Expert Report

CCJEF v. Connecticut

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I. Introduction

In this report I examine student level data on the Connecticut Mastery Test (CMT).

The findings are summarized below.

1. There is no evidence of a systematic positive relationship between spending and student achievement overall or for most student subgroups.
2. Knowing how much a district spends per student tells us virtually nothing about the level or growth of achievement of a student on the CMT. This derives from the lack of an overall relationship between district spending per student and student achievement as well as the fact that the vast majority of variation in student achievement is *within* districts and *within* schools rather than between them.
3. A consequence of the first two points is that there is no statistical foundation for "costing out" a given level of student achievement. There is no statistically credible way to establish a level of district spending per student that can reliably forecast a given level of student achievement as measured by the CMT.

These findings are consistent with the larger research literature, where traditional measures of school resources have a weak or inconsistent relationship with student achievement (Hanushek, 1986, 2003), and are also consistent with similar analyses of student test scores and spending I have undertaken as an expert witness in school finance cases in Missouri, Texas, and Kansas.

II. Analysis of Variance (ANOVA) on CMT scores

Analysis of Variance (ANOVA) is a statistical procedure that decomposes or divides the variance in a variable into a share that is within groups and a share that is between groups. In the analysis below, ANOVA is used to decompose variation in student test scores on the Connecticut Mastery Test (CMT) into a share that is *within* schools or districts and a share that is *between* them. If most of the variation in student achievement is between districts, then it is at least possible that district or school-level resource measures could explain a large share of achievement gaps between students. However, if most of the variation in achievement is within districts or schools, then it is logically impossible for variation in district or school resources to explain most of the student achievement gaps.

The following charts report ANOVA results for student-level 2012 8th grade CMT scale scores.[1] As noted, ANOVA is used to decompose the total variance or inequality of CMT scores into a share that is *within* school districts and the share that is *between* school districts. ANOVA is also used to decompose the share of test score inequality that is within schools versus between schools.

Figure 1 focuses on school districts, and reports the percent of total variation in 8th grade CMT scores within and between districts on four CMT tests. The height of each column is 100%. The lower blue portion is the within district share and the upper red portion is the between district share. Between 75-80 percent of the variation is within districts and only 20-25 percent is between districts. This means that if average test score gaps between districts were entirely eliminated (i.e., the average CMT score in every school district were the same), the vast majority of test score inequality would remain.

Figure 2 reports the percent of total variation in 8th grade CMT scores within and between *schools* on the same four CMT tests. Roughly 70-75 percent of the variation is within schools and roughly 25-30 percent is between schools. This means that if average test score gaps between schools were eliminated, the vast majority of test score inequality would remain.

The lesson of Figures 1 and 2 is that achievement inequality on the CMT is largely a within district and within school phenomenon. This means that variation in school resource measures at the school or district level cannot explain the vast majority of achievement differences between students.

[1] CMT scale scores range from 100-400 and determine the performance levels in which a student is placed. For example, on 8th grade math a student scoring between 287 and 400 is "Advanced," 245-286 "Goal," 214-244 "Proficient," etc. See Table 1 on p. 11 for performance score ranges.

Figure 1

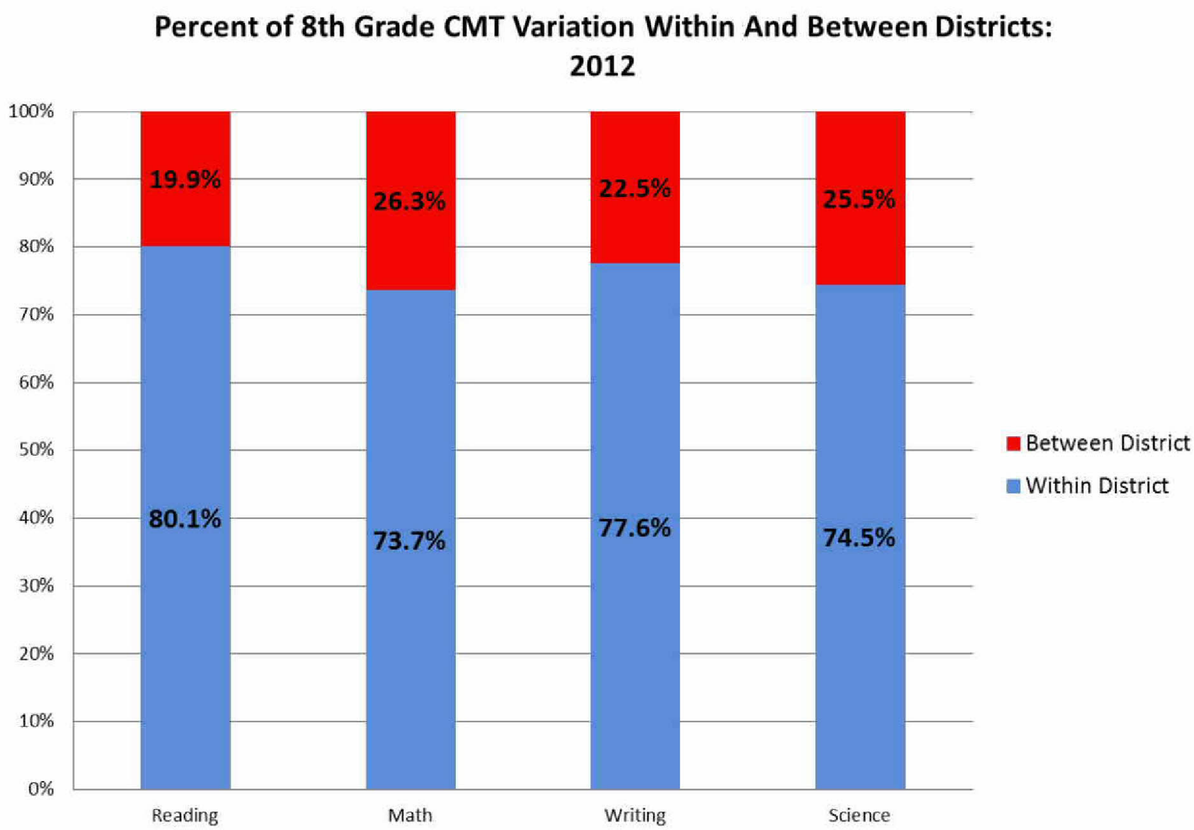
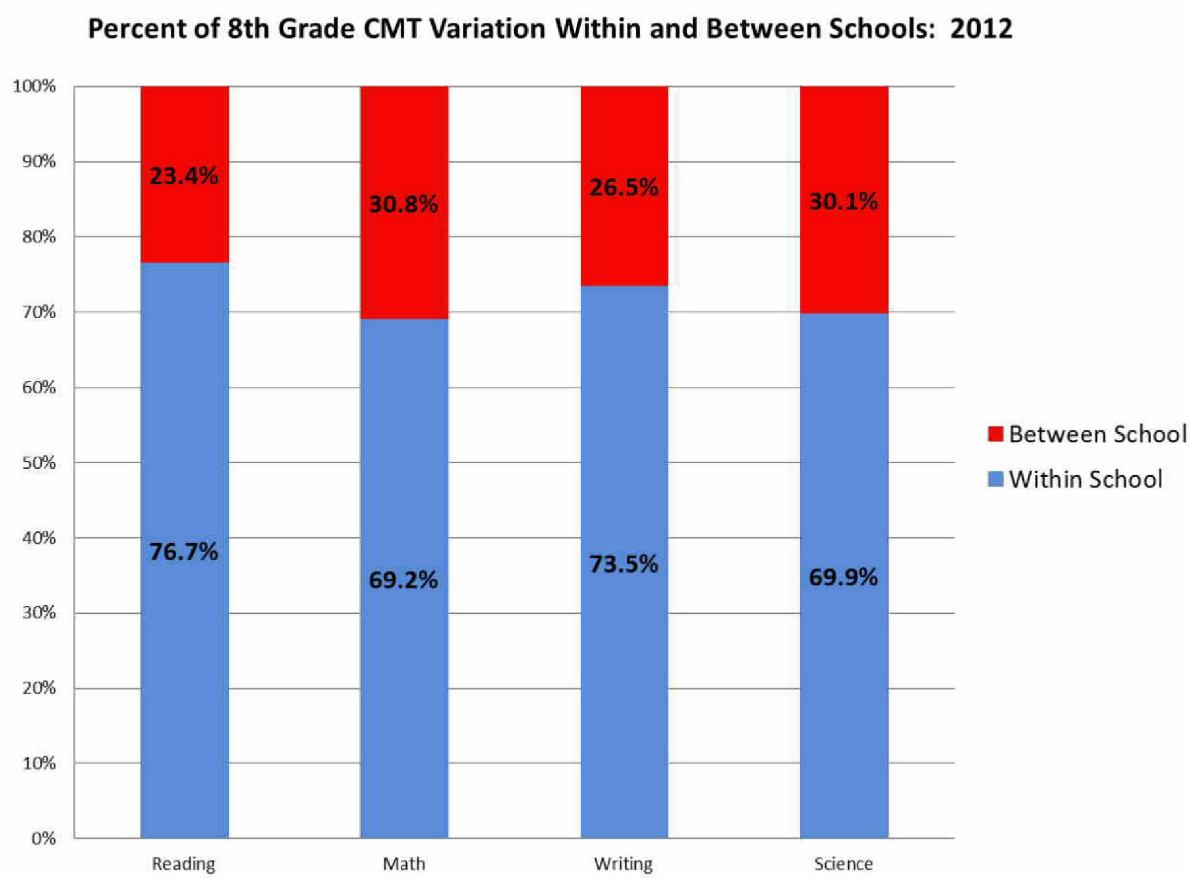

Percent of 8th Grade CMT Variation Within And Between Districts: 2012
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
19.9%
26.3%
22.5%
25.5%
80.1%
73.7%
77.6%
74.5%
Reading
Math
Writing
Science
Between District
Within District

Figure 2


Percent of 8th Grade CMT Variation Within and Between Schools: 2012
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
23.4%
30.8%
26.5%
30.1%
76.7%
69.2%
73.5%
69.9%
Reading
Math
Writing
Science
Between School
Within School

Figures 3-6 help visualize the ANOVA results. Each chart shows three distributions of CMT math scale scores. The first (dark blue) is the actual distribution of scores. The second (gray) line is a counterfactual distribution. This is the distribution that would obtain if all differences between *school districts* were eliminated (holding the overall state average score constant). Thus, if district X had an average score 5 points below the state mean, then every student in district X would receive 5 additional CMT points. The reverse would hold for a district five points above the state mean. The light blue line performs a similar analysis but in this case equalizes mean scores of 357 *schools* that reported 8^{th} grade math test scores. This graph shows the distribution of student math test scores when all differences in average scores between schools have been eliminated. This analysis shows that eliminating differences in average test scores between districts or even schools leaves the vast majority of inequality of test scores intact.

Figure 3: Actual and ANOVA Adjusted Distributions of Student Achievement: 2012 8^{th} Grade Math

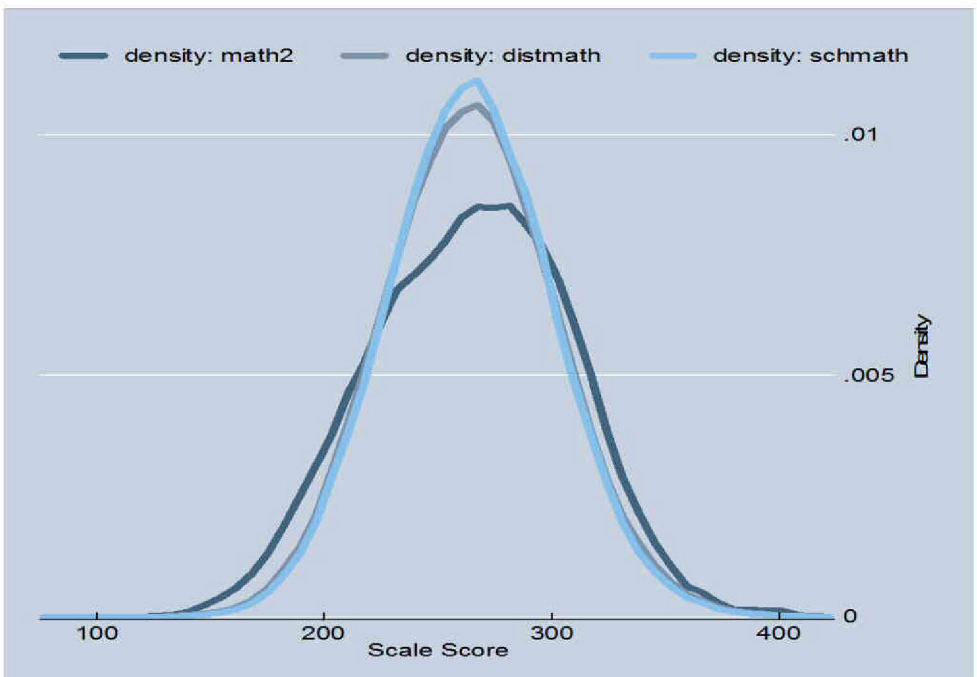


Figure 4: Actual and ANOVA Adjusted Distributions of Student Achievement: 2012 8th Grade Reading

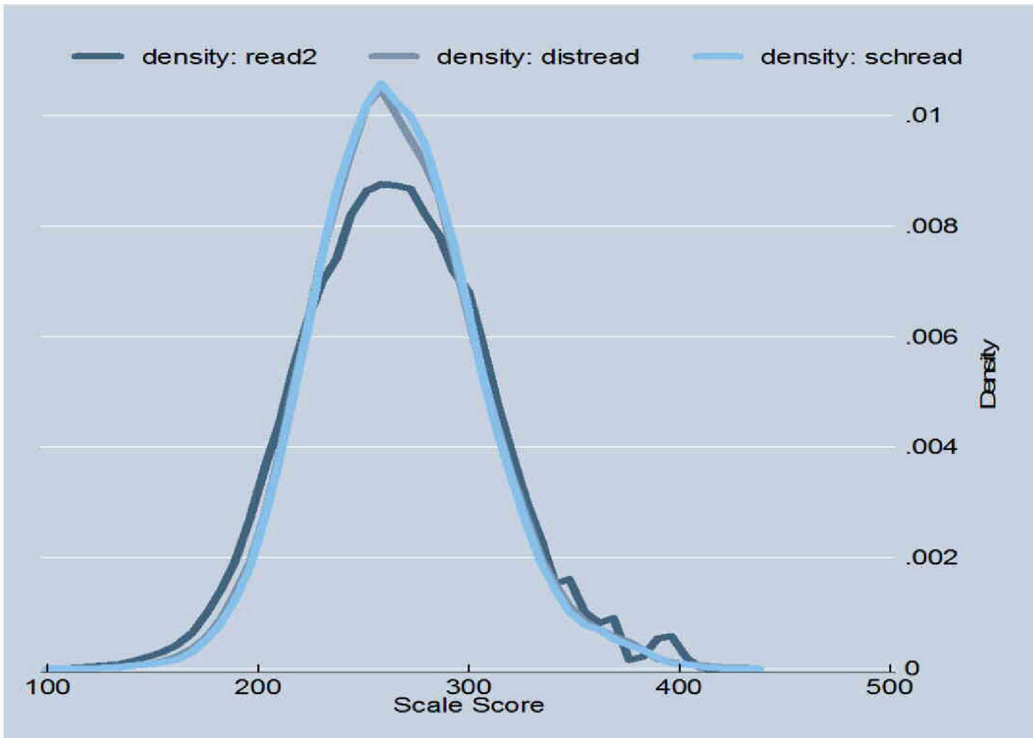


Figure 5: Actual and ANOVA Adjusted Distributions of Student Achievement: 2012 8th Grade Science

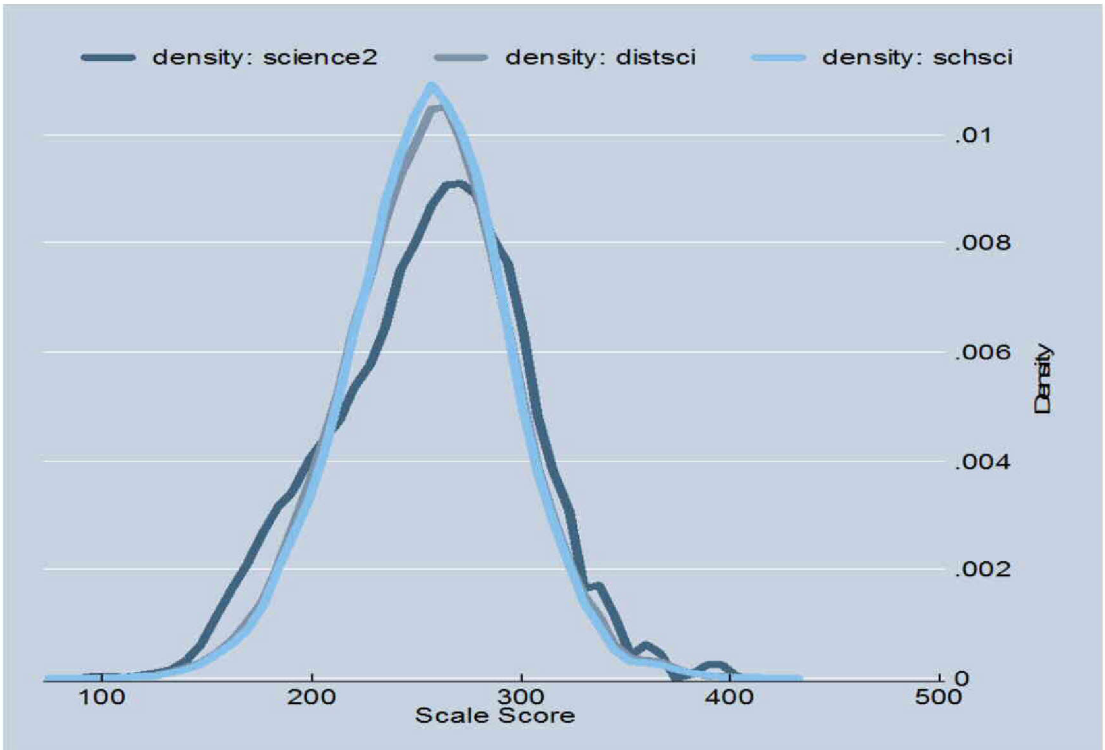
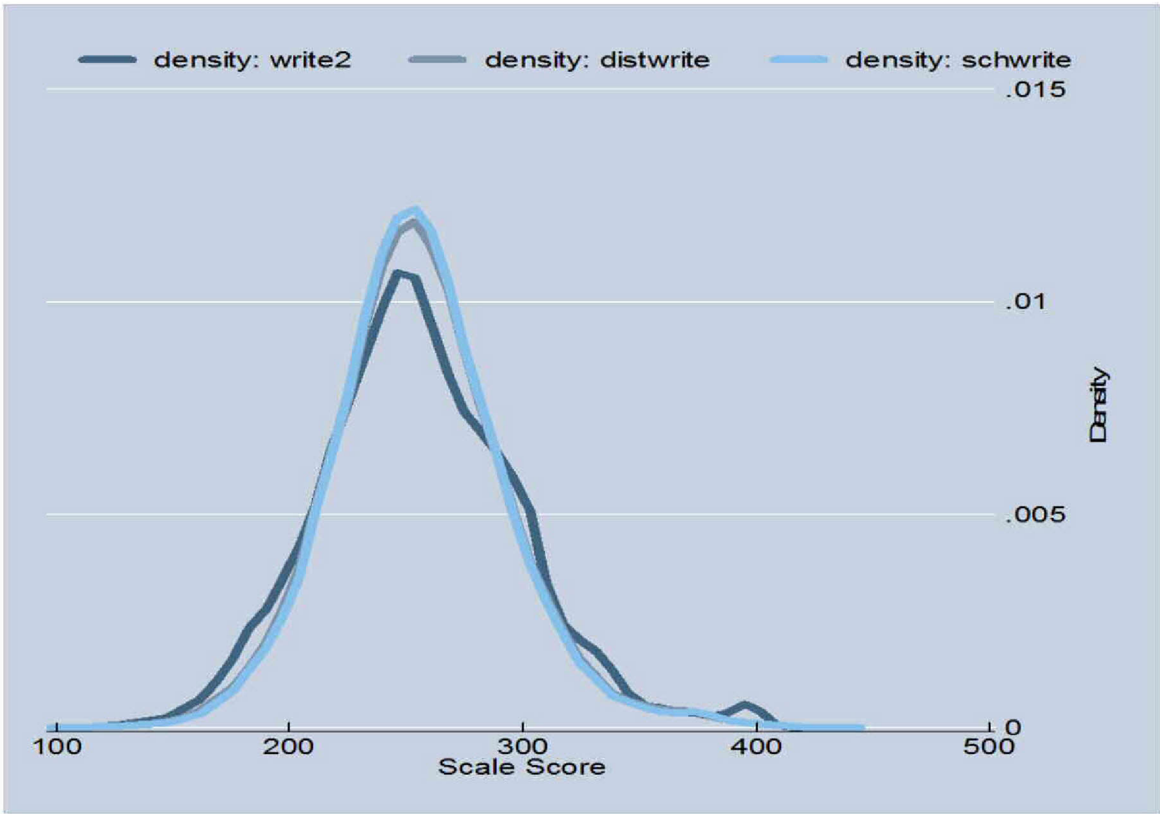


Figure 6: Actual and ANOVA Adjusted Distributions of Student Achievement: 2012 8th Grade Writing



III. Student Achievement Gaps and District Spending Per Student

This section provides an extended examination of the relationship, or lack thereof, between CMT achievement scores and district spending per student. However, before undertaking that examination it is worth beginning with an examination of gaps in CMT scores by student poverty in Figure 7 below. This chart shows the distribution of CMT test scores for students who are eligible for free and reduced-price lunches ("Poor") and students who are not.

Although there is some overlap in the distributions (indicating that some poor students do better than some non-poor students) it is clear that the average non-poor student scores well above the average poor student. The gap in the mean CMT scale score ranges from 37 to 44 points (.86 to .96 standard deviations), depending on the test. This is a large gap, but not unlike those found in other states. One way to understand the magnitude of this gap is to consider the data in Table 1 below. This table, reproduced directly from an SDE document, gives the CMT scale score ranges for the various tests and grade levels. For example, on the 8th grade math test the gap between the mid-point of the "Basic" range (191-213) and the mid-point of the "Proficient" range (214-244) is 26 points. In other words, a student in the middle of the Basic range would need 26 points to move to the middle of the Proficient range. Thus, the CMT gap between poor and non-poor students is considerably larger than the gap between a typical student performing at Proficient versus a student performing at Basic on 8th grade math.

Figure 7 Distribution of 8th Grade CMT Scores by Selected Student Characteristics.

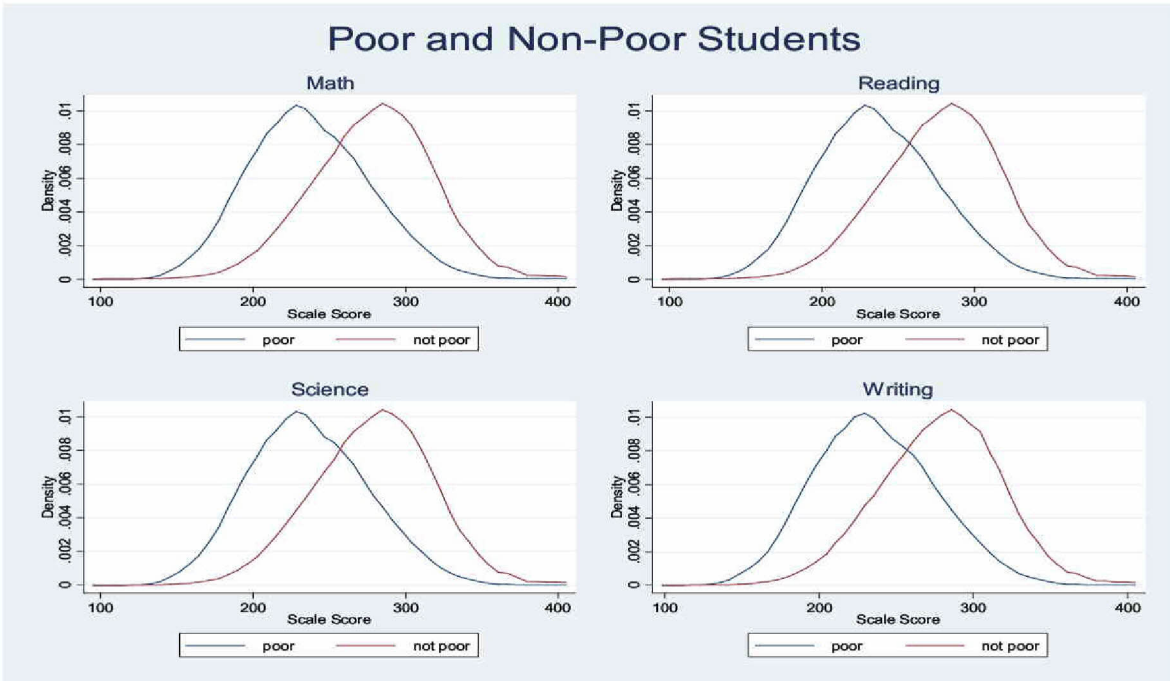


Table 1: CMT Performance Levels and Scale Score Ranges

CMT4 Achievement Levels and Scale Score Ranges

Content Area	Grade	Below Basic	Basic	Proficient	Goal	Advanced
Mathematics	3	100 - 186	187 - 209	210 - 241	242 - 287	288 - 400
	4	100 - 193	194 - 214	215 - 244	245 - 289	290 - 400
	5	100 - 190	191 - 214	215 - 244	245 - 292	293 - 400
	6	100 - 189	190 - 213	214 - 243	244 - 284	285 - 400
	7	100 -190	191 - 215	216 - 245	246 - 289	290 - 400
	8	100 - 190	191 - 213	214 - 244	245 - 286	287 - 400
Reading	3	100 - 201	202 - 216	217 - 234	235 - 278	279 - 400
	4	100 - 212	213 - 226	227 - 243	244 - 294	295 - 400
	5	100 - 202	203 - 214	215 - 229	230 - 278	279 - 400
	6	100 - 206	207 - 219	220 - 235	236 - 288	289 - 400
	7	100 - 193	194 - 207	208 - 221	222 - 272	273 - 400
	8	100 - 205	206 - 218	219 - 231	232 - 281	282 - 400
Writing	3	100 - 187	188 - 211	212 - 239	240 - 286	287 - 400
	4	100 - 184	185 - 208	209 - 236	237 - 280	281 - 400
	5	100 - 185	186 - 208	209 - 237	238 - 283	284 - 400
	6	100 - 184	185 - 210	211 - 236	237 - 283	284 - 400
	7	100 - 191	192 – 212	213 - 235	236 - 269	270 - 400
	8	100 - 188	189 - 211	212 - 235	236 - 282	283 - 400
Science	5	100 – 187	188 – 212	213 – 247	248 – 299	300 – 400
	8	100 – 201	202 – 220	221 - 243	244 - 298	299 - 400

Source:
http://www.sde.ct.gov/sde/lib/sde/pdf/student_assessment/research_and_technical/public_2011_cmt_tech_report.pdf

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Now we turn to an examination of test score gaps associated with district spending. This relationship will be explored in a variety of ways, but a common theme will be to focus on student-level test data, rather than test data averaged at the school or district level.

We start by dividing Connecticut school districts into "high" and "low" spending districts. In this analysis a high spending district is defined as one in the highest quintile (20 percent) of spending, and a low spending district as one in the lowest quintile of spending.[2] Districts in the middle 60 percent are excluded since the purpose of the exercise is to examine student achievement the upper and lower tails of district spending. If district spending per student has a potent effect on student achievement, we would expect to see a significant difference between the distributions (e.g., as in the student poverty graphs in Figure 7).

Figure 8 shows that on all four exams the distribution of student test scores for 8th grade students in high and low spending districts nearly completely overlap. This means that district spending per student conveys no useful information about student performance, at least for the top and bottom quintiles of spending.

Figure 9 plots the same test data for poor students only. These are poor students in the highest and lowest spending Connecticut school districts. Once again, these distributions nearly completely overlap. Knowing whether a poor student is enrolled in a top or bottom spending quintile district provides no useful information about how that student will perform on the CMT.

[2] Districts in the highest and lowest quintiles are listed in Appendix A.

Figure 8: Distribution of 8th Grade CMT Scores in High and Low Spending Districts

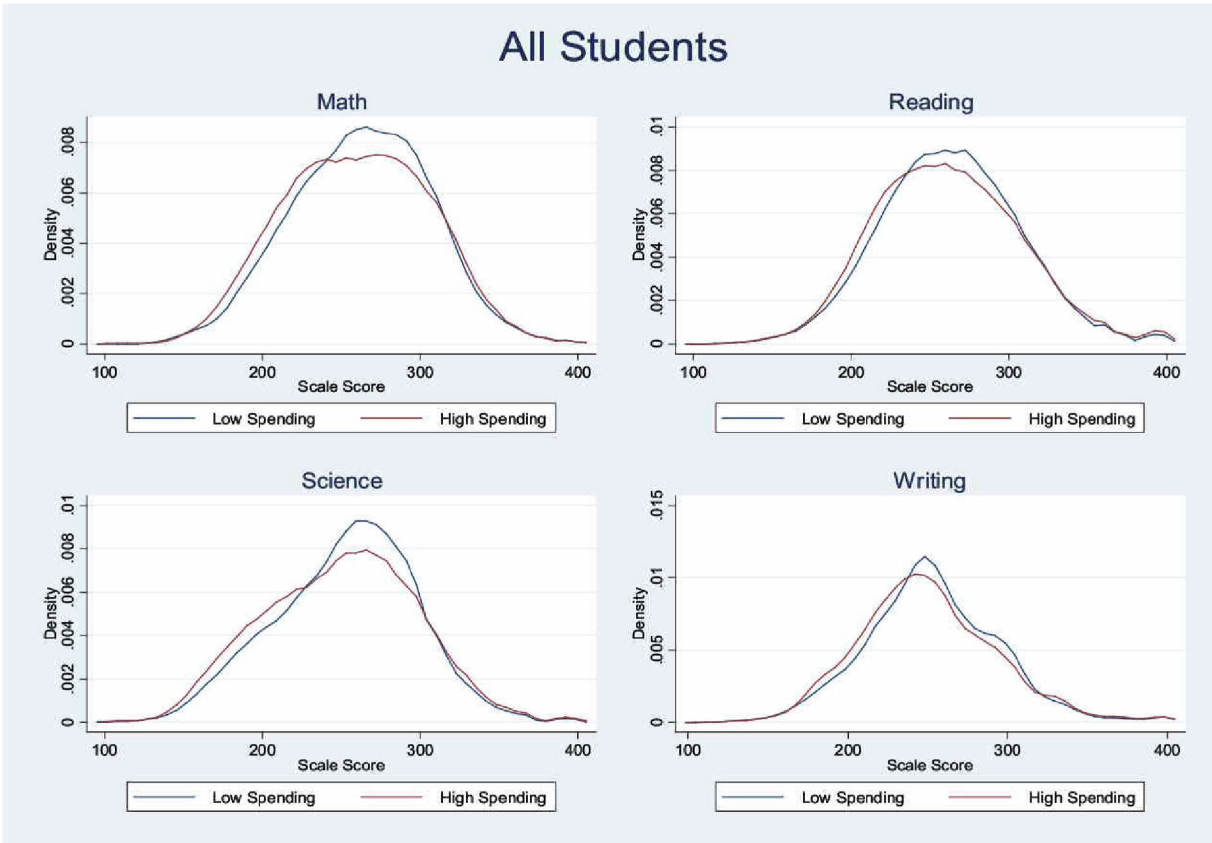

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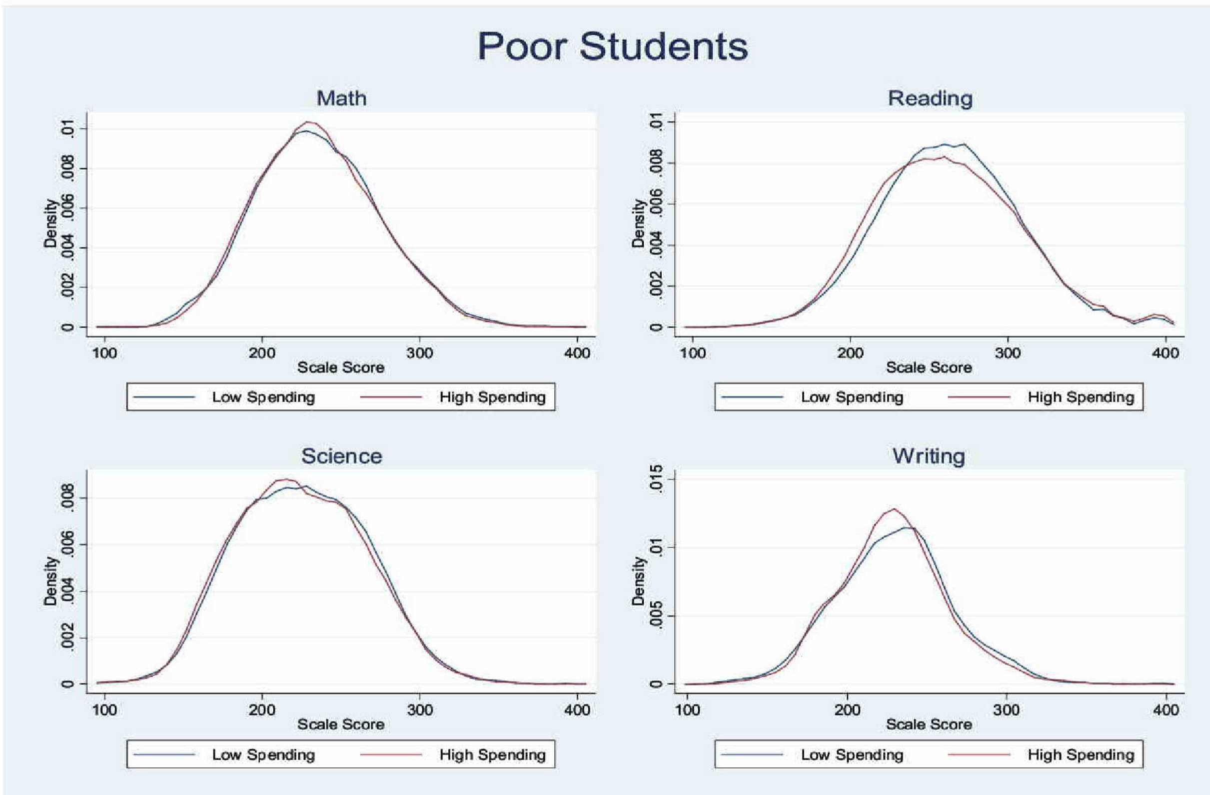
Figure 9: Distribution of 8th Grade CMT Scores in High and Low Spending Districts: Poor Students



Figures 8 and 9 presented student achievement data for the highest and lowest spending districts. The charts did not explicitly display the actual levels of spending by district. The following scattergram charts plot test scores for all students, regardless of district spending, against district average spending. Each dot represents a student or group of students with the same CMT scale score in a district with a given level of spending. All students in a district are assigned the same average spending per student, thus many of the dots are aligned vertically.

The red line represents an ordinary least squares regression line ("line of best fit") of student level CMT scores on district spending. The slope of the regression line indicates the direction and strength of the relationship between spending and student achievement. A steeper positive line represents a stronger positive association.

For each test, scattergrams are presented for six groups: all students, poor students, poor black students, poor hispanic students, ELL students, and SPED students. As in earlier charts, "Poor" means the student is eligible for free or reduced price lunches.

Note that the wide vertical spread of scores for any given level of spending is visual evidence of the point made in the previous section, namely, that that the vast majority of variation in achievement is within rather than between school districts.

These charts illustrate two points. First, knowing the average spending per student in a school district conveys no useful information about how well a student will do on the CMT. Second, analysis of CMT data finds no reliable statistical foundation for "costing out" a given level of student achievement.

Figure10. Reading Scores and District Spending Per Student

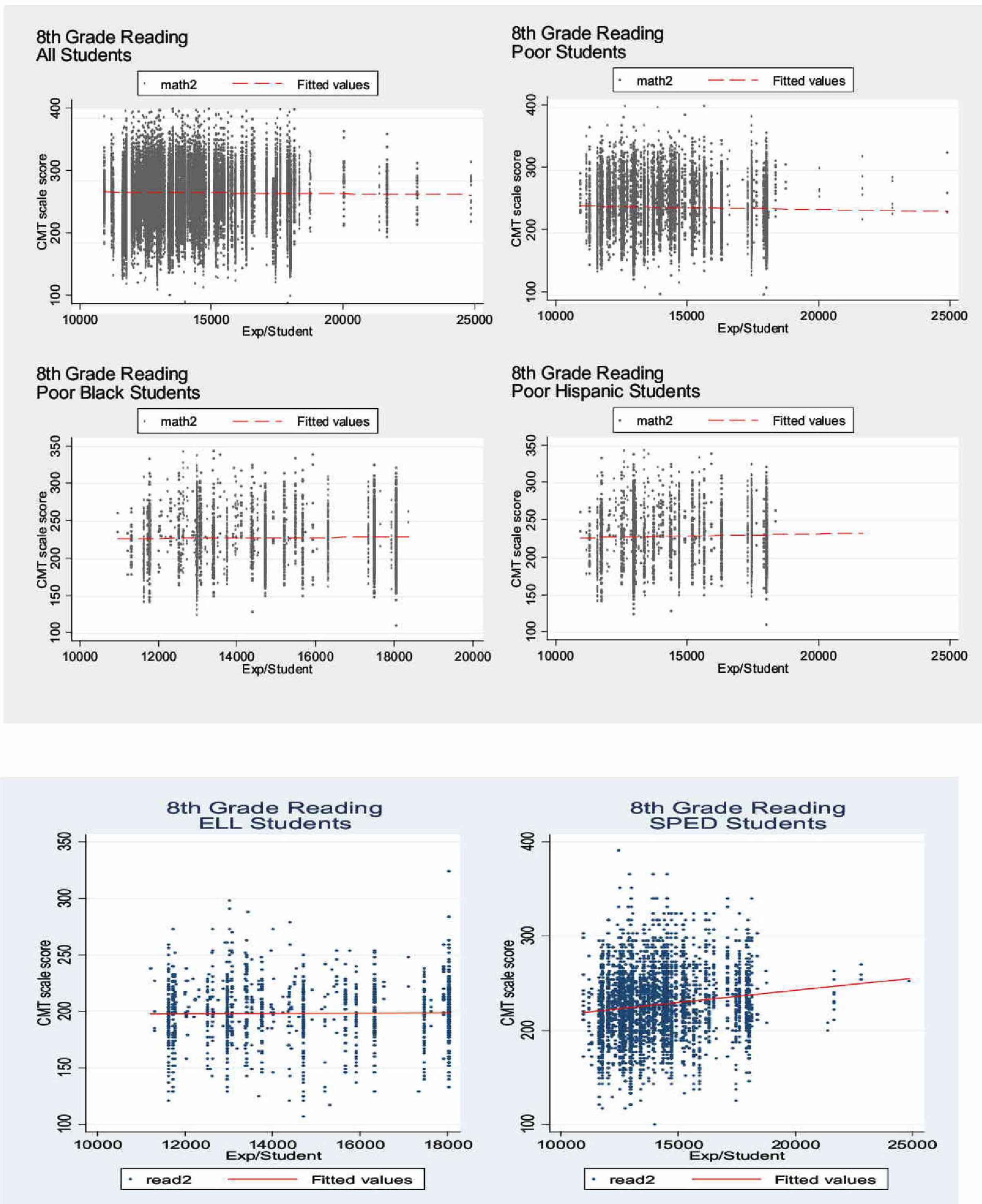
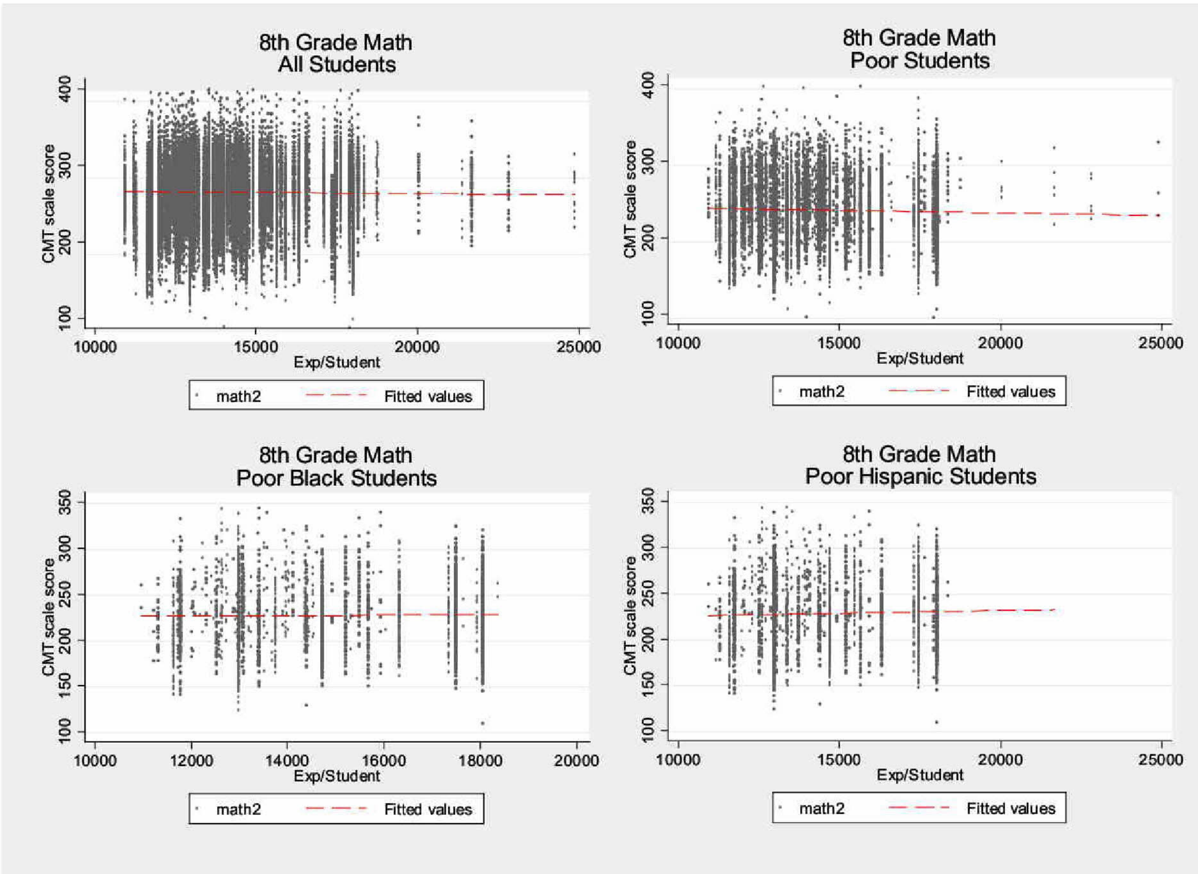


Figure 11: Math Scores and District Spending Per Student



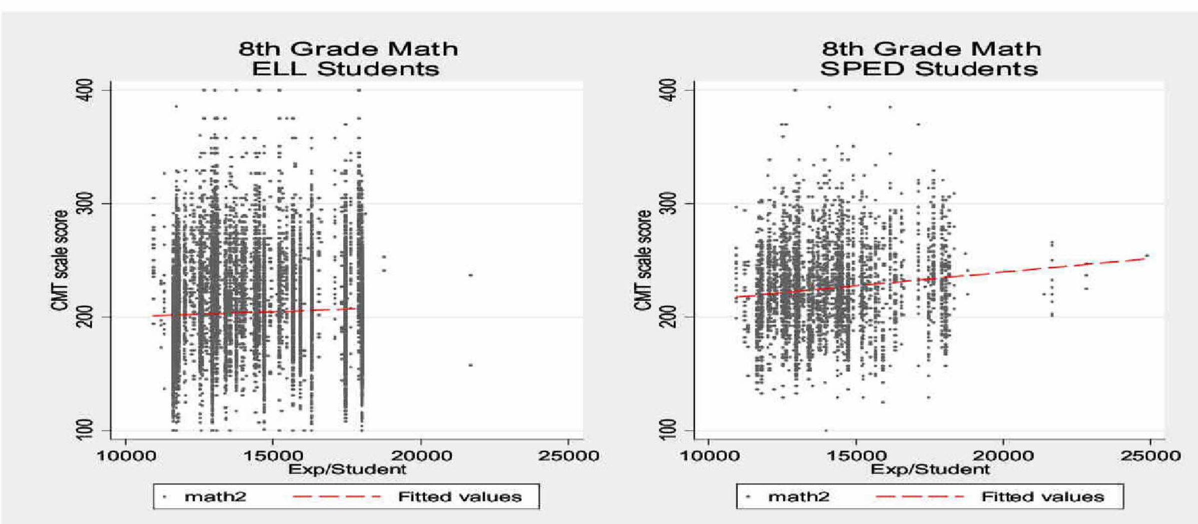
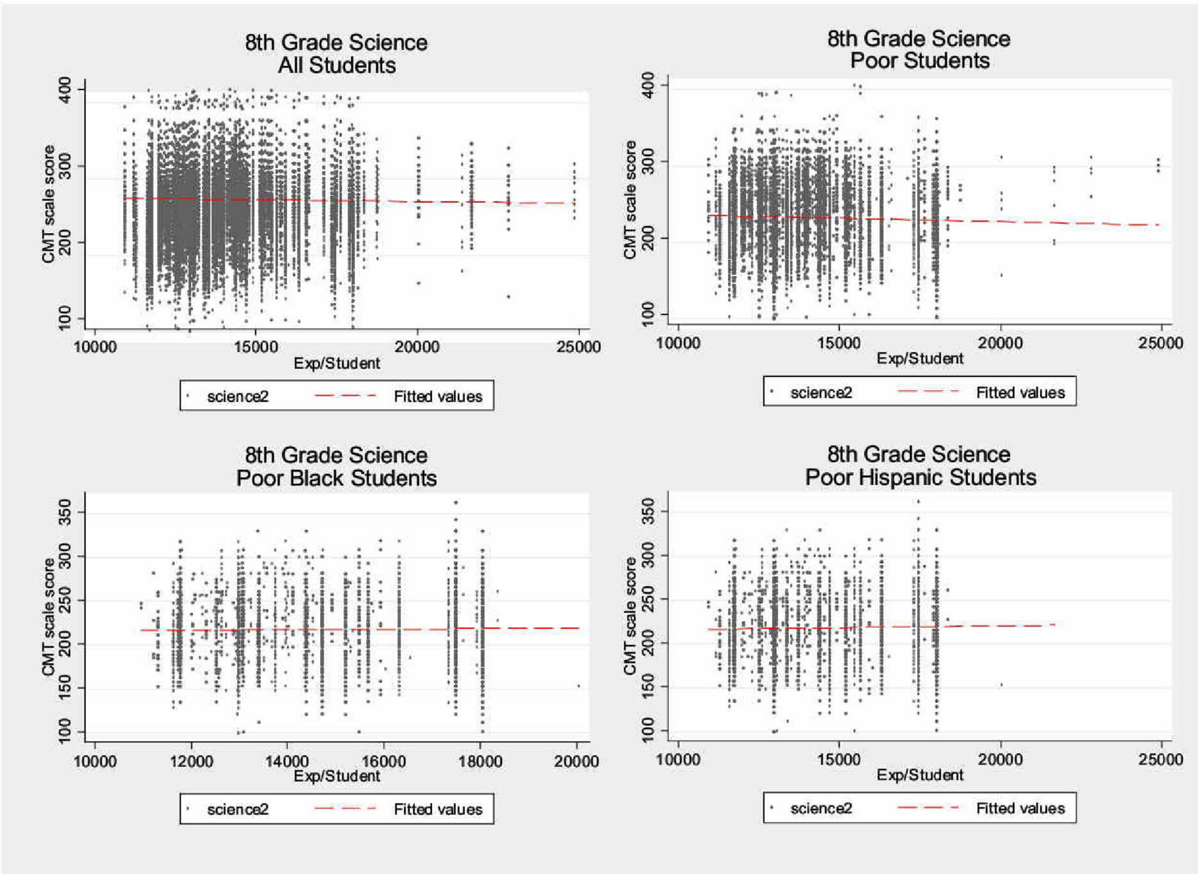


Figure 12: Science Scores and District Spending Per Student



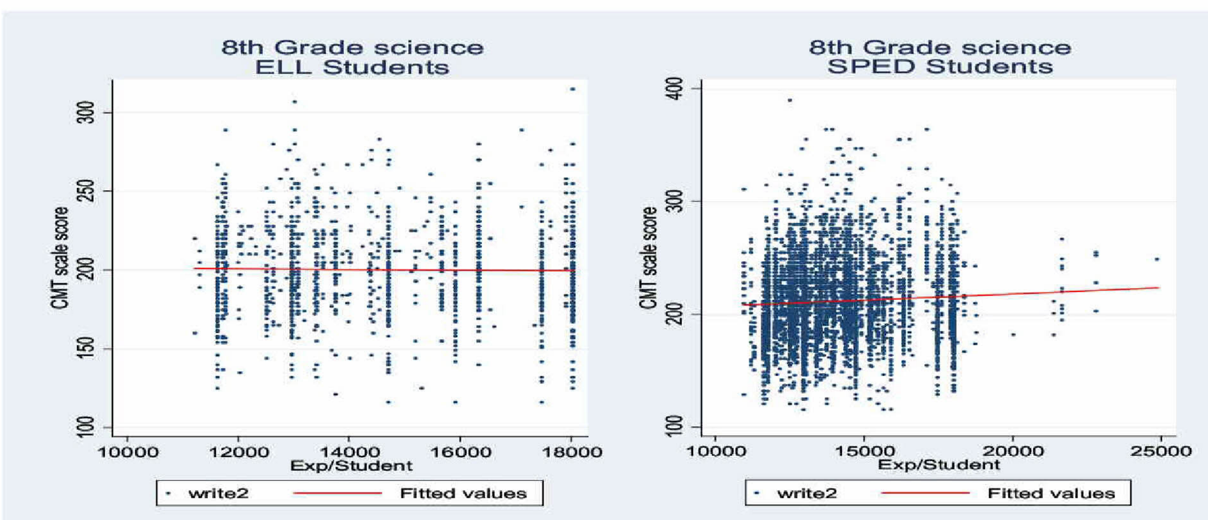
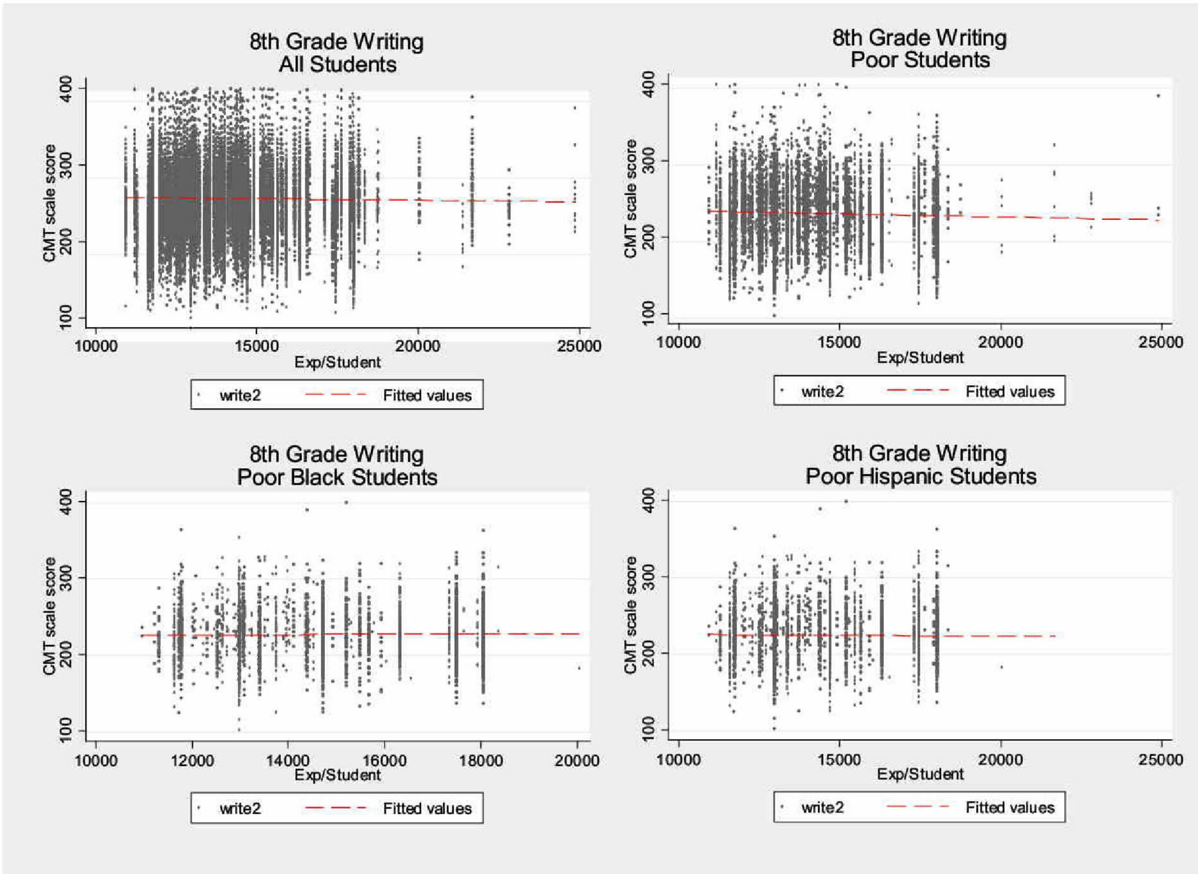
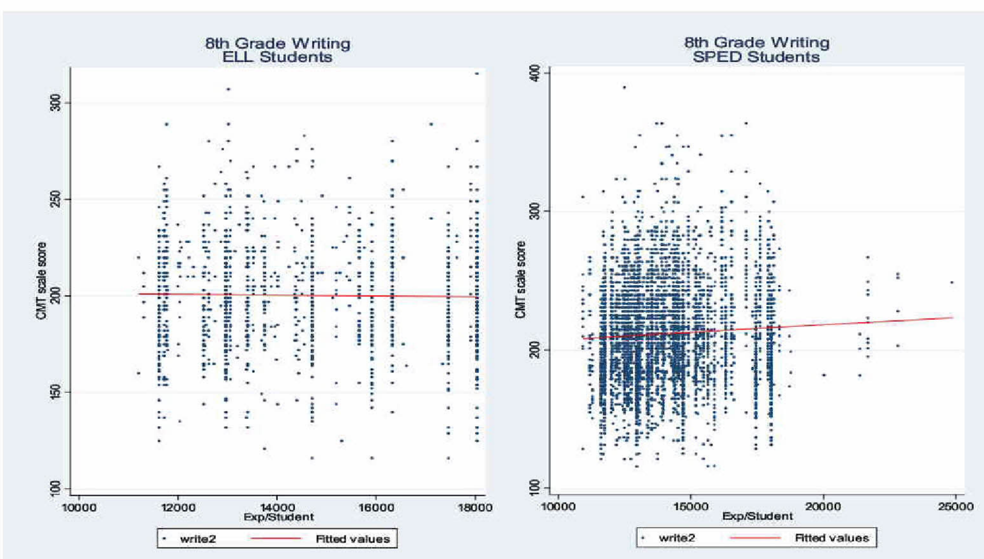


Figure 13: Writing Scores and District Spending Per Student





IV. Value-Added Analysis of CMT Scores and District Average Spending

The previous section presented simple descriptive data on the lack of relationship between student CMT scores and district average spending. The analysis was conducted for all students and various subgroups of students (e.g., poor, black, Hispanic, LEP, SPED). No systematic positive relationship between district spending and student achievement was observed.

However, it might be the case that a strong positive relationship exists, but is obscured due to a lack of more complete controls for student characteristics. Or, it is possible that current spending per student may not capture the true, cumulative effect of resources on student achievement. For this reason, the use of value-added models (VAM) has become commonplace in studies of student achievement (e.g., Hanushek, 1986, 2003; Harris, 2011). These models capture the effect of student characteristics, but also the effect of current or contemporaneous resources on growth in student achievement. Because they control for prior achievement, they are termed "value-added" models.

The following VAM is fit to the student-level CMT data:

$$\begin{aligned} CMT(8) &= B0 + B1\ CMT(7) + B2\ Male + B3\ Black + B4\ Hispanic + B5\ White \\ &\quad + B6\ LEP + B7\ SPED + B8\ Disadvantaged + B9\ Distsize + B10\ Distsize^2 \qquad (1) \end{aligned}$$

CMT(8) is the student's 8th grade CMT score. CMT(7) is the student's CMT score in the same subject in grade 7. Male, Black, Hispanic, White, LEP (Limited English Proficient), SPED (Special Education), and Disadvantaged are indicator variables for whether a student has that characteristic. Distsize is the enrollment in the district, and $Distsize^2$ is the square of enrollment.

When equation (1) is estimated on Connecticut student data it can be used to predict the CMT score of any 8th grade student. These predicted scores are simply forecasts of 8th grade test scores for any student based on data from similar students. These predicted scores can be subtracted from the actual 8th grade scores (CMT(8) – predicted CMT(8)). If the value is positive, the student is doing better than predicted, and if negative, otherwise. If the typical student in a district has a positive residual, then the district is producing better than expected results, with the reverse holding for a district having negative residuals. A student or district with a zero residual is performing at the state average level of performance given prior test scores and student background.

The following charts report the relationship between the CMT residual scale scores and district spending.[3] As noted above, since these estimates control for lagged student achievement

[3] Residual district spending plotted on the horizontal axis comes from a regression on the same control variables as test scores, thus it too is centered on zero (meaning average). The scatter diagram from this step-wise regression

these are *value-added* or growth estimates. In the first set of charts, which include all 8th grade students, residual scale scores are derived from a linear regression of CMT scale scores on a list of student characteristics in equation (1). These CMT residuals reflect variation in student CMT achievement that is *not* explained by or associated with these student-level factors.

The vertical axis (CMT residuals) in these charts is the difference between actual student achievement and student achievement that is predicted by a statistical model based in equation (1). Positive values of this residual indicate students who are doing better than expected and negative values are for students who are doing worse than expected.[4] These residuals are plotted against district spending (compared to the state average). If district spending raises test scores we would expect a positive relationship.

Figure 14 plots student CMT residuals in 8th grade math against average district spending per student. Note that the vast majority of variation is within rather than between districts and the relationship between district spending per student and student achievement is very weak. The correlation between 8th grade CMT residual growth scores and district average spending is .03.[5] The regression slope indicates that an additional $1000 in district average spending per student is associated with an additional .25 scale score points on the 8th grade CMT. Recall from the discussion above that the 8th grade average CMT gap between poor and non-poor students is 42 points.

Figure 15 plots the relationship between 8th grade reading residual growth scores and district average spending per student. The partial correlation between 8th grade CMT residual reading scores and district average spending is .04. The regression slope indicates that an additional $1000 in district spending is associated with a gain of .51 scale score points on the 8th reading CMT. The average CMT reading gap between poor and non-poor students is 40 points.

Figure 16 plots the relationship between 8th grade residual growth scores and district average spending.

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allows examination of the effect of district spending on student achievement growth after controlling for the effect of all of the other variables. The model is not estimated for Science scores since the Science CMT is not given in 7th grade. District enrollment (Distsize) and its square is included in the model since it is sometimes claimed that there are non-linear "economies of scale" in the provision of education services by school districts.

[4] Since the model controls for 7th grade student achievement, it is also accurate to say that students with positive residuals had greater than average achievement growth, and students with negative residuals had less than average growth. A student with a zero residual experienced average growth as compared to his or her peers.

[5] Correlation is simply an indication of the strength of the statistical relationship between achievement residuals and district spending. A correlation coefficient can range from -1, indicating a perfect linear negative relationship, to +1 indicating a perfect linear positive relationship. Zero indicates no relationship. Correlation coefficient values below .1 in absolute value would indicate a weak relationship. Whatever its magnitude, a positive correlation coefficient does not necessarily indicate a causal relationship.

The partial correlation between CMT residual writing scores and district average spending is .06. An additional $1000 of district spending is associated with .93 scale score points on the 8th grade CMT. The average CMT writing gap between poor and non-poor students is 37 points.

Figures 17-19 plot similar data for poor 8th grade students only. Although the earlier regression model fit to all students included a control for student poverty, it is possible that a positive association between spending and achievement growth for poor students might have been obscured by pooling them with non-poor students. These plots show that is not the case. When the sample is restricted to poor students only no systematic positive relationship between district spending and student achievement growth is observed.

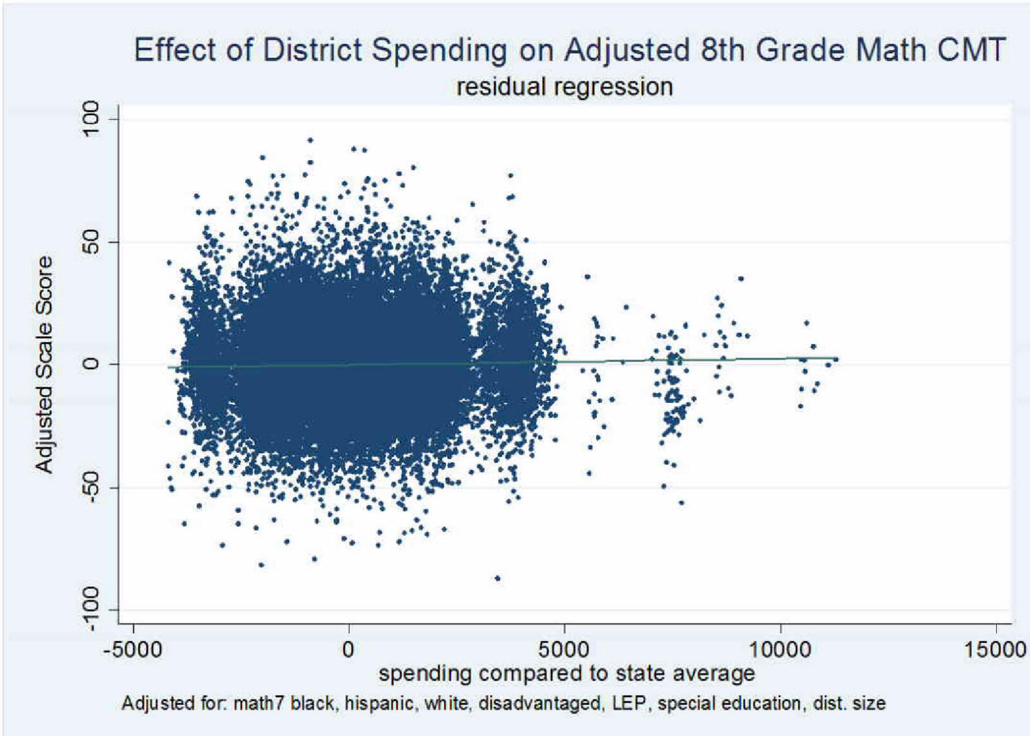
Finally, Figures 20-31 present the same data plotted for grade 4 and grade 6 students (controlling for grade 3 and grade 5 CMT scores, respectively). These data show that there is nothing unusual about the 8th grade findings. After controlling for student characteristics and lagged test scores, there is no systematic positive relationship between achievement growth and district spending per student, either for all students or for poor students.

The finding of a small and inconsistent relationship between spending and CMT growth scores is robust to changes in the regression model shown in equation (1) above. That is, if some controls (e.g., race and ethnicity) are dropped from the model, the weak and inconsistent relationship between residual test scores and achievement remains.

These student growth charts illustrate that there is no statistically reliable positive relationship between district spending and student achievement that would permit "costing out" a given level of achievement or achievement growth. Of course, even the weak positive relationships that are observed in the data may not, in fact, be causal. For example, they may reflect inadequate controls for family or community factors not adequately captured by lagged test scores and eligibility for free or reduced-price lunches.

Examination of these data show that some students exhibit more CMT achievement growth and some exhibit less. There is a wide range of experience. Knowing how much a district spends per student has no useful predictive power in forecasting which case is more likely.

Figure 14



Effect of District Spending on Adjusted 8th Grade Math CMT
residual regression
Adjusted Scale Score
100
50
0
-50
-100
-5000
0
5000
10000
15000
spending compared to state average
Adjusted for: math7 black, hispanic, white, disadvantaged, LEP, special education, dist. size

Figure 15

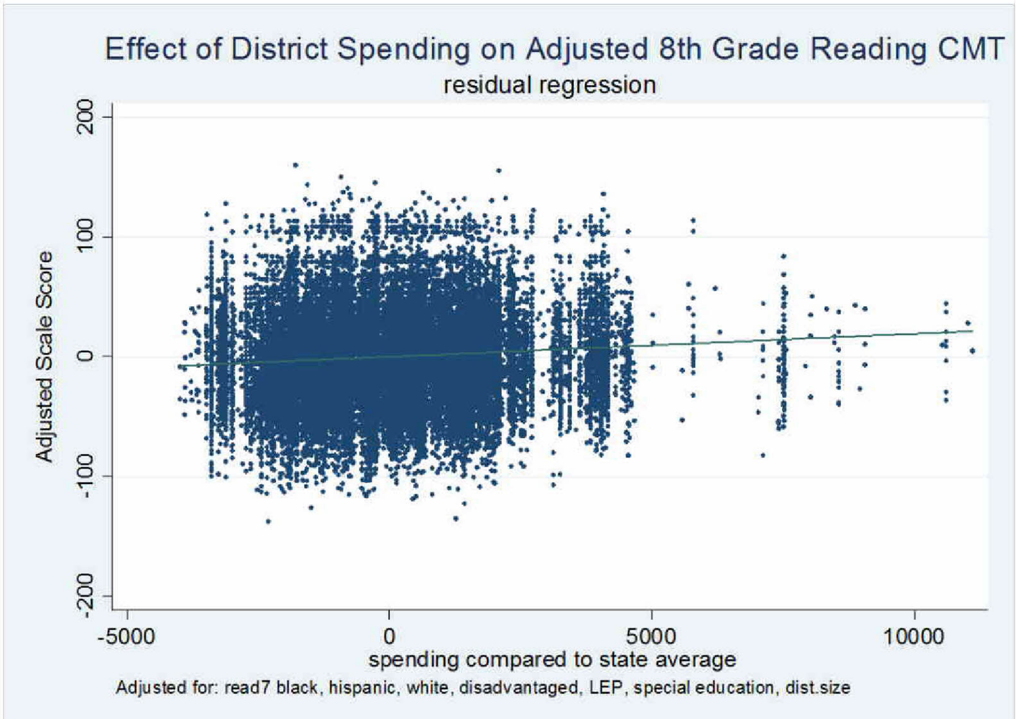
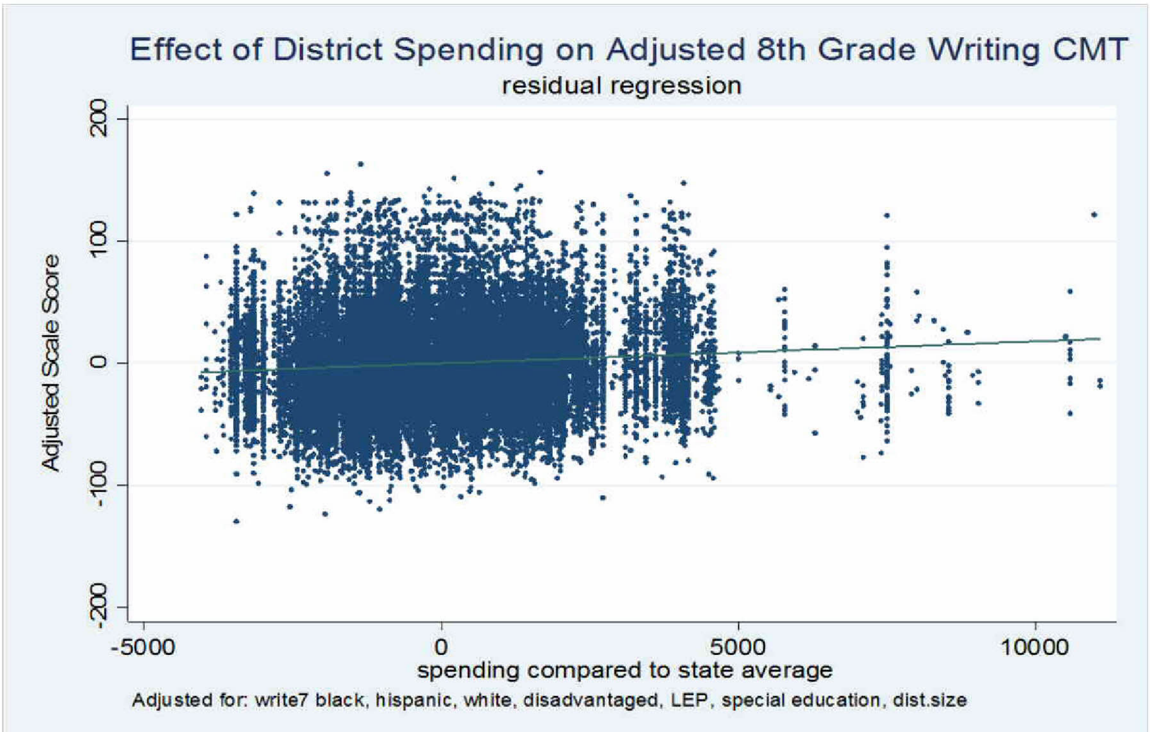
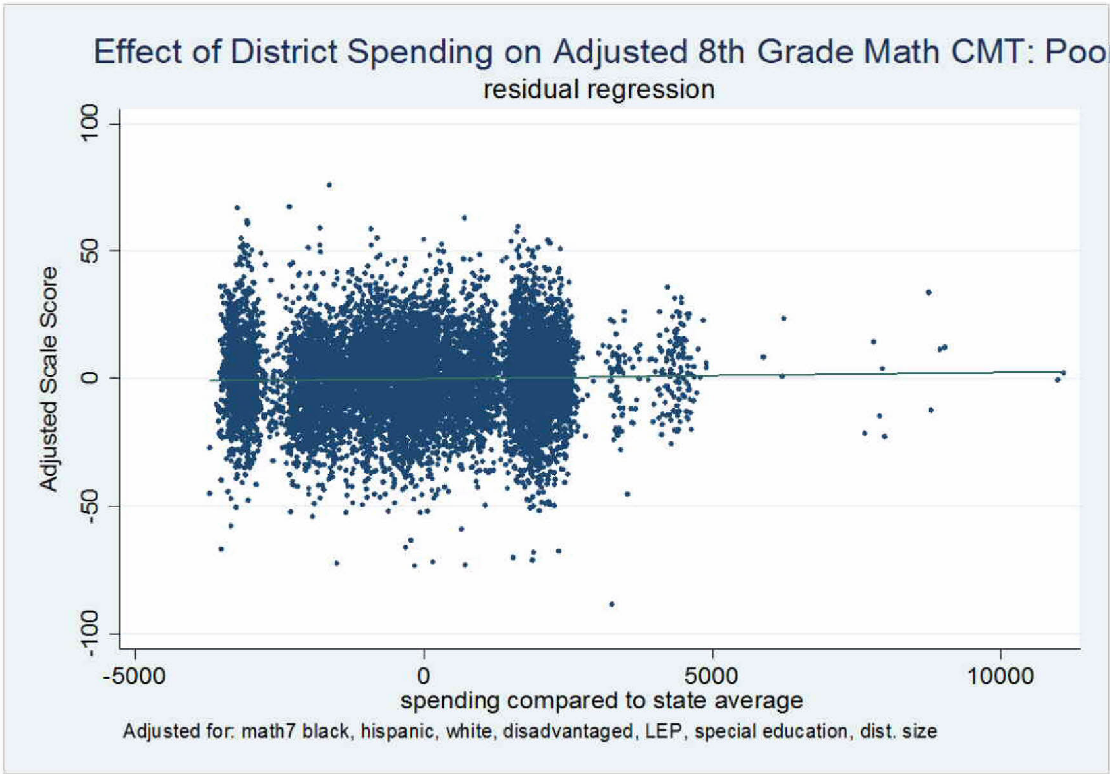

Effect of District Spending on Adjusted 8th Grade Reading CMT
residual regression
Adjusted Scale Score
200
100
0
-100
-200
-5000
0
5000
10000
spending compared to state average
Adjusted for: read7 black, hispanic, white, disadvantaged, LEP, special education, dist.size

Figure 16



Effect of District Spending on Adjusted 8th Grade Writing CMT
residual regression
Adjusted Scale Score
-200
-100
0
100
200
-5000
0
5000
10000
spending compared to state average
Adjusted for: write7 black, hispanic, white, disadvantaged, LEP, special education, dist.size

Figure 17



Effect of District Spending on Adjusted 8th Grade Math CMT: Poor
residual regression
Adjusted Scale Score
100
50
0
-50
-100
-5000
0
5000
10000
spending compared to state average
Adjusted for: math7 black, hispanic, white, disadvantaged, LEP, special education, dist. size

Figure 18

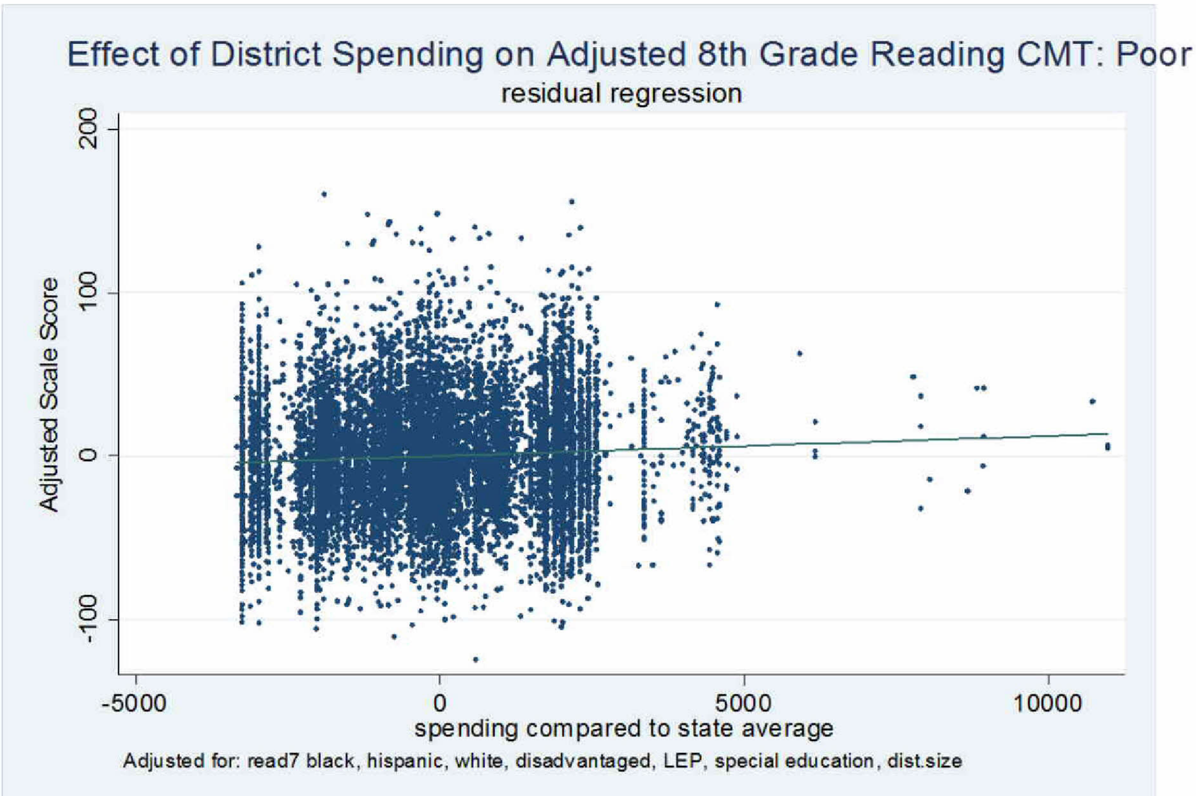
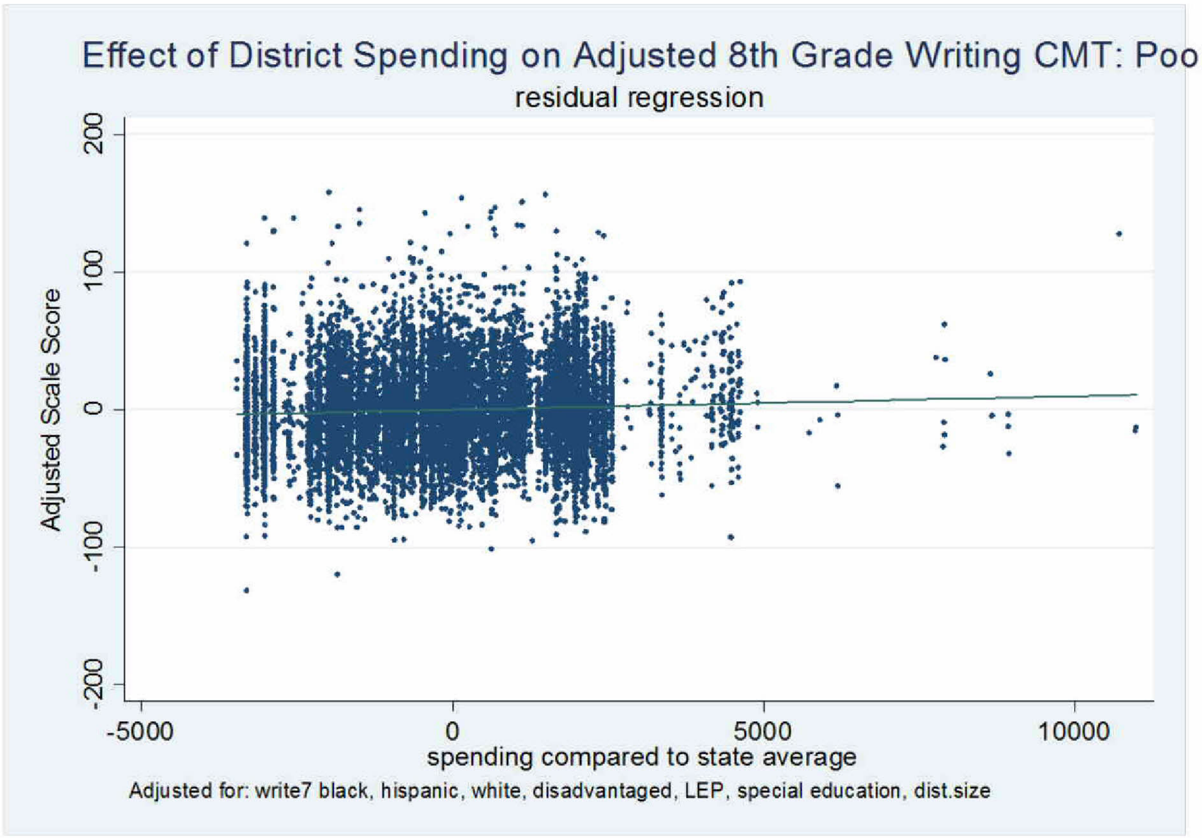
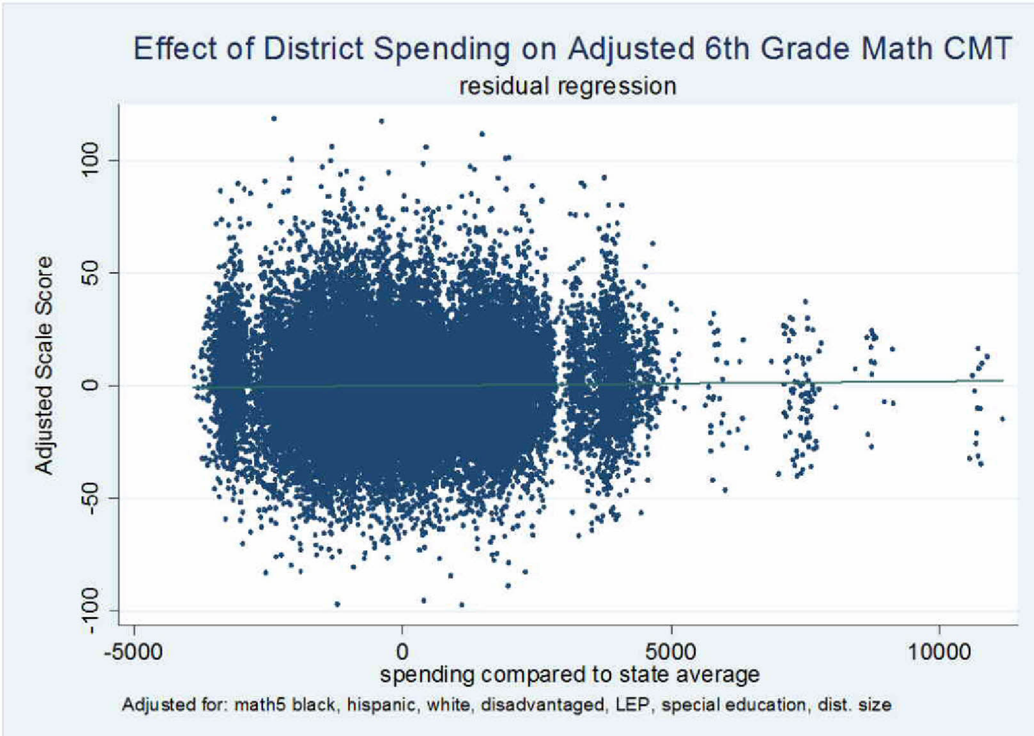

Effect of District Spending on Adjusted 8th Grade Reading CMT: Poor
residual regression
Adjusted Scale Score
200
100
0
-100
-5000
0
5000
10000
spending compared to state average
Adjusted for: read7 black, hispanic, white, disadvantaged, LEP, special education, dist.size

Figure 19



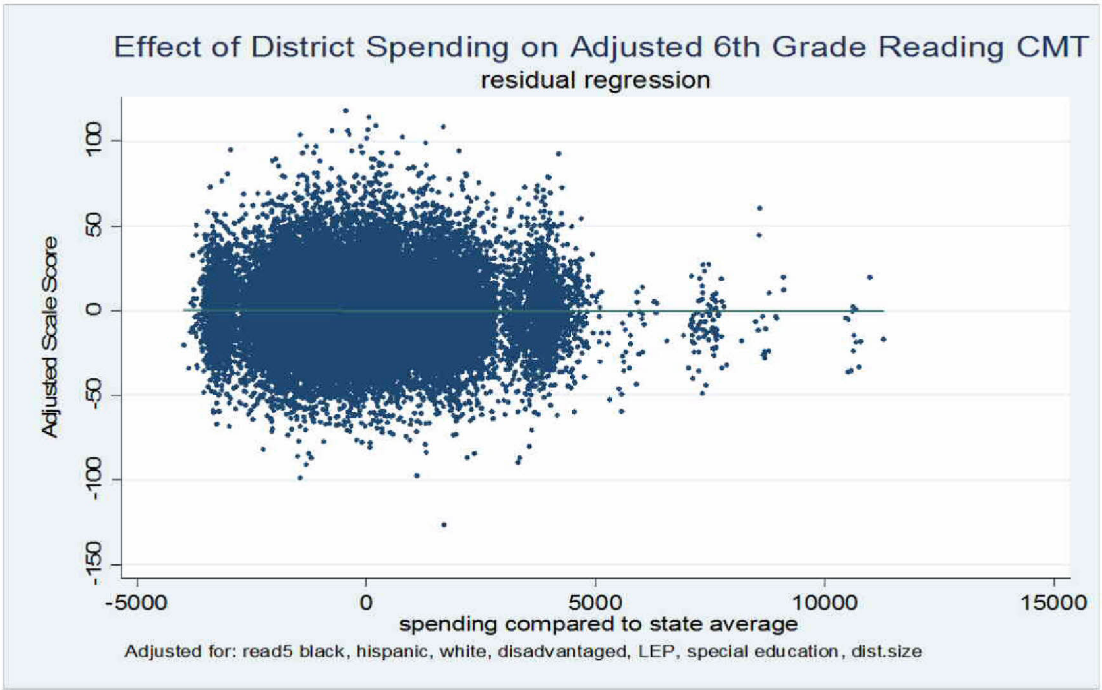
Effect of District Spending on Adjusted 8th Grade Writing CMT: Poor
residual regression
Adjusted Scale Score
200
100
0
-100
-200
-5000
0
5000
10000
spending compared to state average
Adjusted for: write7 black, hispanic, white, disadvantaged, LEP, special education, dist.size

Figure 20



Effect of District Spending on Adjusted 6th Grade Math CMT
residual regression
Adjusted Scale Score
-100
-50
0
50
100
-5000
0
5000
10000
spending compared to state average
Adjusted for: math5 black, hispanic, white, disadvantaged, LEP, special education, dist. size

Figure 21



Effect of District Spending on Adjusted 6th Grade Reading CMT
residual regression
Adjusted Scale Score
-150
-100
-50
0
50
100
-5000
0
5000
10000
15000
spending compared to state average
Adjusted for: read5 black, hispanic, white, disadvantaged, LEP, special education, dist.size

Figure 22

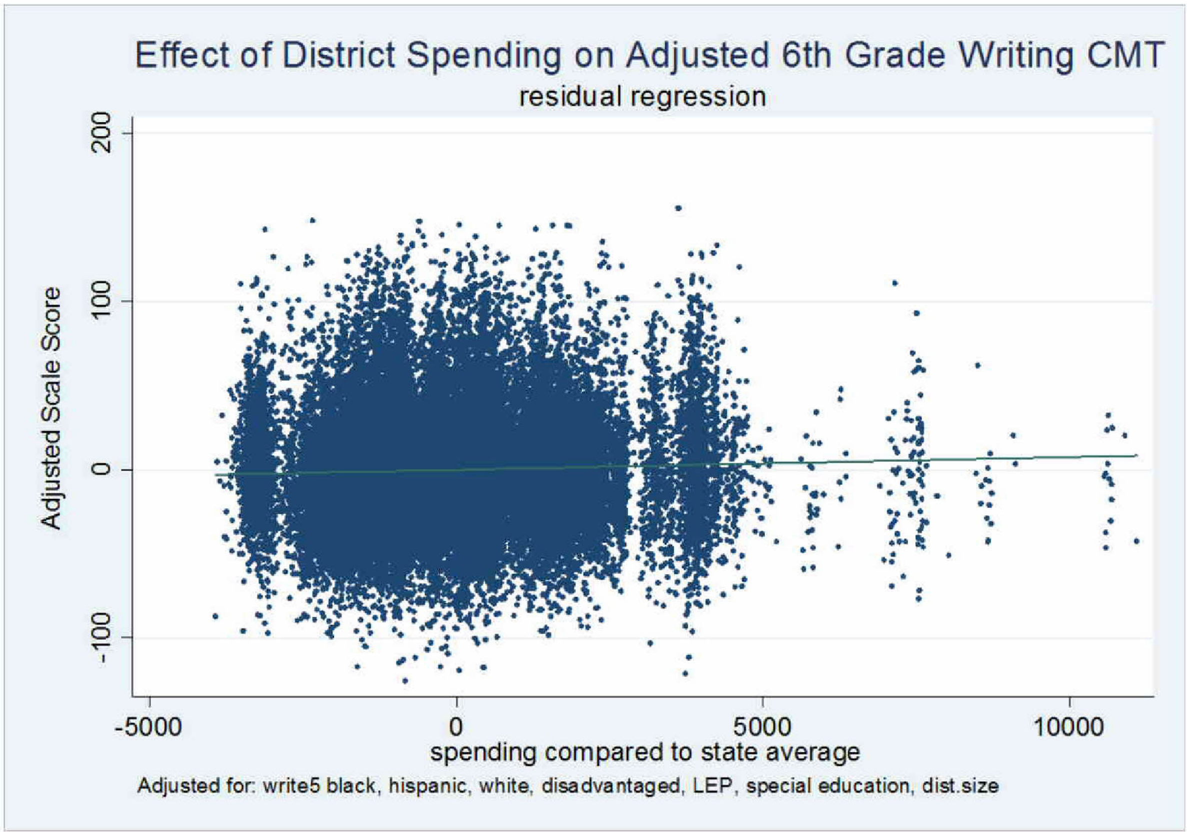

Effect of District Spending on Adjusted 6th Grade Writing CMT
residual regression
Adjusted Scale Score
200
100
0
-100
-5000
0
5000
10000
spending compared to state average
Adjusted for: write5 black, hispanic, white, disadvantaged, LEP, special education, dist.size

Figure 23

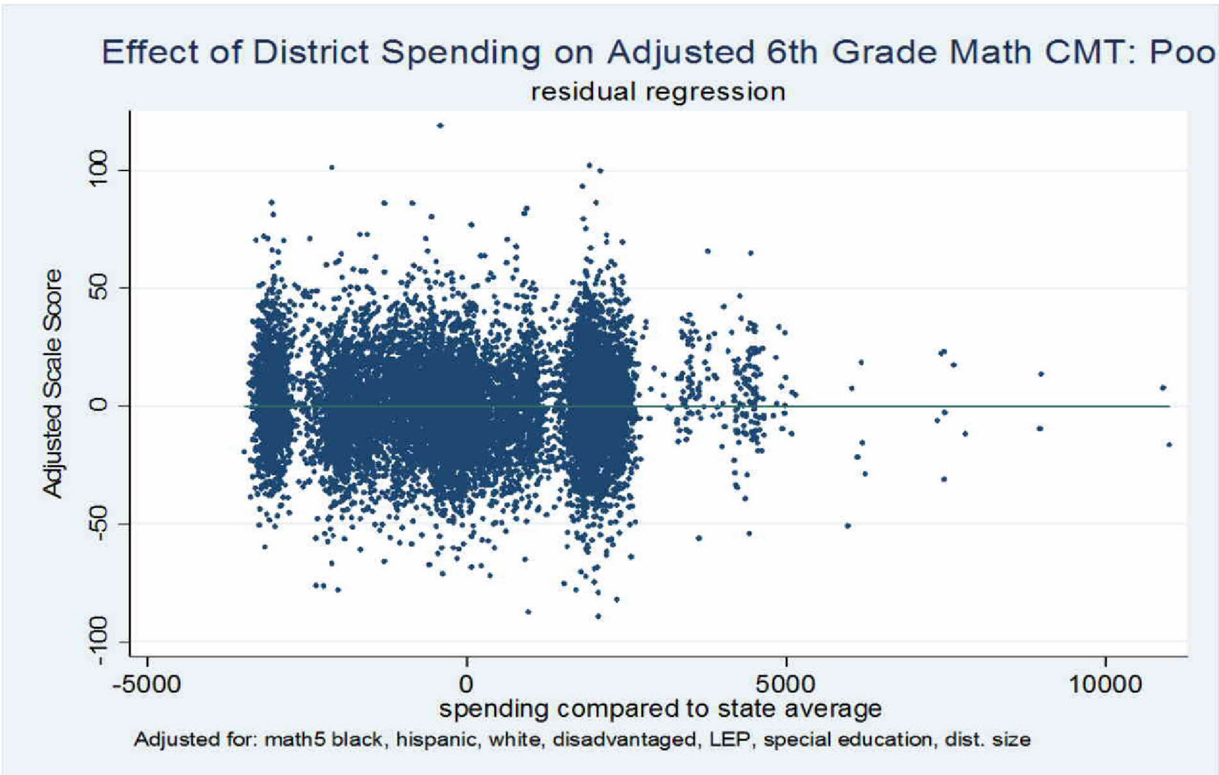

Effect of District Spending on Adjusted 6th Grade Math CMT: Poor
residual regression
Adjusted Scale Score
-100
-50
0
50
100
-5000
0
5000
10000
spending compared to state average
Adjusted for: math5 black, hispanic, white, disadvantaged, LEP, special education, dist. size

Figure 24

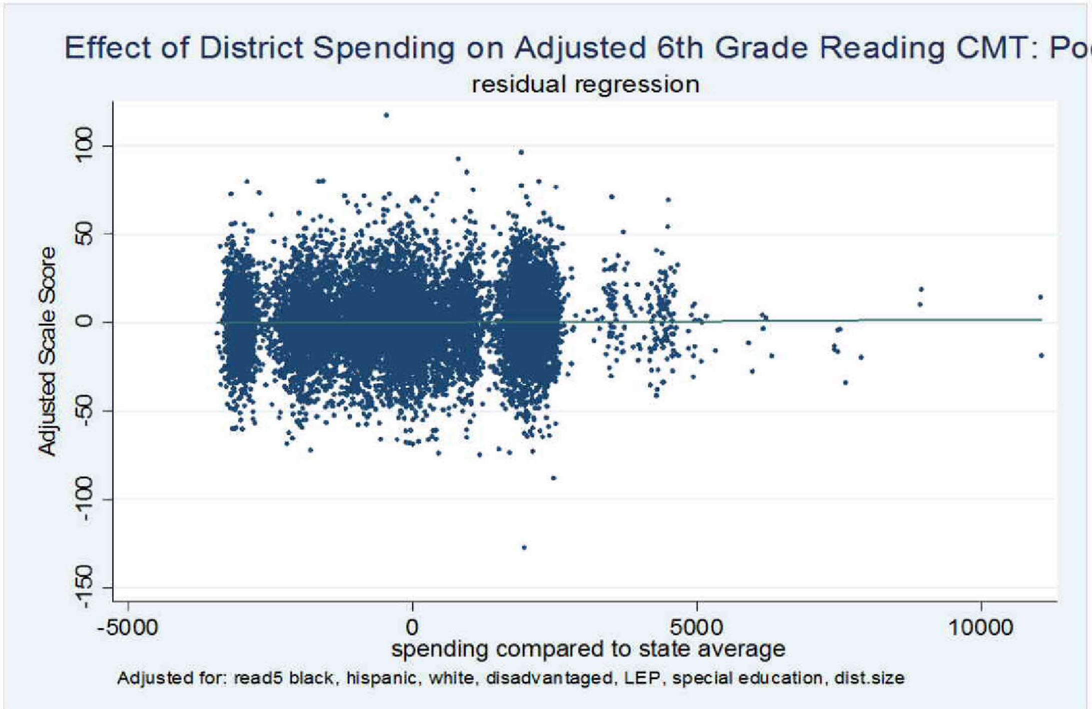
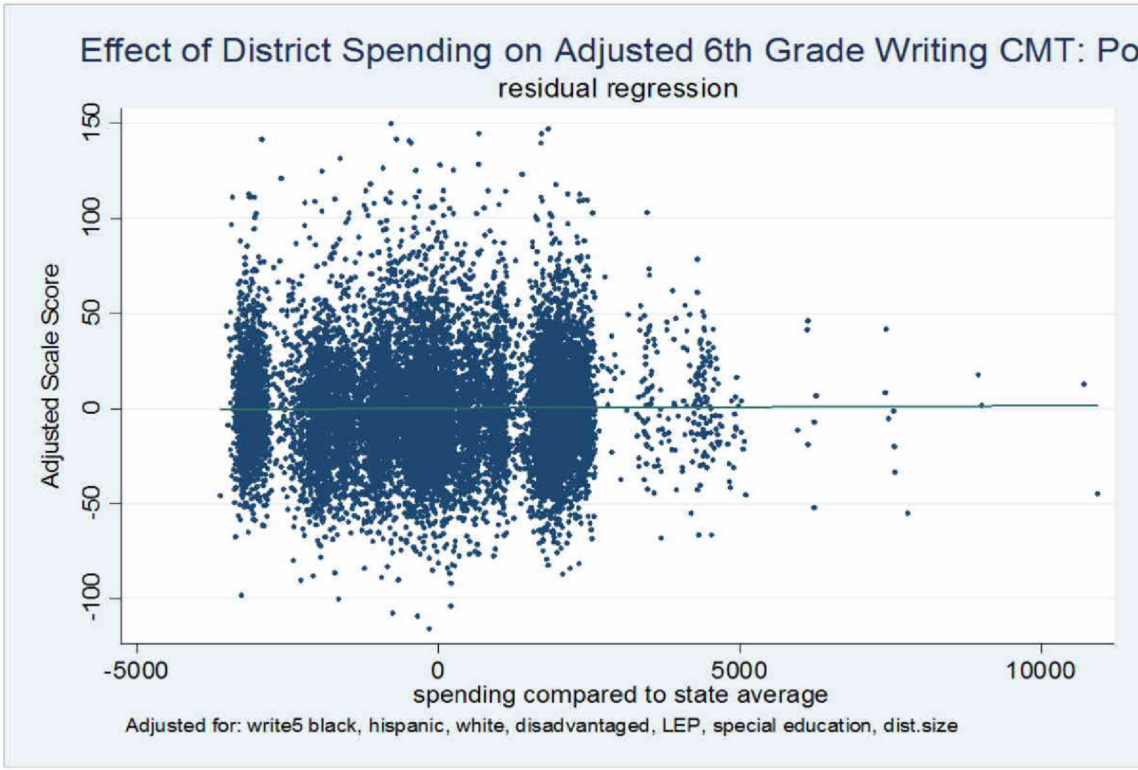
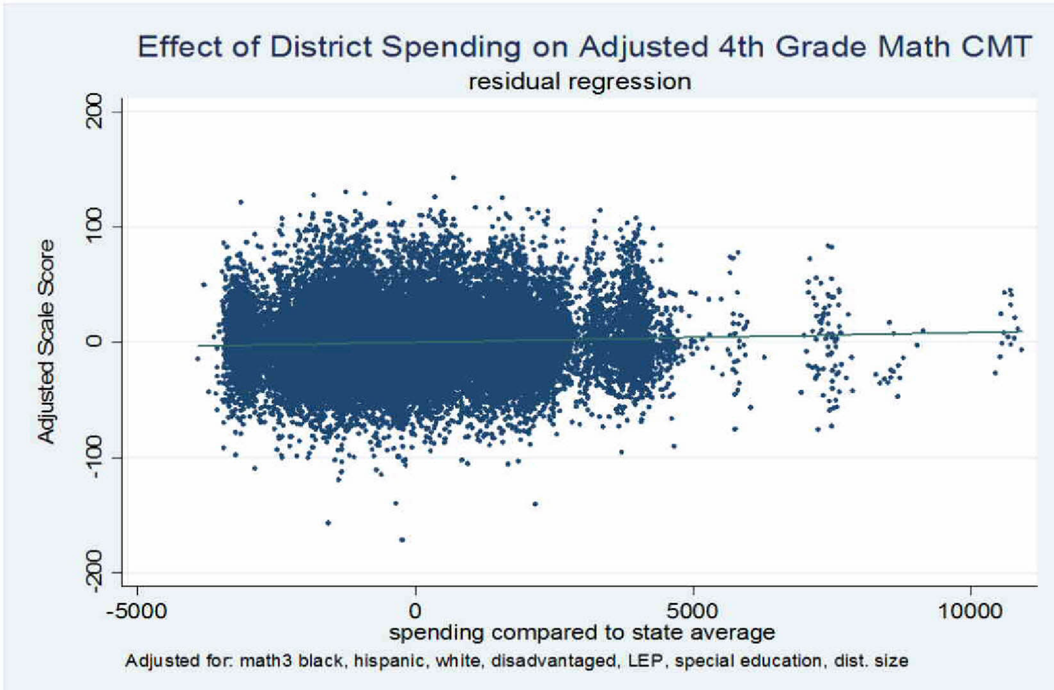

Effect of District Spending on Adjusted 6th Grade Reading CMT: Poor
residual regression
Adjusted Scale Score
-150
-100
-50
0
50
100
-5000
0
5000
10000
spending compared to state average
Adjusted for: read5 black, hispanic, white, disadvantaged, LEP, special education, dist.size

Figure 25



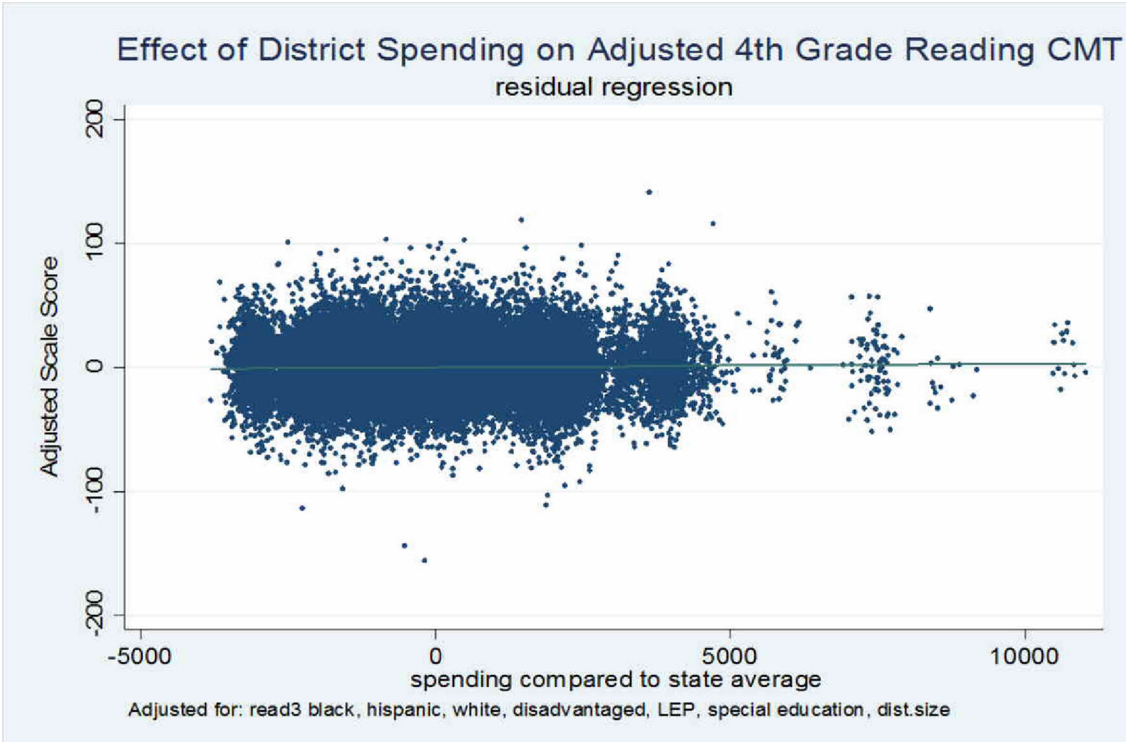
Effect of District Spending on Adjusted 6th Grade Writing CMT: Poor
residual regression
Adjusted Scale Score
-100
-50
0
50
100
150
-5000
0
5000
10000
spending compared to state average
Adjusted for: write5 black, hispanic, white, disadvantaged, LEP, special education, dist.size

Figure 26



Effect of District Spending on Adjusted 4th Grade Math CMT
residual regression
Adjusted Scale Score
200
100
0
-100
-200
-5000
0
5000
10000
spending compared to state average
Adjusted for: math3 black, hispanic, white, disadvantaged, LEP, special education, dist. size

Figure 27



Effect of District Spending on Adjusted 4th Grade Reading CMT
residual regression
Adjusted Scale Score
200
100
0
-100
-200
-5000
0
5000
10000
spending compared to state average
Adjusted for: read3 black, hispanic, white, disadvantaged, LEP, special education, dist.size

Figure 28

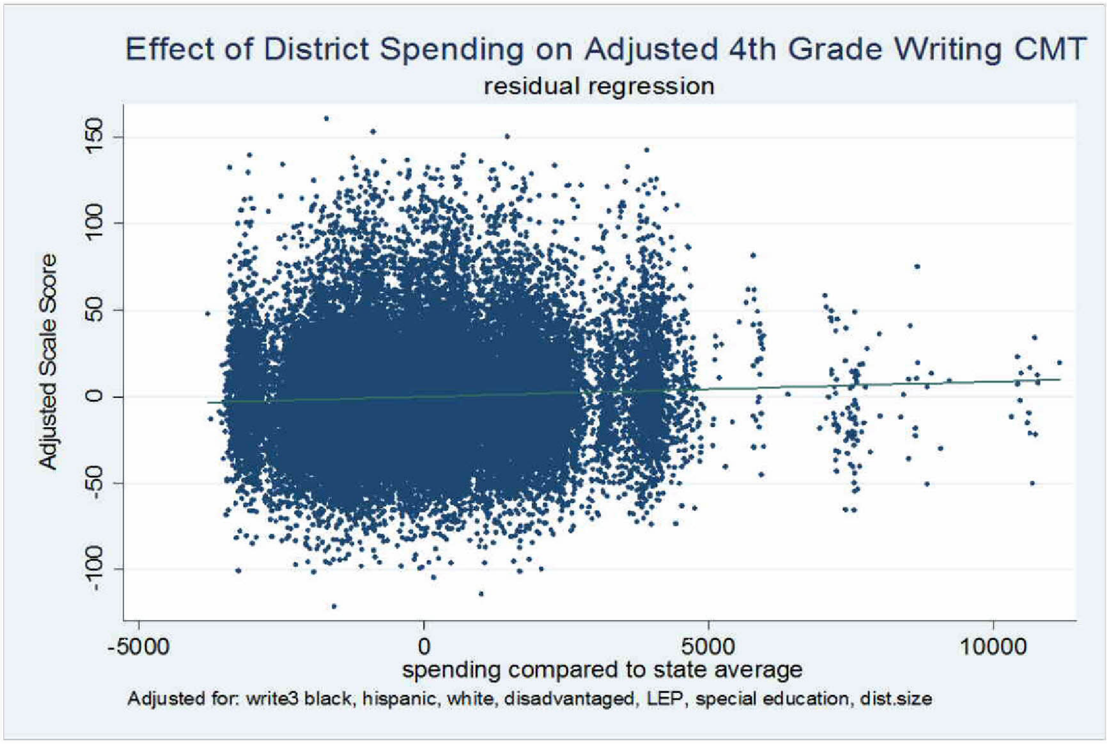

Effect of District Spending on Adjusted 4th Grade Writing CMT
residual regression
Adjusted Scale Score
-100
-50
0
50
100
150
-5000
0
5000
10000
spending compared to state average
Adjusted for: write3 black, hispanic, white, disadvantaged, LEP, special education, dist.size

Figure 29

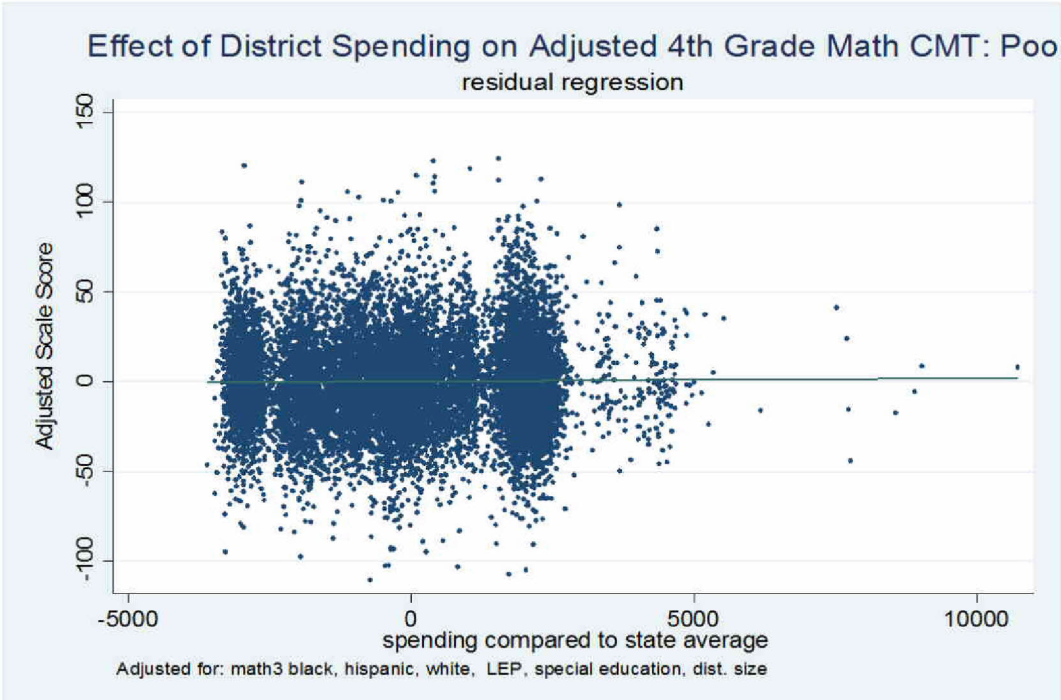

Effect of District Spending on Adjusted 4th Grade Math CMT: Poor
residual regression
Adjusted Scale Score
150
100
50
0
-50
-100
-5000
0
5000
10000
spending compared to state average
Adjusted for: math3 black, hispanic, white, LEP, special education, dist. size

Figure 30

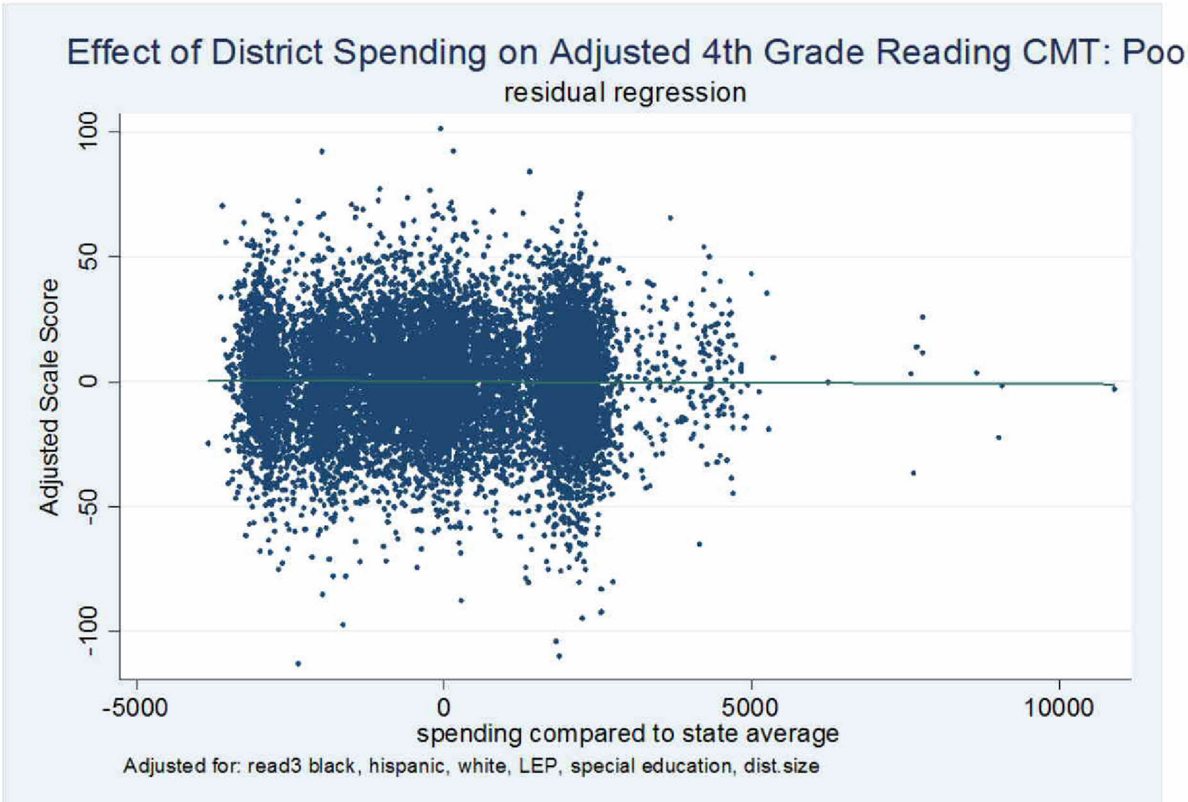
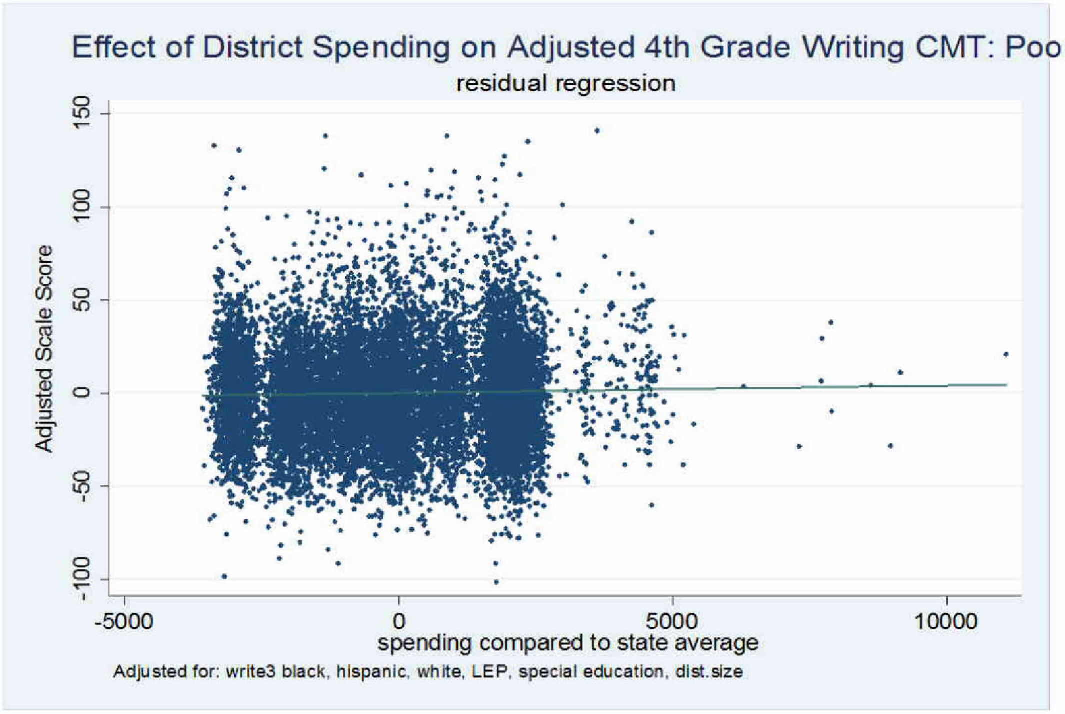

Effect of District Spending on Adjusted 4th Grade Reading CMT: Poor
residual regression
Adjusted Scale Score
100
50
0
-50
-100
-5000
0
5000
10000
spending compared to state average
Adjusted for: read3 black, hispanic, white, LEP, special education, dist.size

Figure 31


Effect of District Spending on Adjusted 4th Grade Writing CMT: Poor
residual regression
Adjusted Scale Score
-100
-50
0
50
100
150
-5000
0
5000
10000
spending compared to state average
Adjusted for: write3 black, hispanic, white, LEP, special education, dist.size

V. School District Inputs

The analysis in this report has shown that the vast majority of variation in student achievement as measured by CMT is within districts (and schools) rather than between them. Among other things this logically implies that variation in *any* district-level variable cannot predict the vast majority of variation in CMT student scores or their growth. It has also been shown that there is no consistent positive relationship between school district spending per student and student CMT scores or their growth. A report by Kolbe, Donaldson, and Rice (undated) examines variation in selected teacher characteristics and behaviors across Connecticut school districts. The Kolbe, et. al. study provides no student or classroom-level evidence that their measures of teacher quality are associated with CMT performance. Nor is there consistent evidence in the research literature that these variables affect student achievement. This is also the case for the observation protocols. An additional problem with the observational data used in the study is that teachers may alter behavior in response to classroom circumstances. The authors have concluded from their observational data that students in low SES schools have access to lower quality teachers based on differences in teacher behavior in their sample of low and high SES schools. However, it may be that teachers of high SES students, if placed in low SES classrooms, would engage in teaching practices similar to those currently observed. How increased spending per student would remediate this phenomenon is not explained by the authors.

References

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Harris, Douglas. 2011. *Value-Added Measures in Education.*_ Cambridge: Harvard Education Press.

Kolbe, Tammy, Morgaen Donaldson, and Jennifer King Rice. Undated. An Evaluation of Disparities in Instructional Quality Across Connecticut School Districts.

Appendix A: Districts in Lowest and Highest 2011-12 Quintiles of Spending

Districts in the lowest per pupil spending (NCEP) quintile for 8th Graders (8th Grade Count)

Distname	Freq.	Percent	Cum.
Ansonia	187	2.02	2.02
Brookfield	212	2.29	4.30
Brooklyn	96	1.04	5.34
Cheshire	386	4.16	9.50
Colchester	239	2.58	12.08
Danbury	738	7.96	20.03
Derby	106	1.14	21.18
District No. 10	223	2.40	23.58
District No. 8	308	3.32	26.90
East Hartford	491	5.29	32.20
Ellington	193	2.08	34.28
Enfield	435	4.69	38.97
Granby	191	2.06	41.03
Griswold	146	1.57	42.60
Meriden	549	5.92	48.52
New Britain	746	8.04	56.57
New Milford	352	3.80	60.36
Newtown	432	4.66	65.02
North Branford	192	2.07	67.09
Oxford	174	1.88	68.97
Plainfield	200	2.16	71.12
Shelton	488	5.26	76.39
Somers	140	1.51	77.90
Southington	526	5.67	83.57
Sterling	57	0.61	84.18
Thomaston	92	0.99	85.17
Tolland	250	2.70	87.87
Watertown	256	2.76	90.63
West Haven	520	5.61	96.24
Wolcott	252	2.72	98.95
Woodstock	97	1.05	100.00
Total	9,274	100.00	

Districts in the highest per pupil spending (NCEP) quintile for 8th Graders

Distname	Freq.	Percent	Cum.
Bloomfield	130	1.53	1.53
Canaan	10	0.12	1.65
Cornwall	13	0.15	1.80
Darien	390	4.59	6.40
District No. 11	59	0.69	7.09
District No. 12	86	1.01	8.10
District No. 18	106	1.25	9.35
District No. 6	89	1.05	10.40
East Granby	81	0.95	11.35
Easton	120	1.41	12.77
Greenwich	624	7.35	20.12
Hartford	1,681	19.80	39.91
Kent	22	0.26	40.17
New Canaan	285	3.36	43.53
New Haven	1,396	16.44	59.97
North Canaan	33	0.39	60.36
Norwalk	765	9.01	69.37
Preston	45	0.53	69.90
Redding	153	1.80	71.70
Salisbury	29	0.34	72.04
Sharon	22	0.26	72.30
Stamford	1,070	12.60	84.90
Weston	213	2.51	87.41
Westport	464	5.46	92.87
Wilton	348	4.10	96.97
Winchester	2	0.02	97.00
Windham	254	2.99	99.99
Woodbridge	1	0.01	100.00
Total	8,491	100.00	