black or Hispanic, with relatively equal percentages of each (36%), while only 11% of the students in the elementary schools are Asian. Recent immigrants, (students entering the country within the past three years), comprise about 8% of the student population, just under 50% of the students are female, and 16% of the students in elementary schools, on average, are limited English proficient. There are equal percentages (6%) of students who are in special education

settings on a part- or full-time basis. The average daily attendance in these schools is about 91%; 92% of students remain in the same school the entire school year.

Student characteristics, on average, change little across time. (See Table 3.) From 1997 to 1999, the percent of students eligible for free lunch decreased by less than one percentage point. The percentage of Asian and Hispanic students increases across the three years, while the percentage of black students decreases across time – all by less than one percentage point. Across the three years, the percentage of recent immigrants and percentage of students who are LEP decline, recent immigrants by about one percentage point, and LEP students by one and one-half percentage points. The percentage of part-time special education students increases slightly from 1997 to 1999, while the percentage of full-time special education students decreases by about one-half of one percentage point. Both attendance and stability rates increase over the three-year period by approximately seven-tenths of one percent and one percentage point, respectively. These are small changes, but in each case the standard deviation and the minimum and maximum numbers suggest that a fair number of schools change more substantially over time and that at least two (as indicated by the minimum and maximum) change drastically over time.

School Inputs and Characteristics (SC)

The school inputs included in this study represent teachers and other resources. (See Table 2.) In 1998, on average, there are 6 teachers per 100 students. About 87% of the teachers are licensed, 62% have five or more years of teaching experience, and 70% have taught in the same school for more than 2 years. Spending, exclusive of teachers, amounts to $4,466 per pupil; this figure includes sub-district and district expenditures on administration and debt service. The average size of an elementary school is 792 students.

From 1997 to 1999, the teacher pupil ratio increases by 9% to 6.5 teachers per 100 students. (See Table 3.) The number of licensed teachers changes by less than one percentage point. By contrast, the proportion of experienced teachers and stable teachers (i.e., those with 2 or more years at the same school) decreases substantially from 1997 to 1999. The decrease in experienced teachers is 8 percentage points and the decrease in stable teachers is about 19 percentage points. Per pupil spending, excluding amounts spent on teachers, increases 23% from 1997 to 1999. School size as measured by enrollment is fairly steady, but does grow by 2.7% from 1997 to 1999.

IV. Results

First, we report the results of our statistical estimations of production functions. Second, we list statistical comparisons between raw, fixed effects and residuals as efficiency measures. Third, we report the results of resource distributions by performance group.

Score Regressions

Table 4 shows the results of a set of regressions with 5th grade reading scores and changes in these scores between 4th and 5th grade as the dependent variable. A complete set of tables, showing 5th grade math and 4th grade reading and math is included in the Appendix.[10] We show two versions of the regressions: one without fixed effects and one with fixed effects. In each, missing values of variables are coded as missing dummy variables and the variable itself is recoded to reflect the missing value as zero, thus preserving all our observations for the regressions. These equations also have been estimated with robust standard errors that do not change the results.

The 5th grade reading regressions in Table 4 (column 1), with no fixed effects, fit the data well, with an R^2 of 77%. Most coefficients are statistically significant at the 5% or lower level, and the signs on these coefficients are similar to what have been found in many previous studies. Schools with higher percentages of students eligible for the free lunch program have lower Z scores, as do schools with higher percentages of non-white, LEP and resource room students. Schools with higher percentages of females have higher scores. Teacher resources show conflicting and sometimes insignificant effects on scores (e.g., the percent of teachers with two or more years of experience has a positive effect on scores; teachers with five or more years of experience have a negative effect; and both the coefficient on teacher/pupil ratio and the coefficient on percent of licensed teachers are not significant). One of the year dummies is significant.

The estimation of the same equation, with school fixed effects (column 2), also fits the data well, even better with the added fixed effects (R^2 of 94%). The fixed effects are jointly significant at less than the 1% level. There are, however, many fewer coefficients that are statistically significant. This is to be expected, especially in light of the small variations (i.e., changes) noted for many independent variables in the data section (Table 3). With a short panel in which many variables vary little across time for a given school, the fixed effects, which absorb the variation across schools, will absorb much of the total variation in the scores. Thus, there is relatively little variation remaining to identify the coefficients on the other variables.

Nevertheless, some coefficients of variables still do show statistical significance, such as the coefficient on percent of students with free lunch eligibility and the percent of Hispanic students. In addition, the coefficient on logarithm of enrollment becomes significant and negative, and the coefficient on logarithm of non-teacher spending becomes significant and positive. This last result is one that occurs in two equations. Given the large amount of money in this category (over $4,000 per pupil in each year), it is of note.

Table 4, columns 3 and 4, also shows the results of regressions using change in 5th grade reading (i.e., 5th grade reading minus the previous year's 4th grade reading in the same school). These regressions are a version of equation (2) with the lagged test score, but here the lagged coefficient is constrained to equal one. The explanatory power of this equation without fixed effects (column 3) is low (R^2 of 3%), which is typical of regressions involving dependent variables measured in changes rather than levels. Fewer independent variables than in the level equation are statistically significant. The percentage of Asian students shows a positive sign, as does the percentage of students who remain in the same school for the full school year.

In a comparable equation, augmented with school fixed effects (column 4), the explanatory power jumps to 42% and the schools fixed effects are jointly significant. Few of the independent variables show statistical significance, again perhaps because of their relative stability over the three years. Percentage of Asian students has a positive coefficient and the non-teacher funding variable also shows a positive and significant coefficient.

Summarizing the results of the four regression equations in Table 4, we note that the level regressions without the fixed effects show results similar to what others have found -- that the fixed effects are always jointly significant, at least one non-white group shows statistical significance, and the non-teaching resource variable is significant in two of the four equations.

Differences Among Measures of Efficiency

We use fixed effects and residuals to group schools into high, middle and low performing categories based on their standard deviations from the mean. Before doing so, however, we show how similar the various measures of efficiency are or are not to one another. (We include the raw scores both for comparison to last year and because they are sometimes used by analysts or policymakers to group schools.)

Tables 5, 6 and 7 display Pearson correlation coefficients between various measures of performance/efficiency. For all analyses, raw scores and residuals are presented for 1998. Fixed effects need not specify a year because they represent efficiency over all three years of the panel dataset. Although the parameters of the regression equations that yield residuals are also based

on the three-year panel dataset, in order to calculate an actual residual, a specific year for the values of the independent variables in the predicted score equation must be specified. In Table 5, we present raw scores and include reading and math, levels and changes, and 4th and 5th grades, looking for agreement among measures. Subsequently in Table 6, we limit the analysis to residuals and fixed effects from regressions using 5th grade reading and math levels and changes, looking at agreement within methods. In Table 7, we use raw scores, residuals and fixed effects from regressions using 5th grade reading levels and changes, looking at agreement across methods.

Table 5 illustrates several points about the degree of agreement among raw scores. Beginning with the top panel of correlations on level performance, we see that "likes are the most alike." That is, the correlations are highest between different subjects in the same *grade,* second highest between the different grades in the same *subject,* and third highest between different subjects in different grades. All the correlations among the raw scores are quite high, the lowest being .882.

Moving to the middle panel in Table 5 on change in performance, we see the identical result as for levels (same grade highest correlation, same subject next highest, different grade and subject lowest), but all the correlations are noticeably lower than for levels. The highest correlation in the middle panel is .591, while the lowest is .050. In addition, some correlations are not significantly different from zero at conventional significance levels.

Finally, the bottom panel of Table 5 on changes and levels illustrates that these two raw measures of performance are very different from one another. The very highest correlations, .342 between 4th grade reading (.273 for math) and change from 3rd to 4th grade reading and math, are low. Some of the correlations between levels and changes are even negative, and several correlations are insignificantly different from zero at conventional significance levels.

Table 5 shows that using level raw scores to group schools by performance, using levels, one would be somewhat confident of obtaining similar groupings no matter what measure or grade was used. But even here, the correlations are in the low .9's or high .8's, which could result in different classifications based on choice of measure. *For all other measures, differences in where a school falls by performance group would depend on the measure chosen, as the correlations are low and sometimes negative or not different from zero.*

Table 6 illustrates how well efficiency measures, using the same *grade* for the dependent variables, agree across reading and math for both residuals and regression fixed effects. (Recall that Table 5 showed us that the *grades* had the highest correlations.) We see here that levels are more highly correlated for both methods than are changes (once again, levels and changes are

different measures) and that fixed effects are more highly correlated with each other than are residuals (the two methods are different). *None of the correlations in Table 6 is high enough to inspire confidence that choosing one of these measures (residuals or fixed effects) would result in the same classification of schools for reading and math.*

Finally, Table 7 compares across three measures of performance/efficiency using 5th grade reading and change in reading alone. Here the only high correlation (.989) is between residuals and raw scores for change in reading. All other correlations are below .65, with many significantly below that number. *Table 7 illustrates that even holding constant the grade and the subject tested, the methods are quite different and would likely result in different classifications of schools.*

Putting results from Tables 5, 6, and 7 together, we conclude that when grouping schools by performance there is no statistical way to choose one measure on which to base the grouping. Decisions about the subject area tested, the grade, and especially whether one is interested in levels or changes are very important. In addition, neither the residuals nor the fixed effects, as two alternative ways to get at the efficiency idea, yield the same results.

To further emphasize these points, Tables 8 through 11 categorize schools into three performance groups and then compare via cross tabulations how many fall into the same category on two different measures. The groupings are made on the basis of falling more than one standard deviation above (high or 3) or below (low or 1) the mean on the measure. A school falls in group 2 if it is within plus or minus one standard deviation of the mean on the measure.

Table 8 compares level reading and math outputs for 5th grade by raw scores, residuals and fixed effects. Table 9 does the same, but for changes. Table 10 compares methods (raw, residuals and fixed effects) for 5th grade reading scores. Table 11 compares methods (raw, residuals and fixed effects) for change in 5th grade reading scores.

Table 8 provides much information. First, at the bottom of each table is a number labeled "% on diagonal." This number tells us the percentage of schools classified identically by the two tests, math and reading. Each cell of the table relays four pieces of information: the number of schools, the percent of all schools, the percent of the row of schools, and the percent of the column. Since there are 626 schools in our study, there are always 626 schools categorized in the cross tabulations. These three cross tabulations give us more concrete information than do the correlations about how many schools would be classified differently based on different measures. We see from the diagonal number that the highest on the diagonals are the raw Z scores, followed by the fixed effects and finally the residuals. This is consistent with the correlations of .937, .857 and .770 previously reported in Tables 5 and 6. In addition, for the raw Z scores, we see that 23.3

percent of schools classified as lowest in reading (1) would be middle (2) in math (row percent) while 28.2 percent of schools classified lowest in math (1) would be middle (2) in reading (column percent). On the other hand there are zero schools that would jump from groups 1 to 3 (off diagonals) for the raw scores.

We will not discuss all the numbers on these tables, but rather state the important general conclusions that follow from them. First, choices *must* be made about the test and the method since no method is without significant numbers (percents) of misclassifications of at least one grouping. Residuals are especially problematic because the off-diagonals indicate some schools would jump two groupings if the measure were changed from reading to math. In this table, in terms of consistency, fixed effects dominate residuals.

Table 9 shows the same comparison as Table 8, but for changes in scores instead. As shown, all the classifications are less stable than for levels; the percent on diagonal numbers are lower and the percent on the off-diagonals are higher. In this table, the residuals and fixed effects are more similar; one does not clearly dominate the other in terms of consistency of classification.

Table 10 shows cross tabulations across methods, holding the score constant at 5th grade reading. Fixed effects and residuals have the highest percent on the diagonals or similarly classified. Only fixed and raw Z scores have schools on the off-diagonal (differently classified by two groupings). Overall the table shows that these methods give very different classifications.

Table 11, comparable to Table 10 except that it measures changes in reading from 4th to 5th grade, shows what the correlations did: residuals and raw scores classify schools very similarly, but the other two pairs are more different than the levels.

Taken as a whole, Tables 5 through 11 demonstrate that choices are essential between grades, tests, levels, changes, and methods of measuring efficiency. The choices will result in different classifications of schools, at least in terms of low to middle and high to middle. *While the choice of a test (reading or math), a grade, and a level or a change must be based on what the decision-maker intends to measure, reward, improve etc., the choice of a method is a bit different. It seems clear that using raw scores and calling them a measure of efficiency misuses the idea of efficiency* (i.e., to produce a given output with the least resources). *Given the choice between residuals and fixed effects, we believe that the fixed effects stand on firmer theoretical ground because they allow for random variation around the mean, adjusted for social and school characteristics* (in the error term), *while capturing what is constant across a school over a set of years.* This constant is likely to measure a good part of the unique efficiency of the school.

The residuals, on the other hand, pick up random variations in addition to reflecting efficiency. The difficulty is that the fixed effects also capture the effect of all other variables that

are time invariant (such as location) and those that are essentially invariant over the study period, such as poverty. Additional statistical procedures may be developed to "purge" the fixed effects of these factors, but that work remains undone.

In the following section, we use all three measures to look at resource distributions across groups of schools. We include the raw scores only to provide a comparison to last year's work.

Resource Distributions Across Low, Middle and High Performing Groups of Elementary Schools

In Tables 12 through 17, we present data on average student, and school and resource characteristics by groups of low, middle and high performing schools. In Tables 12 through 14, the three groups of schools are defined by whether they are more than plus or minus one standard deviation from the mean of raw, residual or fixed effects of *levels* of 5th grade reading score measures. The subsequent three tables, 15 through 17, are based on *changes* from 4th to 5th grade reading on raw, residual or fixed effect measures. All raw and residual calculations are based on 1998 data. Using standard deviations from the mean to construct groups of low, middle and high performing schools across different scores and different methods results in different numbers of schools falling into each group for each table. In addition, as Tables 5 through 11 demonstrated, the methods and scores themselves are conceptually and empirically different measures of efficiency/performance.

The second page of each table shows averages for a variety of resources by performance group. Definitions of the resource groupings are evident from their titles; more complete definitions can be found in Appendix Table G. The teacher pupil ratio is for all teachers and all students (both general and special education); resources are reported in total and in subgroups of the totals. The first group of spending numbers is on all students, while the next group is spending on general education students only (excluding resource room or full-time special education), both per general education student. These two spending groups provide us with the extremes available in the data. Spending on all students mixes students with and without special needs, while general education spending reflects only those expenditures related to students who for a majority of their day are in general education settings. In addition, following the per-pupil numbers are percents of totals, which provide yet another view of resource distribution.

Table 12 is included as a comparison to last year's report (Stiefel et al, 2000) in which only raw scores were used to group schools. The results are fundamentally the same: low performing schools teach higher percentages of special education, limited English proficient, black, Hispanic, and poor students. They teach lower percentages of resource room, Asian, and

recent immigrant students, and employ teachers who are proportionately less licensed, lower paid, and less experienced. In terms of resources, the lower performing schools have higher teacher/pupil ratios and spend more per pupil. Proportionately, the three groups of schools spend about the same percentages on direct services to schools and classroom instruction, while low performing schools spend proportionately more on teachers and less on paraprofessionals, textbooks and professional development. Again, these are similar results to those presented in the last condition report (Stiefel et al., 2000), as they should be because they use the same method to group schools.

Table 13 shows the results of grouping schools by the residuals from the 5th grade reading regressions. In these tables, the educational needs, attendance, socioeconomic variables and teacher characteristics are much more similar across the three groups of schools than they were when schools were grouped by raw scores. This is to be expected, because all of these variables were entered into the regression and thereby controlled for, leaving only omitted variables (including efficiency), and random error in the residual. We would then expect that the mean values of the included variables would be more similar across the groups than they were for the raw scores.

Resources are also essentially evened out across the groups, which would not have been obvious, since not all these variables were entered into the regression. If we use residuals as a measure of efficiency, then we would conclude that the three groups of schools do not differ with respect to students, teachers or resources, and that their differences in adjusted performance must be due to some uncaptured variable in the residual.

Table 14's results differ. They are based on groupings using the fixed effects instead of the residuals, and these fixed effects are the most accurate measure of all three of what one might mean by efficiency. In this table we see differences across the groups. Similar to the raw results, but not as pronounced, the low performing schools teach higher percentages of special education, black and poor students, and lower percentages of recent immigrant students. They also employ teachers who are proportionately less licensed, lower paid, and less experienced. On the other hand, in contrast to the raw score results, the low performing schools teach lower percentages of limited English proficient and Hispanic students and have equal percentages to the high performing schools of resource room and Asian students. As with the raw measures, in terms of resources, the lower performing schools have higher teacher/pupil ratios, and spend more per pupil. Proportionately, the three groups of schools spend about the same percentages on direct services to schools and classroom instruction, while low performing schools spend

proportionately *less* on teachers and *more* on paraprofessionals, textbooks and professional development.

Tables 15 through 17 repeat Tables 12 through 14, except they are based on changes in reading scores. The results using the change-based measures differ from those using the level-based measures. The results in Table 15 are particularly interesting when compared to those in Table 12. Considerably fewer schools (25 to 35 fewer) are in the low and high performing groups; conversely, more are in the middle-performing group. Many of the characteristics of students, schools and resources are more evenly distributed across the groups than was true for the raw scores. In particular, the percentages of students with special needs are either essentially the same (resource room students) or considerably more evenly spread. Attendance percentages are even, percentages of students by race/ethnicity are either even or more level, teacher resources are leveled, and, in a reverse of the pattern for levels, spending per pupil is slightly *higher* in the high performing group. The change measures definitely differ not only in concept and in the way they classify schools, but also in the results of the average student, school and resources across groups.

What happens when we use residuals, based on change scores, to group schools? Results in Table 16, where these results are presented, are similar to results in Table 15 in that the characteristics and resources are somewhat evenly distributed across performance groups. However, compared to the results of the residuals based on levels of scores (Table 13) , the averages are not as even. Thus, the raw change scores to a considerable extent *even out* the characteristics and resources across groups, compared to the raw level scores. The residuals based on changes, however, do not even out characteristics to the extent that residuals based on levels do. Some of the reason for this result can be found in the regression equations (Table 4). The change regressions have lower R-squares and many fewer statistically significant coefficients than do the level regressions. This, in turn, means that the change regressions are not able to "control" for the student and school characteristics as well as the level regressions. In general, changes in variables are harder to explain than are levels, and we have no different conclusion here.

The last Table, 17, groups schools based on fixed effects from change in score regressions. This table is comparable to Table 14 for the levels. Table 17 results differ the most from those of the other tables. Again, the percentage of special education and percentage of Asian and black students are considerably higher in low performing schools. But contrary to other results, the percentage of Hispanic students is notably higher in high performing schools, as is the percentage of limited English proficient students. Also the percentage of teachers who are

licensed and are experienced is higher in low performing schools. Salaries are even, while spending per pupil is higher in low performing schools. If we use Table 17 to gauge efficient schools, we break many of the stereotypes about characteristics of high and low performance, especially with respect to Hispanic students and licensed teachers. Finally, in this table, as in the table of fixed effects based on levels of scores, school size is larger in high performing schools - this is the only time we find this result in any pronounced way.

V. Conclusions

Several conclusions follow closely from the empirical work, and some are inferred from the work. Ones that follow closely include:

- Choices must be made about tests, grades and methods for measuring performance/efficiency because schools are grouped differently and characteristics change depending on the particular measure of performance/efficiency used.
- Raw scores are not measures of efficiency, though their levels and changes are important to track because ultimately it is these kinds of measures that schools hope to improve and produce at high levels.
- Conceptually, fixed effects seem to be the best measure of efficiency at the school level, but they are not easy to estimate well. It is not yet clear how many years of panel data can be used in an estimation before a school is not the same one. If not very many years can be used, as was the case in this study, then control variables do not change much and it is difficult to control statistically once fixed effects are added to the regression equation.
- Changes in scores yield very different results from levels of scores in both raw and fixed effects classifications. Residuals do not even out the controls or resources in the change classifications as much as they do in the level classifications.
- Causality is difficult to model. In the estimated regressions in Table 4, there is possible reverse causality, though the instruments we used to overcome this problem did not work well. In addition, the average use of resources across performance/efficiency groups describes differences but does not show causality.
- Future research should explore longer time series, include middle and high schools, and use individual student data.

We are certain that there will be interest in what the results of this study imply for ranking schools based on performance or efficiency. New York State already uses some rankings to identify Schools Under Registration Review, commonly referred to as SURR schools, and there currently is talk of including bonus pay for New York City teachers at good performing schools. The purpose of this study was not to determine ranking methods, but rather to group schools and find averages of resource use. We are much more confident that the results *group* schools reasonably well, than that the results *rank* them well. We envision that mistakes might be made at the borderline between rankings (e.g., between high and middle performing schools). In addition, it is vitally important that explicit choices are based on grade, test, level, change and method before any ranking of schools is done.

Endnotes

[1] Much of the material on production functions is drawn from other publications by Schwartz and Stiefel, notably, "Measuring School Efficiency: Lessons from Economics, Implications for Practice," forthcoming in *Improving Educational Productivity,* editors, David H. Monk and Herbert J. Walberg , Information Age Publishing Inc.

[2] Regressions using math scores are also estimated and results from these regressions are presented in Appendix Table A. the regressions for 4th grade and changes from 3rd to 4th grade reading and math are in Appendix Tables B and C.

[3] We also included interactions between many of the variables and some quadratic forms (for enrollment for example), but we did not find any significant results with these functional forms. Therefore we used the more parsimonious logarithmic form and used the interactions for our instrumental variable estimations. Finally, we estimate equations that include instruments for the teacher/pupil ratio. The possible need for instrumental variables exists because of the possible reverse causality (or endogeneity) of the teacher/pupil ratio and the dependent variables. While we hypothesize that more intensity in teacher resources raises test scores, *ceteris paribus*, low scores may also trigger a response on the part of the school system, which sends additional teacher resources to low performing schools. Such reverse causality, if not corrected statistically with instrumental variables or otherwise, will result in biased coefficients for all variables. Results for these estimations are in the Appendix Tables D-F.

[4] In 1997, there are 938 schools of which 46 are excluded from the three-year balanced panel. In 1998, there are 937 schools of which 45 are excluded. In 1999, there are 960 schools of which 68 are excluded.

[5] A bridge school is one that is not an elementary school in the fullest sense because it spans only pre-kindergarten or kindergarten to second grades. On a citywide basis, the BOE does not test below third grade.

[6] In 1997, out of the 730,809 registered students in the 938 schools, 11,516 are enrolled in the 46 excluded schools (approximately, 1.6% of the students). In 1998, out of the 737,561 registered students in the 937 schools, 13,561 are enrolled in the 45 excluded schools (approximately, 1.8% of the total). In 1999, out of the 741,431 registered students in the 960 schools, 16,047 are enrolled in the 68 excluded schools (approximately, 2.2% of the students). In 1997, there are actually 941 observations in the data set. There are three schools that have two separate codes in this year. We combine the data from the two separate codes for each of the three schools. Thus, six observations are combined into three.

[7] Elementary and middle schools in New York City have multiple grade configurations. By basing our sample on schools with 4th and 5th grades we capture most of the schools that are identified as elementary schools by the BOE and a few that are identified as middle schools by the BOE.

[8] Comparable analyses for math scores and for changes from 3rd to 4th grade were conducted as well. Results do not differ significantly from those discussed in the paper.

[9] $$Z = \frac{X_{it} - \overline{X_t}}{\sqrt{S_t^2}}$$

[10] We also estimated regressions reported in the paper and Appendix using two sets of weights (the inverse of the square root of enrollment and enrollment). Results were materially the same, although an occasional standard error changed enough to make a variable or two become significant or insignificant at the 5% or lower level. Appendix Table A shows the results for 5th grade math and Appendix Tables B and C show these results for 4th grade reading and math.

References

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Note: Readers are directed to the Education Finance Research Consortium's website, http://www.albany.edu/edfin, for Appendices A-G to this condition report. The Appendices contain tabular data used by the authors to produce the report.

TABLE 1. Variable Names and Descriptions

Variable Name	Description
Test Scores (TS)	
R5ZMEAN	Reading, grade 5: mean Z score.
CHR5ZMN	Change in reading test scores from 4^{th} to 5^{th} grades
Student Characteristics (ST)	
PFL	Percent of students eligible for free or reduced price lunch
PASIAN	Percent of students who are Asian or other
PBLACK	Percent of students who are black
PHISP	Percent of students who are Hispanic
PIMMIG	Percent of students who have arrived in the U.S. in the last three years
PFEMALE	Percent of students who are female
PLEP	Percent of students who are limited English proficient
PRR	Percent of students who are receiving resource room
PSEREG	Percent of students who are in special education
PATTEN	Percent of days student attended
PFULLYR	Percent of students in this school in October and June
School Inputs and Characteristics (SC)	
TCH_PUP	Number of full time equivalent teachers per 100 students
PTCHLISC	Percent of teachers who are fully licensed and permanently assigned
PTCH5PLS	Percent of teachers who have five or more years of teaching experience
PTCH2PLS	Percent of teachers who have been in this school for 2 or more years
A_NONTCH	Non-Teacher Spending per pupil
ENROLL	Total student enrollment

TABLE 2. Descriptive Statistics Test Scores, Student Characteristics, and School Inputs and Characteristics 1998

Variable	Label	N	Mean	Std Dev	Minimum	Maximum
Test Scores (TS)						
R5ZMEAN	Read, Grade 5 Mean Z score	626	0.003	0.48	-1.31	1.82
M5ZMEAN	Math, Grade 5 Mean Z score	626	0.011	0.52	-1.45	1.25
CHR5ZMN	Read, Grade 4 to 5 Mean Z	626	0.002	0.18	-0.87	1.07
CHM5ZMN	Math, Grade 4 to 5 Mean Z	626	0.003	0.19	-0.64	0.89
Student Characteristics (ST)						
PFL	% of Stu, free lunch	626	75.14	24.37	6.30	100.00
PASIAN	% of Stu, Asian or other	626	10.68	14.71	0.10	94.30
PBLACK	% of Stu, black	626	35.69	31.57	0.20	97.60
PHISP	% of Stu, Hispanic	626	35.57	26.38	1.30	98.10
PIMMIG	% of Stu, recent immigrants	626	7.82	6.08	0.00	36.40
PFEMALE	% of Stu, female	626	48.80	2.52	38.50	61.60
PLEP	% of Stu, LEP	611	15.81	12.74	0.40	96.50
PRR	% of Stu, resource room	625	5.95	2.53	0.40	16.50
PSEREG	% of Stu, special education	626	5.94	6.09	0.00	31.20
PATTEN	% Ave. Daily Attendance	626	91.14	2.41	84.20	97.00
PFULLYR	% of Stu, in this sch oct&jun	620	92.03	3.67	49.60	99.60
School Inputs and Characteristics (SC)						
TCH_PUP	Teacher per 100 students	626	6.33	1.09	3.17	15.06
PTCHLISC	% of Tch, fully licensed	606	87.43	11.74	41.20	100.00
PTCH5PLS	% of Tch, experienced 5+yrs	606	61.97	11.82	15.80	90.60
PTCH2PLS	% of Tch, this sch 2+ yrs	606	69.59	13.22	0.00	96.90
A_NONTCH	Non-teacher spend per pupil	626	4465.57	1097.70	2572.08	10450.45
ENROLL	Total student enrollment	626	791.66	347.83	112.00	2672.00

Note: The regressions include controls for missing data.

TABLE 3. Descriptive Statistics Change in Independent Variables from 1997 to 1999

Label	N	Mean	Std Dev	Minimum	Maximum
Change in Student Characteristics (ST) from 1997 to 1999					
% of Stu, free lunch	626	-0.840	7.56	-65.70	34.71
% of Stu, Asian or other	626	0.743	2.33	-22.80	10.40
% of Stu, black	626	-0.216	3.03	-16.10	16.60
% of Stu, Hispanic	626	0.582	3.13	-10.30	37.10
% of Stu, recent immigrants	626	-1.082	2.40	-20.50	12.00
% of Stu, female	626	0.108	2.38	-6.90	23.70
% of Stu, LEP	623	-1.524	3.41	-14.70	17.40
% of Stu, resource room	624	0.044	1.64	-6.20	8.50
% of Stu, special education	602	-0.446	2.26	-10.30	12.80
% Ave. daily attendance	625	0.702	1.02	-3.00	5.50
% of Stu, in this sch oct&jun	625	1.110	7.63	-24.50	87.40
Change in School Inputs and Characteristics (SC) from 1997 to 1999					
% of Tch, fully licensed	600	0.303	8.87	-28.60	89.70
% of Tch, experienced 5+yrs	604	-7.966	8.93	-52.00	65.50
% of Tch, this school 2+ yrs	593	-18.660	12.39	-65.80	40.10
Proportional changes					
Teachers per 100 students	626	0.092	0.14	-0.97	1.08
non-teacher spending per pupil	626	0.234	0.14	-0.16	1.07
Total Students	626	0.027	0.18	-0.93	1.77

TABLE 4. Selected Coefficients Reading

	5th Grd.	**5th Grd. Fixed Effects***	**Δ 4-5th Grd.**	**Δ 4-5th Grd. Fixed Effects***
Intercept	**-4.228**		-0.284	
	(0.518)		(0.394)	
PFL	**-0.006**	**-0.003**	0.000	0.001
	(0.000)	(0.001)	(0.000)	(0.001)
PASIAN	**-0.002**	0.006	**0.002**	**0.018**
	(0.001)	(0.004)	(0.000)	(0.004)
PBLACK	**-0.005**	-0.004	0.000	0.006
	(0.000)	(0.003)	(0.000)	(0.004)
PHISP	**-0.005**	**-0.010**	0.000	-0.002
	(0.000)	(0.004)	(0.000)	(0.004)
PIMMIG	**0.009**	**-0.006**	0.000	0.000
	(0.001)	(0.003)	(0.001)	(0.004)
PFEMALE	**0.011**	0.004	0.001	0.003
	(0.002)	(0.003)	(0.002)	(0.003)
PLEPrec	**-0.007**	0.000	0.000	0.002
	(0.001)	(0.001)	(0.001)	(0.002)
PRRrec	**-0.010**	-0.003	0.001	0.001
	(0.002)	(0.004)	(0.002)	(0.005)
PSEREGrec	**0.005**	-0.005	-0.002	-0.001
	(0.002)	(0.003)	(0.001)	(0.004)
logTCH_PUP	0.007	-0.009	-0.033	-0.039
	(0.033)	(0.030)	(0.025)	(0.034)
PTCHLISCrec	0.001	0.000	0.001	0.000
	(0.001)	(0.001)	(0.001)	(0.001)
PTCH5PLSrec	**-0.001**	0.000	-0.001	0.000
	(0.001)	(0.001)	(0.000)	(0.001)
PTCH2PLSrec	**0.002**	0.000	0.001	0.000
	(0.001)	(0.001)	(0.000)	(0.001)
logENROLL	-0.023	**-0.099**	-0.004	-0.033
	(0.015)	(0.046)	(0.011)	(0.052)
PATTENrec	**0.050**	0.006	-0.004	-0.010
	(0.004)	(0.007)	(0.003)	(0.008)
PFULLYRrec	**0.004**	0.002	**0.002**	**0.002**
	(0.001)	(0.001)	(0.001)	(0.001)
logA_NONTCH	-0.040	**0.230**	0.053	**0.270**
	(0.045)	(0.071)	(0.035)	(0.080)
YRDM1998	**-0.030**	**-0.036**	0.003	-0.016
	(0.016)	(0.016)	(0.012)	(0.018)
YRDM1999	0.007	**-0.058**	0.003	**-0.043**
	(0.019)	(0.022)	(0.014)	(0.024)
R-squared	0.766	0.936	0.033	0.423
N	1878	1878	1878	1878
F statistics	224.43	27.64	2.43	1.37

*F-test for joint significance of school fixed effects significant at 1% level

Note 1: Bold indicates significant at 10% level or better

Note 2: Regressions include dummies for missing PLEP, PRR, PSEREG, PTCHLISC, PTCH5PLS, PTCH2PLS, PATTEN, and PFULLYR

TABLE 5. Pearson Correlation Coefficients Performance Measures: Raw Z Scores

Level Performance			
	5th Grd. Math	**4th Grd. Rdg.**	**4th Grd. Math**
5th Grd. Rdg.	0.937 <.0001	0.897 <.0001	0.882 <.0001
5th Grd. Math		0.877 <.0001	0.915 <.0001
4th Grd. Rdg.			0.941 <.0001

Change in Performance			
	Δ 4-5th Math	**Δ 3-4th Rdg.**	**Δ 3-4th Math**
Δ 4-5th Rdg.	0.535 <.0001	0.113[a] 0.0047	0.074[a] 0.0664
Δ 4-5th Math		0.050[a] 0.2099	0.095[a] 0.0180
Δ 3-4th Rdg.			0.591[a] 0.0895

Level and Change in Performance				
	Δ 4-5th Rdg.	**Δ 4-5th Math**	**Δ 3-4th Rdg.**	**Δ 3-4th Math**
5th Grd. Rdg.	0.161 <.0001	0.025 0.5258	0.170[a] <.0001	0.147[a] 0.0002
5th Grd. Math	0.096 0.0163	0.126 0.0016	0.164[a] <.0001	0.165[a] <.0001
4th Grd. Rdg.	-0.015 0.7151	-0.063 0.1132	0.342[a] <.0001	0.241[a] <.0001
4th Grd. Math	-0.020 0.6153	-0.092 0.0212	0.239[a] <.0001	0.273[a] <.0001

N schools = 626
[a] N = 621

TABLE 6. Pearson Correlation Coefficients
Performance Measures: Residuals and Fixed Effects

	Residuals	**Fixed Effects**
5th Grd. Rdg., 5th Grd. Math	0.770	0.857
Δ 4-5th Rdg., Δ 4-5th Math	0.550	0.674

N schools = 626

Note: All correlations are significant at 1% level

TABLE 7. Pearson Correlation Coefficients Performance Measures: Raw Scores, Residuals and Fixed Effects

	5th Grade Reading	**Δ 4-5th Reading**
Raw Scores, Residuals	0.488	0.989
Residuals, Fixed Effects	0.600	0.234
Raw Scores, Fixed Effects	0.647	0.182

N schools = 626

Note: All correlations are significant at 1% level

TABLE 8. Cross Tabulation 5th Grade Reading and Math by Performance Grouping

Raw Z Scores

Reading \ Math	1	2	3	Total
1	79	24	0	103
	12.6	3.8	0.0	16.5
	76.7	***23.3***	***0.0***	
	71.8	**6.1**	**0.0**	
2	31	350	25	406
	5.0	55.9	4.0	64.9
	7.6	***86.2***	***6.2***	
	28.2	**89.5**	**20.0**	
3	0	17	100	117
	0.0	2.7	16.0	18.7
	0.0	***14.5***	***85.5***	
	0.0	**4.4**	**80.0**	
Total	110	391	125	626
	17.6	62.5	20.0	100
		% on diagonal		84.5

Residuals

Reading \ Math	1	2	3	Total
1	52	39	1	92
	8.3	6.2	0.2	14.7
	56.5	***42.4***	***1.1***	
	53.1	**8.8**	**1.2**	
2	46	375	26	447
	7.4	59.9	4.2	71.4
	10.3	***83.9***	***5.8***	
	46.9	**84.3**	**31.3**	
3	0	31	56	87
	0.0	5.0	9.0	13.9
	0.0	***35.6***	***64.4***	
	0.0	**7.0**	**67.5**	
Total	98	445	83	626
	15.7	71.1	13.3	100
		% on diagonal		77.2

Fixed Effects

Reading \ Math	1	2	3	Total
1	75	18	0	93
	12.0	2.9	0.0	14.9
	80.7	***19.4***	***0.0***	
	73.5	**4.2**	**0.0**	
2	27	379	34	440
	4.3	60.5	5.4	70.3
	6.1	***86.1***	***7.7***	
	26.5	**87.7**	**37.0**	
3	0	35	58	93
	0.0	5.6	9.3	14.9
	0.0	***37.6***	***62.4***	
	0.0	**8.1**	**63.0**	
Total	102	432	92	626
	16.3	69.0	14.7	100
		% on diagonal		81.8

Frequency
Percent
Row Pct
Col Pct

TABLE 9. Cross Tabulation Change in Reading and Math from 4th to 5th Grade by Performance Grouping

Raw Z Scores

Reading	Math 1	Math 2	Math 3	Total
1	30	45	3	78
	4.8	7.2	0.5	12.5
	38.5	***57.7***	***3.9***	
	36.6	**9.7**	**3.7**	
2	52	368	49	469
	8.3	58.8	7.8	74.9
	11.1	***78.5***	***10.5***	
	63.4	**79.5**	**60.5**	
3	0	50	29	79
	0.0	8.0	4.6	12.6
	0.0	***63.3***	***36.7***	
	0.0	**10.8**	**35.8**	
Total	82	463	81	626
	13.1	74.0	12.9	100
		% on diagonal		68.2

Residuals

Reading	Math 1	Math 2	Math 3	Total
1	29	50	1	80
	4.6	8.0	0.2	12.8
	36.3	***62.5***	***1.3***	
	34.9	**10.9**	**1.2**	
2	54	361	46	461
	8.6	57.7	7.4	73.6
	11.7	***78.3***	***10.0***	
	65.1	**78.5**	**55.4**	
3	0	49	36	85
	0.0	7.8	5.8	13.6
	0.0	***57.7***	***42.4***	
	0.0	**10.7**	**43.4**	
Total	83	460	83	626
	13.3	73.5	13.3	100
		% on diagonal		68.1

Fixed Effects

Reading	Math 1	Math 2	Math 3	Total
1	45	45	1	91
	7.2	7.2	0.2	14.5
	49.5	***49.5***	***1.1***	
	44.1	**10.6**	**1.0**	
2	56	337	38	431
	9.0	53.8	6.1	68.9
	13.0	***78.2***	***8.8***	
	54.9	**79.1**	**38.8**	
3	1	44	59	104
	0.2	7.0	9.4	16.6
	1.0	***42.3***	***56.7***	
	1.0	**10.3**	**60.2**	
Total	102	426	98	626
	16.3	68.1	15.7	100
		% on diagonal		70.4

Frequency
Percent
Row Pct
Col Pct

TABLE 10. Cross Tabulation 5th Grade Reading by Performance Grouping: Raw, Residuals, Fixed Effects

Residuals

Raw	1	2	3	Total
1	40 6.4 ***38.8*** **43.5**	63 10.1 ***61.2*** **14.1**	0 0.0 ***0.0*** **0.0**	103 16.5
2	46 7.4 ***11.3*** **50.0**	308 49.2 ***75.9*** **68.9**	52 8.3 ***12.8*** **59.8**	406 64.9
3	6 1.0 ***5.1*** **6.5**	76 12.1 ***65.0*** **17.0**	35 5.6 ***29.9*** **40.2**	117 18.7
Total	92 14.7	447 71.4	87 13.9	626 100
		% on diagonal		61.2

Fixed Effects

Residuals	1	2	3	Total
1	39 6.2 ***42.4*** **41.9**	51 8.2 ***55.4*** **11.6**	2 0.3 ***2.2*** **2.2**	92 14.7
2	54 8.6 ***12.1*** **58.1**	346 55.3 ***77.4*** **78.6**	47 7.5 ***10.5*** **50.5**	447 71.4
3	0 0.0 ***0.0*** **0.0**	43 6.9 ***49.4*** **9.8**	44 7.0 ***50.6*** **47.3**	87 13.9
Total	93 14.9	440 70.3	93 14.9	626 100
		% on diagonal		68.5

Fixed Effects

Raw	1	2	3	Total
1	52 8.3 ***50.5*** **55.9**	51 8.2 ***49.5*** **11.6**	0 0.0 ***0.0*** **0.0**	103 16.5
2	41 6.6 ***10.1*** **44.1**	318 50.8 ***78.3*** **72.3**	47 7.5 ***11.6*** **50.5**	406 64.9
3	0 0.0 ***0.0*** **0.0**	71 11.3 ***60.7*** **16.1**	46 7.4 ***39.3*** **49.5**	117 18.7
Total	93 14.9	440 70.3	93 14.9	626 100
		% on diagonal		66.5

Frequency
Percent
Row Pct
Col Pct

TABLE 11. Cross Tabulation Change in Reading 4th to 5th Grade by Performance Grouping: Raw, Residuals, Fixed Effects

Residuals

Raw	1	2	3	Total
1	75 12.0 ***96.2*** **93.8**	3 0.5 ***3.9*** **0.7**	0 0.0 ***0.0*** **0.0**	78 12.5
2	5 0.8 ***1.1*** **6.3**	455 72.7 ***97.0*** **98.7**	9 1.4 ***1.9*** **10.6**	469 74.9
3	0 0.0 ***0.0*** **0.0**	3 0.5 ***3.8*** **0.7**	76 12.1 ***96.2*** **89.4**	79 12.6
Total	80 12.8	461 73.6	85 13.6	626 100
		% on diagonal		96.8

Fixed Effects

Residuals	1	2	3	Total
1	20 3.2 ***25.0*** **22.0**	56 9.0 ***70.0*** **13.0**	4 0.6 ***5.0*** **3.9**	80 12.8
2	69 11.0 ***15.0*** **75.8**	318 50.8 ***69.0*** **73.8**	74 11.8 ***16.1*** **71.2**	461 73.6
3	2 0.3 ***2.4*** **2.2**	57 9.1 ***67.1*** **13.2**	26 4.2 ***30.6*** **25.0**	85 13.6
Total	91 14.5	431 68.9	104 16.6	626 100
		% on diagonal		58.2

Fixed Effects

Raw	1	2	3	Total
1	17 2.7 ***21.8*** **18.7**	57 9.1 ***73.1*** **13.2**	4 0.6 ***5.1*** **3.9**	78 12.5
2	71 11.3 ***15.1*** **78.0**	317 50.6 ***67.6*** **73.6**	81 12.9 ***17.3*** **77.9**	469 74.9
3	3 0.5 ***3.8*** **3.3**	57 9.1 ***72.2*** **13.2**	19 3.0 ***24.1*** **18.3**	79 12.6
Total	91 14.5	431 68.9	104 16.6	626 100
		% on diagonal		56.3

Table 12. 5th Grade Reading by Level of Performance, Raw Scores

Variable	Low < -1 STD	Middle ± 1 STD	High > +1 STD
Number of Schools	103	406	117
Total Enrollment	740	839	672
TESTING (Mean Z Score[a])			
5th Grade			
Reading	-0.627	-0.055	0.756
Mathematics	-0.639	-0.039	0.749
Change from 4th Grade to 5th Grade			
Reading	-0.082	0.020	0.016
Mathematics	-0.041	0.011	-0.016
EDUCATIONAL NEEDS			
Percent of students			
in special education	9.00	5.51	4.71
receiving resource room services	5.43	5.96	6.37
with limited English proficiency	20.32	16.11	10.75
ATTENDANCE			
Pct of students in this school for entire year	89.97	91.64	95.15
Average daily attendance	88.57	91.09	93.54
SOCIOECONOMIC VARIABLES			
Percent of students who are			
Asian	2.48	10.63	18.04
black	47.14	39.70	11.67
Hispanic	49.15	37.33	17.48
white	1.23	12.33	52.81
female	48.41	48.95	48.62
recent immigrants (within the past 3 years)	4.96	8.38	8.36
eligible for free lunch	92.95	80.91	39.46
TEACHERS			
Percent of teachers			
licensed and permanently assigned to the school	75.54	87.88	96.46
with 5+ years teaching experience	54.96	62.39	66.78
who have been in this school for 2+ years	59.49	70.56	75.18
Average teacher salary	39969.77	43158.17	46431.89
Average prep-period salary per teacher	105.17	55.93	38.06
Average other salary per teacher	1444.49	1558.88	2373.78

Note: The cutoff for each group is based on the standard deviation of the raw Z scores that equals 0.003.
[a] A school's average National Curve Equivalent scores are transformed to Z scores, standardizing the scores across time.

Table 12 (continued).

	Low	Middle	High
RESOURCES			
Teacher:Pupil	7.08	6.30	5.81
TOTAL Spending per pupil – ALL students	9060.38	8048.79	7917.44
Direct Services to Schools	8166.92	7198.40	7072.18
A. Classroom Instruction	4740.73	4369.20	4148.11
i. Teachers	3871.48	3696.53	3695.44
ii. Ed Paraprofessionals	380.45	295.69	177.41
iii. Textbooks, Librarians/Library Books	106.28	80.73	68.84
iv. Professional Development	129.58	114.94	97.56
B. Instructional Support Services	983.51	762.47	828.21
C. Leadership/Supervision/Support	683.56	598.38	571.34
Spending as a percent of TOTAL spending per pupil			
Direct Services to Schools	89.86	89.23	89.10
A. Classroom Instruction	52.66	54.59	52.75
i. Teachers	43.09	46.28	47.09
ii. Ed Paraprofessionals	4.14	3.61	2.15
iii. Textbooks, Librarians/Library Books	1.18	1.02	0.88
iv. Professional Development	1.46	1.43	1.25
B. Instructional Support Services	10.37	9.20	10.08
C. Leadership/Supervision/Support	7.55	7.42	7.28
TOTAL Spending per pupil - GE ONLY	7348.90	6787.05	6544.13
Direct Services to Schools	6521.95	5991.29	5758.18
A. Classroom Instruction	4217.06	3970.57	3728.65
i. Teachers	3502.95	3396.81	3382.14
ii. Ed Paraprofessionals	249.23	212.22	87.64
iii. Textbooks, Librarians/Library Books	103.38	78.55	67.08
iv. Professional Development	112.45	104.21	86.09
B. Instructional Support Services	321.00	238.88	209.36
C. Leadership/Supervision/Support	643.24	569.30	535.13
Spending as a percent of TOTAL spending per pupil			
Direct Services to Schools	88.58	88.14	87.85
A. Classroom Instruction	57.40	58.54	57.18
i. Teachers	47.72	50.14	51.87
ii. Ed Paraprofessionals	3.39	3.13	1.34
iii. Textbooks, Librarians/Library Books	1.40	1.16	1.03
iv. Professional Development	1.55	1.53	1.34
B. Instructional Support Services	4.33	3.51	3.15
C. Leadership/Supervision/Support	8.67	8.33	8.16

Table 13. 5th Grade Reading by Level of Performance, Residuals

Variable	Low < -1 STD	Middle ± 1 STD	High > +1 STD
Number of Schools	92	447	87
Total Enrollment	744	809	753
TESTING (Mean Z Score[a])			
5th Grade			
Reading	-0.303	-0.010	0.392
Mathematics	-0.250	0.001	0.328
Change from 4th Grade to 5th Grade			
Reading	-0.084	0.001	0.100
Mathematics	-0.038	-0.011	0.075
EDUCATIONAL NEEDS			
Percent of students			
in special education	5.68	5.99	5.96
receiving resource room services	6.00	5.89	6.21
with limited English proficiency	15.32	15.93	15.68
ATTENDANCE			
Pct of students in this school for entire year	91.59	91.99	92.68
Average daily attendance	91.08	91.19	90.94
SOCIOECONOMIC VARIABLES			
Percent of students who are			
Asian	11.29	11.05	8.11
black	30.86	36.88	34.66
Hispanic	36.79	35.03	37.05
white	21.06	17.04	20.18
female	48.92	48.72	49.06
recent immigrants (within the past 3 years)	7.53	7.98	7.30
eligible for free lunch	73.62	75.45	75.14
TEACHERS			
Percent of teachers			
licensed and permanently assigned to the school	88.42	87.38	86.68
with 5+ years teaching experience	63.17	62.05	60.27
who have been in this school for 2+ years	68.76	70.19	67.25
Average teacher salary	43222.54	43257.41	43208.01
Average prep-period salary per teacher	63.41	61.48	53.77
Average other salary per teacher	1499.40	1675.38	1983.70

Note: The cutoff for each group is based on the standard deviation of the residuals that equals 0.232.
[a] A school's average National Curve Equivalent scores are transformed to Z scores, standardizing the scores across time.

Table 13 (continued).

	Low	Middle	High
RESOURCES			
Teacher:Pupil	6.36	6.33	6.32
TOTAL Spending per pupil – ALL Students	8278.27	8163.35	8238.52
Direct Services to Schools	7408.27	7310.45	7377.66
A. Classroom Instruction	4388.35	4389.21	4388.70
i. Teachers	3721.39	3726.76	3720.62
ii. Ed Paraprofessionals	283.73	287.90	289.63
iii. Textbooks, Librarians/Library Books	90.79	80.68	84.61
iv. Professional Development	106.60	116.68	108.78
B. Instructional Support Services	852.75	804.84	799.44
C. Leadership/Supervision/Support	638.72	602.40	599.58
Spending as a percent of TOTAL spending per pupil			
Direct Services to Schools	89.23	89.33	89.29
A. Classroom Instruction	53.28	54.13	53.61
i. Teachers	45.40	46.08	45.55
ii. Ed Paraprofessionals	3.34	3.45	3.40
iii. Textbooks, Librarians/Library Books	1.07	1.00	1.05
iv. Professional Development	1.28	1.44	1.36
B. Instructional Support Services	9.87	9.51	9.44
C. Leadership/Supervision/Support	7.69	7.38	7.30
TOTAL Spending per pupil - GE ONLY	6871.20	6826.66	6833.04
Direct Services to Schools	6058.28	6031.30	6029.66
A. Classroom Instruction	3945.62	3977.36	3928.52
i. Teachers	3392.49	3421.22	3381.87
ii. Ed Paraprofessionals	190.28	197.98	184.85
iii. Textbooks, Librarians/Library Books	88.51	78.55	81.99
iv. Professional Development	91.85	105.10	98.09
B. Instructional Support Services	250.94	248.55	233.93
C. Leadership/Supervision/Support	613.18	568.47	568.75
Spending as a percent of TOTAL spending per pupil			
Direct Services to Schools	88.00	88.21	88.04
A. Classroom Instruction	57.51	58.31	57.68
i. Teachers	49.63	50.22	49.71
ii. Ed Paraprofessionals	2.74	2.89	2.68
iii. Textbooks, Librarians/Library Books	1.25	1.15	1.20
iv. Professional Development	1.33	1.54	1.46
B. Instructional Support Services	3.58	3.61	3.41
C. Leadership/Supervision/Support	8.78	8.28	8.31

Table 14. 5th Grade Reading by Level of Performance, Fixed Effects

Variable	Low < -1 STD	Middle ± 1 STD	High > +1 STD
Number of Schools	93	440	93
Total Enrollment	617	814	859
TESTING (Mean Z Score[a])			
5th Grade			
Reading	-0.489	0.012	0.452
Mathematics	-0.502	0.029	0.431
Change from 4th Grade to 5th Grade			
Reading	-0.038	0.008	0.016
Mathematics	-0.042	-0.006	0.050
EDUCATIONAL NEEDS			
Percent of students			
in special education	7.85	5.88	4.32
receiving resource room services	5.63	6.06	5.74
with limited English proficiency	13.23	16.00	17.41
ATTENDANCE			
Pct of students in this school for entire year	89.79	92.02	94.32
Average daily attendance	89.14	91.27	92.48
SOCIOECONOMIC VARIABLES			
Percent of students who are			
Asian	9.36	11.16	9.72
black	59.55	34.32	18.28
Hispanic	26.46	35.29	45.98
white	4.63	19.23	26.02
female	48.35	48.76	49.41
recent immigrants (within the past 3 years)	5.58	7.95	9.42
eligible for free lunch	89.98	73.87	66.32
TEACHERS			
Percent of teachers			
licensed and permanently assigned to the school	80.77	88.18	90.26
with 5+ years teaching experience	58.03	62.63	62.60
who have been in this school for 2+ years	63.01	70.19	73.07
Average teacher salary	40884.69	43553.57	44148.22
Average prep-period salary per teacher	80.73	58.94	48.98
Average other salary per teacher	1489.98	1684.20	1933.38

Note: The cutoff for each group is based on the standard deviation of the fixed effects that equals –1.338.
[a] A school's average National Curve Equivalent scores are transformed to Z scores, standardizing the scores across time.

Table 14 (continued).

	Low	Middle	High
RESOURCES			
Teacher:Pupil	7.03	6.27	5.92
TOTAL Spending per pupil – ALL Students	9000.57	8139.53	7622.82
Direct Services to Schools	8114.23	7286.86	6777.93
A. Classroom Instruction	4733.30	4362.49	4170.17
i. Teachers	3923.43	3713.07	3583.77
ii. Ed Paraprofessionals	335.03	285.81	248.16
iii. Textbooks, Librarians/Library Books	96.65	80.30	80.19
iv. Professional Development	128.29	112.87	105.72
B. Instructional Support Services	914.12	811.62	705.82
C. Leadership/Supervision/Support	709.13	594.52	566.22
Spending as a percent of TOTAL spending per pupil			
Direct Services to Schools	89.87	89.32	88.72
A. Classroom Instruction	52.91	53.93	54.95
i. Teachers	43.98	46.03	47.24
ii. Ed Paraprofessionals	3.64	3.43	3.20
iii. Textbooks, Librarians/Library Books	1.06	1.00	1.07
iv. Professional Development	1.47	1.39	1.42
B. Instructional Support Services	9.70	9.65	8.96
C. Leadership/Supervision/Support	7.84	7.32	7.45
TOTAL Spending per pupil - GE ONLY	7426.26	6777.96	6507.50
Direct Services to Schools	6603.64	5983.25	5711.44
A. Classroom Instruction	4253.63	3938.02	3810.13
i. Teachers	3577.23	3397.75	3311.01
ii. Ed Paraprofessionals	224.46	193.23	174.05
iii. Textbooks, Librarians/Library Books	94.26	78.08	78.17
iv. Professional Development	111.01	101.27	97.65
B. Instructional Support Services	286.58	244.11	220.22
C. Leadership/Supervision/Support	668.94	562.14	542.46
Spending as a percent of TOTAL spending per pupil			
Direct Services to Schools	88.73	88.14	87.64
A. Classroom Instruction	57.29	58.18	58.56
i. Teachers	48.26	50.28	50.86
ii. Ed Paraprofessionals	3.01	2.84	2.66
iii. Textbooks, Librarians/Library Books	1.25	1.15	1.21
iv. Professional Development	1.52	1.49	1.53
B. Instructional Support Services	3.82	3.58	3.33
C. Leadership/Supervision/Support	8.89	8.25	8.31

Table 15. Change in Reading from 4th to 5th Grade by Level of Performance, Raw Z Scores

Variable	Low < -1 STD	Middle ± 1 STD	High > +1 STD
Number of Schools	78	469	79
Total Enrollment	718	815	725
TESTING (Mean Z Score[a])			
5th Grade			
Reading	-0.134	0.006	0.116
Mathematics	-0.064	0.011	0.077
Change from 4th Grade to 5th Grade			
Reading	-0.296	0.003	0.292
Mathematics	-0.165	-0.004	0.163
EDUCATIONAL NEEDS			
Percent of students			
in special education	6.78	5.83	5.75
receiving resource room services	5.95	5.98	5.78
with limited English proficiency	18.21	15.44	15.58
ATTENDANCE			
Pct of students in this school for entire year	92.12	91.97	92.29
Average daily attendance	90.98	91.18	91.05
SOCIOECONOMIC VARIABLES			
Percent of students who are			
Asian	10.16	10.76	10.67
black	27.50	36.46	39.16
Hispanic	41.58	34.65	35.08
white	20.76	18.12	15.08
female	48.57	48.78	49.14
recent immigrants (within the past 3 years)	7.96	7.74	8.09
eligible for free lunch	73.77	74.98	77.45
TEACHERS			
Percent of teachers			
licensed and permanently assigned to the school	85.12	87.96	86.46
with 5+ years teaching experience	61.40	62.31	60.40
who have been in this school for 2+ years	68.57	69.74	69.67
Average teacher salary	42949.68	43369.91	42798.38
Average prep-period salary per teacher	85.76	59.56	42.68
Average other salary per teacher	1637.52	1702.90	1683.95

Note: The cutoff for each group is based on the standard deviation of raw scores that equals 0.002.
[a] A school's average National Curve Equivalent scores are transformed to Z scores, standardizing the scores across time.

Table 15 (continued).

	Low	Middle	High
RESOURCES			
Teacher:Pupil	6.45	6.28	6.54
TOTAL Spending per pupil – ALL Students	8412.20	8098.67	8518.25
Direct Services to Schools	7547.36	7244.90	7653.61
A. Classroom Instruction	4418.28	4359.67	4534.32
i. Teachers	3765.27	3703.84	3811.76
ii. Ed Paraprofessionals	297.43	282.13	309.83
iii. Textbooks, Librarians/Library Books	82.55	82.27	85.49
iv. Professional Development	104.92	114.16	122.79
B. Instructional Support Services	935.31	784.58	846.09
C. Leadership/Supervision/Support	626.56	596.29	653.98
Spending as a percent of TOTAL spending per pupil			
Direct Services to Schools	89.51	89.24	89.53
A. Classroom Instruction	52.98	54.16	53.53
i. Teachers	45.27	46.14	45.15
ii. Ed Paraprofessionals	3.45	3.39	3.59
iii. Textbooks, Librarians/Library Books	0.98	1.03	1.01
iv. Professional Development	1.26	1.42	1.44
B. Instructional Support Services	10.62	9.37	9.58
C. Leadership/Supervision/Support	7.48	7.37	7.65
TOTAL Spending per pupil - GE ONLY	6832.97	6778.88	7163.01
Direct Services to Schools	6026.51	5981.70	6360.10
A. Classroom Instruction	3963.25	3940.68	4118.34
i. Teachers	3430.36	3392.96	3503.21
ii. Ed Paraprofessionals	194.68	190.44	222.57
iii. Textbooks, Librarians/Library Books	80.26	80.19	82.57
iv. Professional Development	92.75	102.54	109.32
B. Instructional Support Services	256.27	239.90	279.00
C. Leadership/Supervision/Support	585.20	565.71	620.74
Spending as a percent of TOTAL spending per pupil			
Direct Services to Schools	88.10	88.10	88.54
A. Classroom Instruction	58.05	58.19	57.60
i. Teachers	50.29	50.18	49.13
ii. Ed Paraprofessionals	2.84	2.79	3.10
iii. Textbooks, Librarians/Library Books	1.16	1.18	1.15
iv. Professional Development	1.36	1.51	1.53
B. Instructional Support Services	3.74	3.51	3.82
C. Leadership/Supervision/Support	8.48	8.30	8.58

Table 16. Change in Reading from 4th to 5th Grade by Level of Performance, Residuals

Variable	Low < -1 STD	Middle ± 1 STD	High > +1 STD
Number of Schools	80	461	85
Total Enrollment	724	816	722
TESTING (Mean Z Score[a])			
5th Grade			
Reading	-0.118	0.003	0.113
Mathematics	-0.047	0.010	0.060
Change from 4th Grade to 5th Grade			
Reading	-0.292	0.002	0.282
Mathematics	-0.159	-0.006	0.162
SPECIAL EDUCATION			
Percent of students			
in special education	6.50	5.82	6.03
receiving resource room services	5.95	6.00	5.69
with limited English proficiency	17.83	15.57	15.19
ATTENDANCE			
Pct of students in this school for entire year	92.27	91.96	92.22
Average daily attendance	91.00	91.19	90.98
SOCIOECONOMIC VARIABLES			
Percent of students who are			
Asian	10.53	11.05	8.77
black	28.15	36.42	38.76
Hispanic	40.70	34.47	36.69
white	20.61	18.05	15.76
female	48.71	48.76	49.10
recent immigrants (within the past 3 years)	7.89	7.90	7.29
eligible for free lunch	73.70	75.11	76.68
TEACHERS			
Percent of teachers			
licensed and permanently assigned to the school	85.58	88.03	85.70
with 5+ years teaching experience	61.06	62.40	60.34
who have been in this school for 2+ years	68.90	69.91	68.33
Average teacher salary	42998.53	43367.14	42817.65
Average prep-period salary per teacher	79.73	60.18	45.59
Average other salary per teacher	1657.40	1691.09	1732.18

Note: The cutoff for each group is based on the standard deviation of the residuals that equals 0.178.
[a] A school's average National Curve Equivalent scores are transformed to Z scores, standardizing the scores across time.

Table 16 (continued).

	Low	Middle	High
RESOURCES			
Teacher:Pupil	6.40	6.29	6.50
TOTAL Spending per pupil – ALL Students	8351.82	8108.20	8486.40
Direct Services to Schools	7486.71	7254.87	7620.66
A. Classroom Instruction	4388.43	4365.42	4517.50
i. Teachers	3737.75	3710.28	3793.67
ii. Ed Paraprofessionals	294.56	282.01	310.87
iii. Textbooks, Librarians/Library Books	82.79	82.51	83.74
iv. Professional Development	104.61	114.38	121.52
B. Instructional Support Services	919.24	786.70	841.88
C. Leadership/Supervision/Support	621.68	597.02	649.84
Spending as a percent of TOTAL spending per pupil			
Direct Services to Schools	89.42	89.26	89.49
A. Classroom Instruction	52.99	54.17	53.51
i. Teachers	45.25	46.17	45.09
ii. Ed Paraprofessionals	3.44	3.39	3.61
iii. Textbooks, Librarians/Library Books	0.99	1.03	0.99
iv. Professional Development	1.27	1.42	1.43
B. Instructional Support Services	10.51	9.38	9.58
C. Leadership/Supervision/Support	7.48	7.37	7.64
TOTAL Spending per pupil - GE ONLY	6806.10	6785.89	7121.89
Direct Services to Schools	5998.45	5989.32	6317.41
A. Classroom Instruction	3940.35	3946.55	4094.95
i. Teachers	3407.00	3398.92	3484.18
ii. Ed Paraprofessionals	194.94	190.75	218.26
iii. Textbooks, Librarians/Library Books	80.36	80.48	80.72
iv. Professional Development	92.42	102.83	107.80
B. Instructional Support Services	254.49	240.48	274.38
C. Leadership/Supervision/Support	580.95	566.59	615.63
Spending as a percent of TOTAL spending per pupil			
Direct Services to Schools	88.03	88.12	88.45
A. Classroom Instruction	57.92	58.22	57.61
i. Teachers	50.13	50.22	49.16
ii. Ed Paraprofessionals	2.85	2.79	3.04
iii. Textbooks, Librarians/Library Books	1.17	1.18	1.13
iv. Professional Development	1.36	1.52	1.51
B. Instructional Support Services	3.73	3.52	3.78
C. Leadership/Supervision/Support	8.45	8.30	8.57

Table 17. Change in Reading from 4th to 5th Grade by Level of Performance, Fixed Effects

Variable	Low < -1 STD	Middle ± 1 STD	High > +1 STD
Number of Schools	91	431	104
Total Enrollment	784	775	866
TESTING (Mean Z Score[a])			
5th Grade			
Reading	-0.029	0.000	0.040
Mathematics	0.029	0.002	0.026
Change from 4th Grade to 5th Grade			
Reading	-0.062	0.000	0.069
Mathematics	-0.083	-0.009	0.094
EDUCATIONAL NEEDS			
Percent of students			
in special education	6.14	6.26	4.43
receiving resource room services	5.13	6.04	6.28
with limited English proficiency	13.92	14.74	22.04
ATTENDANCE			
Pct of students in this school for entire year	91.59	91.92	92.87
Average daily attendance	91.39	90.98	91.56
SOCIOECONOMIC VARIABLES			
Percent of students who are			
Asian	24.62	9.40	3.75
black	49.47	38.28	12.88
Hispanic	17.15	33.45	60.47
white	8.77	18.87	22.89
female	48.74	48.72	49.17
recent immigrants (within the past 3 years)	9.63	7.57	7.26
eligible for free lunch	75.26	75.33	74.27
TEACHERS			
Percent of teachers			
licensed and permanently assigned to the school	88.56	87.85	84.59
with 5+ years teaching experience	64.99	61.45	61.45
who have been in this school for 2+ years	71.07	69.20	69.90
Average teacher salary	43385.32	43231.03	43182.66
Average prep-period salary per teacher	63.06	62.22	52.30
Average other salary per teacher	1689.00	1675.33	1765.91

Note: The cutoff for each group is based on the standard deviation of the fixed effects that equals –1.819.
[a] A school's average National Curve Equivalent scores are transformed to Z scores, standardizing the scores across time.

Table 17 (continued).

	Low	Middle	High
RESOURCES			
Teacher:Pupil	6.36	6.38	6.11
TOTAL Spending per pupil – ALL Students	8303.58	8264.84	7784.58
Direct Services to Schools	7458.81	7404.11	6935.22
A. Classroom Instruction	4434.85	4416.45	4235.20
i. Teachers	3745.07	3750.57	3602.19
ii. Ed Paraprofessionals	308.23	288.02	267.38
iii. Textbooks, Librarians/Library Books	73.37	83.69	86.84
iv. Professional Development	126.20	114.61	101.38
B. Instructional Support Services	880.15	823.24	700.53
C. Leadership/Supervision/Support	601.21	608.47	608.01
Spending as a percent of TOTAL spending per pupil			
Direct Services to Schools	89.49	89.36	88.93
A. Classroom Instruction	53.81	53.80	54.58
i. Teachers	45.63	45.82	46.51
ii. Ed Paraprofessionals	3.61	3.39	3.39
iii. Textbooks, Librarians/Library Books	0.87	1.02	1.12
iv. Professional Development	1.54	1.40	1.31
B. Instructional Support Services	9.99	9.63	8.85
C. Leadership/Supervision/Support	7.20	7.37	7.80
TOTAL Spending per pupil - GE ONLY	6818.01	6863.33	6727.00
Direct Services to Schools	6024.57	6063.40	5926.63
A. Classroom Instruction	3982.30	3975.28	3912.77
i. Teachers	3419.25	3424.08	3352.76
ii. Ed Paraprofessionals	196.65	190.85	210.90
iii. Textbooks, Librarians/Library Books	71.47	81.40	84.65
iv. Professional Development	114.28	102.33	90.94
B. Instructional Support Services	239.55	252.12	231.51
C. Leadership/Supervision/Support	565.41	574.93	584.16
Spending as a percent of TOTAL spending per pupil			
Direct Services to Schools	88.19	88.20	87.95
A. Classroom Instruction	58.31	58.02	58.26
i. Teachers	50.20	50.05	50.02
ii. Ed Paraprofessionals	2.87	2.77	3.08
iii. Textbooks, Librarians/Library Books	1.02	1.18	1.26
iv. Professional Development	1.67	1.49	1.36
B. Instructional Support Services	3.49	3.64	3.39
C. Leadership/Supervision/Support	8.17	8.33	8.64