Measuring Disparities in Cost and Spending across Connecticut School Districts

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RESEARCH REPORT 20-2

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EXECUTIVE SUMMARY

Despite multiple court cases and repeated efforts at reform, there are still significant concerns about the equity and the adequacy in Connecticut's public K–12 education funding. One vital component of any attempt to reform education finance is a methodologically rigorous evaluation of what it would cost school districts across the state to achieve target performance standards given their student characteristics.

This report addresses that need, evaluating the equity and the adequacy of school spending in Connecticut based on education costs. Different from actual school expenditure, a district's education cost is an estimation based on its cost factors that are outside the direct control of local officials at any given point in time; efficiency levels are held constant across school districts in the estimation. This report finds large disparities in education costs due to differences among school districts in cost factors. It also finds that, despite existing state aid programs, disparities in cost-adjusted spending across the state remain large. Spending in some districts is well below the levels needed to achieve common performance goals.

Among the specific findings of this report is that in the last year for which data were analyzed, the average costs of school districts with the lowest socioeconomic status and highest level of student need were 62 percent greater than those of districts with the highest socioeconomic status and the lowest level of student need. When this report holds every district's efficiency at the statewide average level, it finds that more than half of Connecticut's public school students attended districts where spending was insufficient to meet the "predicted costs" to achieve the statewide average student test performance level. A direct, negative consequence of spending inadequacy is student underperformance relative to the common student performance target.

This report recommends that the state consider adopting the cost measure as the basis of a new, scientifically grounded, equitable, and adequate formula that allocates more state aid to districts with higher costs. It also suggests that many districts need to increase their spending to meet their predicted costs and close the gap between student performance and the common goal. The exact amount of the additional spending needed partly depends on the state's choices for the student performance target and the common level of district efficiency. For example, this report estimates that in the last year analyzed, with district efficiency held at the statewide average level, an additional $940 million, or an increase of 12.3 percent from statewide public K–12 school spending, would have been needed to fully fund the predicted costs required to achieve the statewide average student test performance level in every district.

While the state and local governments now face great fiscal difficulties induced by the COVID-19 pandemic, they should remain committed to the investment in public education, because it will affect Connecticut's economic growth in the long run.

I. Introduction

Connecticut has faced long-running concerns about equity and adequacy in the education finance system. The state has been sued multiple times since the 1970s, including in 2005 by the Connecticut Coalition for Justice in Education Funding (CCJEF).[1] In 2016, Connecticut Superior Court Judge Thomas Moukawsher ruled against the state in that case (*CCJEF v. Rell*) and required the state to adopt a method of allocating education grants that is "rationally, substantially, and verifiably connected to creating educational opportunities for students."[2] However, in early 2018, the state's highest court reversed Judge Moukawsher's ruling. Although the state adopted a new and arguably improved education aid formula in 2017, between the two court rulings, there remains an ongoing debate among policymakers, practitioners, and advocates on how to further reform the state education aid system (CSFP 2019).

To help advance reform efforts, this report addresses two important and connected questions facing Connecticut policymakers: (1) How much money does each Connecticut school district require to educate its students and to meet a common student test performance target, given that student need differs across districts? (2) Is spending in each Connecticut school district equitable and adequate relative to the required cost? To answer these questions, this report first reviews the background of Connecticut's education finance system to gain a deeper understanding of the issue. Then, it discusses cost factors that are identified through statistical analysis of recent data. These cost factors are district characteristics that are outside the direct control of local officials at any given point in time but affect school spending. This report examines the cost disparities driven by the differences in these cost factors across school districts. Furthermore, it estimates a measure that it refers to as the "predicted cost," which is defined as the amount of spending required to achieve a common student test performance target given each district's cost factors. Using the predicted cost, this report evaluates the equity and adequacy of Connecticut's school spending and explores the implications of spending inequity and inadequacy for student test performance.

> **This report considers how much each district must spend for its students to meet a common performance target and if current spending is equitable and adequate relative to that cost.**

This report reveals large disparities in education costs and cost-adjusted spending across the state. Many districts' spending does not cover the predicted costs required for them to achieve the statewide average student test performance level. Furthermore, districts with lower socioeconomic status, on average, have higher costs, lower cost-adjusted spending, and more severe spending inadequacy.

Based on these findings, this report recommends that the state consider adopting the predicted-cost measure as the basis of a new, equitable, and adequate state aid formula. This report also suggests that more spending is required for many districts, especially the ones with lower socioeconomic status, in order to achieve the statewide average student test performance level or a higher performance target. The exact amount of the additional spending needed partly depends on the student performance target and the assumed common level of district efficiency that are used in calculating the predicted cost.

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1   CCJEF members include municipalities, local boards of education, teachers unions, advocacy organizations, parents and grandparents, and public school students.

2   See Page 28 of Memorandum of Decision, Connecticut Coalition for Justice in Education Funding, Inc. v. Rell, Superior Court, Judicial District of Hartford, Docket No. XO7 HHD-CV-14-5037565-S (September 7, 2016).

II. Background of Connecticut's Education Finance System

According to the US Census Bureau's Annual Survey of School System Finances, the contribution from local revenues to Connecticut's public school funding in 2017 was 58 percent—the fourth highest percentage in the country. This heavy reliance on local sources creates disparities in education quality between property-rich school districts, which can afford to spend more, and their property-poor counterparts.

The second-largest revenue source for Connecticut public schools is state aid. Connecticut's education aid system includes more than 10 different aid programs (CSFP 2019). Of these programs, the formula-based Education Cost Sharing (ECS) grants are the largest source of K–12 education aid. The stated goals of ECS grants are to mitigate fiscal disparities among school districts and to enable adherence to the state's constitutional mandate of equal protection under the law and the right to a free and adequate public education.

Connecticut's education finance system has been shaped by several lawsuits over the past five decades. In 1977, the Connecticut Supreme Court ruled in *Horton v. Meskill* that the state violated Connecticut's constitution by not providing every public school student with an equal educational opportunity. Before this case, the state's school districts each received the same amount of education aid (Wetzler 2004). However, the Connecticut Supreme Court found that this flat-rate aid system was unconstitutional, because it prevented property-poor communities from providing their students with an adequate education. The state legislature responded to this ruling by changing the state aid formulas so that the amount of aid that a school district received would be based on the city or town's property tax capacity and the needs of its students. In 1985, the Connecticut Supreme Court made a follow-up ruling that, despite these changes in the state aid system, the unconstitutional disparities between property-rich and property-poor school districts persisted. Following this court decision, the state legislature created the ECS grant program, in 1988, to more effectively address the disparities in education finance (Moran et al. 2016). In 2016, the Connecticut Superior Court ruled in *CCJEF v. Rell* that the state had failed to rationally allocate education grants to create educational opportunities for students. The Connecticut Supreme Court later overturned this decision (CSFP 2018a). Nevertheless, the debate about the equity and the adequacy in Connecticut's education finance system has continued, with ongoing efforts to improve the ECS formula (CSFP 2019).

> **Heavy reliance on local revenue sources creates disparities in education quality between property-rich and property-poor districts.**

The structure of ECS is largely the same as it was when the grant program was created more than 30 years ago. The amount of ECS grant funding allocated to a school district is based on three components: the foundation amount, a weighted count of enrolled students, and the base aid ratio. The foundation is the amount of money that the state determines is needed to educate a typical public school student who does not have any additional learning needs. Connecticut set the foundation amount for fiscal year 2019 at $11,525 per pupil (CSFP 2018b). The state recognizes

that a school district with a greater share of at-risk students needs to spend more money than the foundation amount; therefore, in the new formula adopted in 2017, it uses three "need-student" weights (low-income-student weight, concentrated-poverty weight, and English-learner weight) to adjust the number of enrolled students and thus the amount of funding needed. Whereas a typical student without additional learning needs receives a weight of 1.0 in the ECS formula, a low-income student receives a weight of 1.3, and an English-learner a weight of 1.15 (CSFP 2019). For a district with concentrated poverty, which is defined as a district in which more than 75 percent of the students are from low-income households, the state gives an additional weight of 0.05 to each low-income student. After the total school funding is calculated by multiplying the founda-tion amount by the weighted count of enrolled students, the base aid ratio determines the share of this amount that ECS grants will fund.[3] The state uses the base aid ratio to account for differences among municipalities in their capacity for funding local education services and, accordingly, to distribute more grant money to districts with less local fiscal capacity.[4]

> **In 2017, the contribution from local revenues to Connecticut's public school funding was 58 percent—the fourth highest percentage in the country.**

ECS has several limitations. First, the program has rarely been fully funded in the past 30 years (Moran et al. 2016; Sullivan 2018). During economic recessions and related fiscal crises, the state often froze or reduced the ECS funding levels, stopped running the ECS formula, and instead distributed ECS grants via block grants. To address this issue, the state legislature passed a law in October 2017 that calls for the phasing in of full funding of ECS over a 10-year period that began with fiscal year 2019. Second, many education advocates do not view the foundation amount as representing the real costs of educating students in Connecticut. It is not derived from data analysis; instead it is based on the historical levels of the foundation amount and has included few increases to account for changes in costs over time (CSFP 2019). Third, obtaining an accurate count of low-income students has become increasingly challenging. The state has relied on eligibility for free or reduced-price lunch (FRPL) to determine low-income-student status. However, under the Community Eligibility Provision (CEP) in the federal Healthy, Hunger-Free Kids Act of 2010, FRPL is no longer a reliable measure of low-income students in each

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3   School districts are guaranteed to receive at least 1 percent of their total funding through the ECS program (Moran et al. 2016). So-called Alliance Districts—33 state-designated lowest-performing cities and towns—receive a minimum base aid ratio of 10 percent.

4   The formula for calculating the base aid ratio is complex. It takes into account both the total equalized value of taxable property, called the equalized net grand list (ENGL), and the median household income in a school district. In general, districts with lower ENGLs per pupil and lower median household incomes are given higher base aid ratios and therefore receive more ECS grant funding (Moran et al. 2016). In addition, the state gives 19 poor cities and towns an extra 3 to 6 percentage points in the base aid ratio.

school district.[5] In addition, Connecticut does not separate special education from the ECS program; instead it incorporates special education funding into the foundation amount in the ECS formula. This treatment creates an incentive for school districts to underfund the costly special-education programs and deny services to students with special learning needs.[6]

III. Measuring Cost Disparities

Through advanced statistical analysis of recent data, this report finds four cost factors that increase the amount of spending needed for districts to achieve a given student test performance and are outside the direct control of local officials at any given point in time. Based on these cost factors, this report develops a cost index that indicates large disparities in education costs across Connecticut school districts.

> **Four factors increase a district's cost index: poverty, single-parent or non-family households, smaller enrollment, and belonging to a regional district.**

This report uses a regression method to analyze the school-district-level data from 2009 through 2013.[7] This time span was chosen because it is a period for which there are sufficient data on school finances, district characteristics, and student test performance for rigorous statistical analysis. The relationship between school spending and student and district characteristics is believed to be relatively stable, regardless of the time period and how Connecticut tests students.[8] Therefore, although the state changed the standardized tests in 2015 from the Connecticut Mastery Test (for public elementary and middle school students) and the Connecticut Academic Performance Test (for public high school students) to the Smarter Balanced Test, the general pattern of the results should still be informative and relevant for policymakers. This same type of research can be performed in the future, when more data from the Smarter Balanced Test period become available.

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5   The CEP allows all students, not just low-income students, to receive free meals if their districts or schools qualify and participate. To qualify for the CEP, districts and schools must have at least 40 percent of their students directly certified by the state for free meals, without the use of a household application. Using administrative data, the state can directly certify (1) students whose households participate in public benefits programs, such as the Supplemental Nutritional Assistance Program (SNAP), Temporary Assistance for Needy Families (TANF), and Medicaid for children; and (2) students in other programs, such as homeless, runaway, migrant, foster care, and Head Start programs. In districts and schools that qualify for and participate in the CEP, parents of students no longer need to submit an application for FRPL, which was the approach that schools used to collect the student-level meal eligibility data before the CEP took effect. However, states still need the student-level FRPL data to satisfy federal and state school accountability requirements and to run their education aid formulas (if their formulas include FRPL as an input factor), as well as for many other data-reporting purposes. Therefore, the Connecticut State Department of Education requires the CEP districts and schools to continue reporting each student's hypothetical eligibility for FRPL by using the following protocol. These districts and schools should report (1) the FRPL status of directly certified students as eligible for FRPL, (2) the FRPL status of returning students who are not directly certified the same as in the previous year, and (3) the FRPL status of new students who are not directly certified based on the "alternative income survey" that their parents are supposed to complete and return to schools. However, parents of new students have no personal incentive to do so, since their children are already guaranteed to receive free meals in these CEP districts and schools. The resulting student-level hypothetical FRPL data are likely to be inaccurate, drawing serious concerns from state officials. When testifying before the Connecticut General Assembly's Appropriations Committee on March 6, 2019, Connecticut State Department of Education officials highlighted "data integrity" issues in the student-level FRPL data (CSFP 2019).

6   See Jacqueline Rabe Thomas, "State Intervenes in Hartford's Treatment of Students with Disabilities," *CT Mirror*, August 26, 2011; Jacqueline Rabe Thomas, "State: Bridgeport 'Systematically Violated' Special Education Laws," *CT Mirror*, January 24, 2014; Brian McCready, "Oxford Parents Question Special Education Services," *Oxford Patch*, October 11, 2018.

7   See Zhao (2020) for more details of the regression analysis.

8   Duncombe (2006) and Duncombe and Yinger (2011), who conducted cost studies for Kansas and Missouri, respectively, show that the cost estimates are not sensitive to the time periods of the data that are used and are reliable for forecasting purposes.

The regression approach allows us to answer an important question: Which factors are driving up the costs for school districts to achieve a given student test performance level, when all districts are held to operate at the same efficiency level?[9] When holding both student test performance and district efficiency at the same levels across districts, this report finds four cost factors that significantly affect school spending; each factor is outside the direct control of local officials at any given point in time.

These cost factors are (1) the percentage of school-age children (aged 5 to 17) from families living in poverty, (2) the percentage of students living in single-parent or non-family households, (3) whether enrollment size is larger or smaller than 2,000 students, and (4) whether a school district is a regional or local district. A district with a higher percentage of school-age children from families living in poverty or a higher percentage of students living in single-parent or non-family households has to spend more to achieve a given student performance level, because those students are likely to receive less time and/or financial resources from their parents.[10] They are also more likely to learn English as a second language[11] and have disabilities,[12] both of which could hamper their ability to study. A small district, specifically one in which fewer than 2,000 students are enrolled, has to spend more to reach a given student test performance level because it is unable to enjoy the cost savings reaped by larger districts, which can spread costs over a greater number of students.[13] Also, regional school districts experience costs that are higher than those of local school districts to achieve the same student test performance level, perhaps due to the additional expenses associated with coordination among a regional district's member towns.

A cost index based solely on these cost factors allows us to examine the disparities in education costs among Connecticut school districts, when this report effectively holds both student test performance and district efficiency at the same levels across the state. This calculation method avoids rewarding a school district for having a lower efficiency level, since a lower efficiency level would not increase its cost index. It also avoids penalizing a school district for having a higher efficiency level, because a higher efficiency level would not decrease its cost index.

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9   Zhao (2020) finds that the identified cost factors are robust, regardless of how student performance is measured. Alternative measures of student performance explored by Zhao (2020) include high school graduation rates, the percentage of high school graduates pursuing higher education, and the growth in student test performance.

10 This report prefers the school-age-child-poverty rate to the percentage of students eligible for free or reduced-price lunch (FRPL) to account for low-income students mainly because since the CEP in the federal Healthy, Hunger-Free Kids Act of 2010 took effect, the percentage of students eligible for FRPL is likely to be inaccurate. (See Footnote 5 for more information about the impact of the CEP on FRPL.) The school-age-child-poverty rate is not affected by the CEP.

11 This report finds that when the percentage of English-learner students and the percentage of school-age children from families living in poverty are concurrently included in the regression, the cost effect of English-learner students is not significant in a statistical sense. This is likely due to districts with a higher percentage of English-learner students tending to also have a higher percentage of school-age children from families living in poverty. Therefore, the cost effect of English-learner students is likely, at least partly, absorbed by the cost effect of school-age-child poverty.

12 This report does not directly include the percentage of special-education students as a cost factor because it may be affected by schools' or districts' choices. Districts have discretion in accommodating students' request for special education. Since special education is more costly than standard education and the state does not directly account for the number of special-education students in the allocation of state education aid, some districts may have a financial incentive to reduce the number of students receiving special education. Because districts with a higher percentage of school-age children from families living in poverty tend to have a higher percentage of special-education students, the cost effect of special-education students is likely, at least partially, reflected by the cost effect of school-age-child poverty.

13 In theory, the state could mandate small districts to consolidate. However, in the absence of such *state-level* policy, the size of district enrollment is still outside the direct control of local officials at any given point in time. In addition, the regression results suggest that on average, school district consolidation may not produce net cost savings, because forming or joining a regional district triggers additional costs possibly related to coordination with other towns in the same regional district. Table 1 in the online appendix shows similarly sized coefficients on the indicator variable for an enrollment of fewer than 2,000 students and the indicator variable for a district being a regional school district.

| Table 1 | Calculating the Cost Index for Sample School Districts Connecticut Average District, Hartford, and New Canaan (Fiscal Year 2013) | | | | | | |

		Average District		Hartford		New Canaan	
Cost Factors:	Factor Weight (1)	Factor Value (2)	Contri- bution to Cost (3) = (1) x (2)	Factor Value (4)	Contri- bution to Cost (5) = (1) x (4)	Factor Value (6)	Contri- bution to Cost (7) = (1) x (6)
Percentage of School-age Children from Families Living in Poverty	0.012	13.30	0.16	40.39	0.48	3.16	0.04
Percentage of Students Living in Single-parent or Non-family Households	0.003	34.84	0.10	74.20	0.22	14.20	0.04
Indicator for Enrollment < 2,000	0.072	0.08	0.01	0.00	0.00	0.00	0.00
Indicator for Regional School District	0.077	0.08	0.01	0.00	0.00	0.00	0.00
Sum			0.28		0.71		0.08
Cost Index (= $e^{\text{district's sum} - \text{average district's sum}}$)			1.00		1.54		0.82
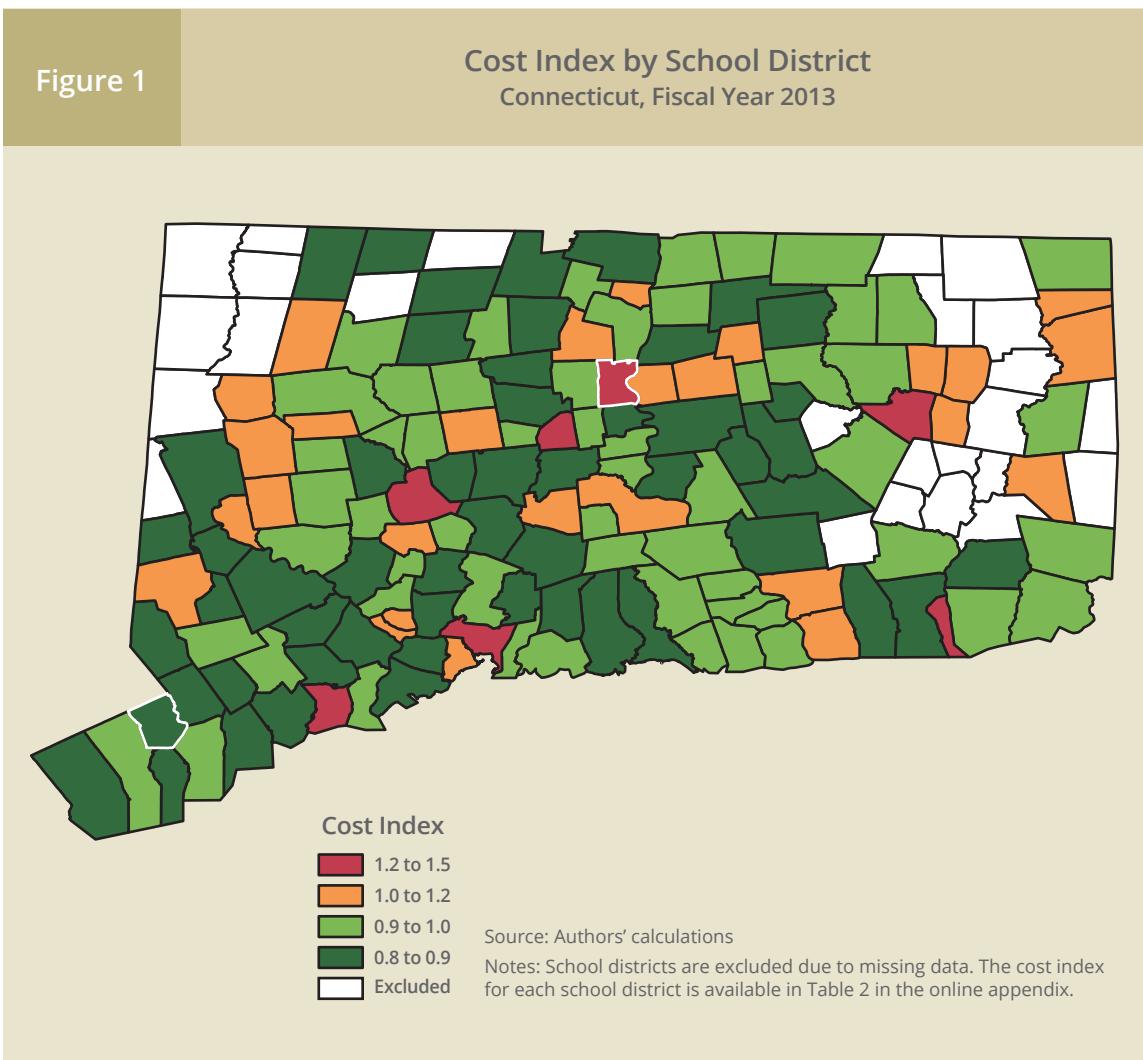
Source: Authors' calculations
Notes: Factor weights are the estimated regression coefficients in Table 1 in the online appendix. A district's cost index is an exponential function of the difference between the sum of its contributions to cost and the sum of the average district's contributions to cost.

Table 1 illustrates how the cost index is calculated for two sample districts—the Hartford school district (an example of a large, poor, urban school district) and the New Canaan school district (an example of a wealthy, suburban school district)—and an average district in fiscal year 2013. This report constructs this average district by assigning it the statewide enrollment-weighted average values of the cost factors that year. The cost index shows how high or low a district's costs are relative to the average district's costs.[14] By construction, the cost index for the average district is equal to 1, since it compares with itself.

The Hartford school district had a cost index of 1.54 in fiscal year 2013, meaning that the district's costs per pupil were 54 percent higher than those of the average district. This is because Hartford had a significantly higher percentage of school-age children from families living in poverty and a significantly higher percentage of students living in single-parent or non-family households. In comparison, New Canaan, with a cost index of 0.82 in fiscal year 2013, had costs per pupil that were about 18 percent lower than those of the average district. These lower costs were driven mostly by New Canaan's lower percentage of school-age children from families living in poverty and lower percentage of students living in single-parent or non-family households, compared with the average district.[15]

14 This report uses the estimated coefficient on each cost factor from the regression analysis as a "weight" to indicate how much this cost factor contributes to education costs. See Table 1 in the online appendix for the full regression results.

15 See Tables 2 and 3 in the online appendix for the values of the cost factors and the cost index for each Connecticut school district in fiscal year 2013. The ratio of the maximum cost index to the minimum cost index for Connecticut in that year is 1.90. It lies within the range of the maximum-to-minimum ratios for other states estimated in previous studies. Imazeki and Reschovsky (2006) estimate that the maximum-to-minimum ratio for Texas in fiscal year 2002 was 8.05, and Duncombe and Yinger (2005) estimate that the maximum-to-minimum ratio for New York in fiscal year 2001 was 1.81.

| Figure 1 | Cost Index by School District
Connecticut, Fiscal Year 2013 |
|---|---|

Cost Index

- 1.2 to 1.5
- 1.0 to 1.2
- 0.9 to 1.0
- 0.8 to 0.9
- Excluded

Source: Authors' calculations

Notes: School districts are excluded due to missing data. The cost index for each school district is available in Table 2 in the online appendix.

The cost index value is not evenly distributed across the state (Figure 1). The highest cost indexes are concentrated among the largest school districts that are also poor and urban. The wealthy suburbs tend to have the lowest cost indexes. In particular, Fairfield County, which is in the southwest corner of the state and near New York City, has a large cluster of the lowest-cost school districts.

On average, the cost index is higher for school districts that the state identifies as having lower socioeconomic status and a higher level of student need. The Connecticut State Department of Education uses a classification system called District Reference Groups (DRGs), which sorts districts according to socioeconomic characteristics (Connecticut State Department of Education 2006). It uses the following seven variables as indicators of students' socioeconomic status and level of need: (1) the median family income for households with children in public schools; (2) the percentage of parents with a bachelor's degree or higher; (3) the percentage of public school students with parents holding jobs in executive, managerial, or professional specialty occupations; (4) the percentage of public school students living in families without a spouse present or in non-family households; (5) the percentage of public school students eligible to receive free or reduced-price

Table 2	Cost Index by District Reference Group Connecticut, Fiscal Year 2013								
	District Reference Groups								
Cost Factors:	**A**	**B**	**C**	**D**	**E**	**F**	**G**	**H**	**I**
Percentage of School-age Children from Families Living in Poverty	4.03	4.88	4.60	6.66	5.90	9.99	13.60	17.03	32.52
Percentage of Students Living in Single-parent or Non-family Households	14.12	19.34	21.52	25.74	24.14	31.32	40.64	40.68	64.05
Indicator for Enrollment < 2,000	0.00	0.00	0.28	0.10	0.70	0.40	0.02	0.02	0.00
Indicator for Regional School District	0.11	0.09	0.61	0.00	0.23	0.03	0.00	0.00	0.00
Cost Index	0.84	0.86	0.92	0.89	0.94	0.97	1.01	1.06	1.36
Percentage of Statewide Enrollment	5.95	18.97	7.31	15.95	2.93	5.01	12.13	12.40	19.37

Source: Authors' calculations
Notes: Districts in District Reference Group A (DRG-A) are considered to have the highest socioeconomic status and the lowest level of student need; DRG-I districts are considered to have the lowest socioeconomic status and the highest level of student need. Each district's enrollment is used as a weight to calculate the weighted average within each DRG.

meals; (6) the percentage of public school students whose family members speak a language other than English at home; and (7) district enrollment. Then, the State Department of Education uses a statistical approach to categorize districts in nine groups, labeled in alphabetic order from A through I. Districts in DRG-A are considered to have the highest socioeconomic status and the lowest level of student need; DRG-I districts are considered to have the lowest socioeconomic status and the highest level of student need. The state created the DRG system to help school districts make more appropriate comparisons.

Table 2 shows that districts in DRG-I, which collectively enroll nearly one-fifth of the state's public school students, have the highest average cost index. This is because these districts have, on average, the highest rate of school-age-child poverty and the highest percentage of students living in single-parent or non-family households. On the other end of the spectrum, districts in DRG-A have the lowest average cost index, because they have, on average, the lowest rate of school-age-child poverty and the lowest percentage of students living in single-parent or non-family households.

The highest cost indexes are concentrated among the largest school districts that are also poor and urban. The wealthy suburbs tend to have the lowest cost indexes.

Table 3	Calculating Cost-adjusted Current Spending for Sample School Districts Connecticut Average District, Hartford, and New Canaan (Fiscal Year 2013)		
	Average District	**Hartford**	**New Canaan**
Current Spending per Pupil in $1,000 (1)	15.12	16.53	18.93
Cost Index (2)	1.00	1.54	0.82
Cost-adjusted Current Spending per Pupil in $1,000 (3) = (1) / (2)	15.12	10.74	23.01

Source: Authors' calculations

IV. Evaluating Equity and Adequacy in School Spending

This report assesses equity and adequacy in districts' spending based on education costs and the student performance target. The assessment suggests that, after cost adjustments, there are large disparities in spending across school districts. Many districts' spending is inadequate to achieve the statewide average student performance level, given their high costs. Ensuring that every district is financially equipped to reach that performance target would require a significant increase in school spending.

It is important that policymakers consider cost differentials across school districts when evaluating equity and adequacy in school spending. The cost index shows that districts with different levels of the cost factors have to spend different amounts of money to achieve the same target level of student test performance. For this reason, current spending adjusted by the cost index portrays inequity more accurately than does unadjusted current spending.

Districts with different levels of the cost factors have to spend different amounts of money to achieve the same level of student performance.

Table 3 illustrates how cost-adjusted current spending is calculated for two sample districts (Hartford and New Canaan) and the average district. Before cost adjustments, Hartford's current spending per pupil in fiscal year 2013 was 13 percent lower than New Canaan's. But because Hartford's cost index was much higher than New Canaan's, its cost-adjusted current spending per pupil was 53 percent lower than that of the wealthier district.[16]

16 See Tables 2 and 3 in the online appendix for the value of cost-adjusted current spending per pupil for other school districts in fiscal year 2013.

Figure 2	Cost-adjusted and Unadjusted Current Spending per Pupil by District Reference Group
	Connecticut, Fiscal Year 2013

■ Unadjusted Current Spending per Pupil ■ Cost–adjusted Current Spending per Pupil

Thousands of Dollars

21.69
18.15
20
17.82
15.31
16.46
14.75
16.01
14.73
15.91
14.93
15.14
14.69
15.01
14.86
14.83
14.16
14.84
15
10.91
10
5
0

A   B   C   D   E   F   G   H   I

District Reference Group

Source: Authors' calculations

Notes: Districts in District Reference Group A (DRG-A) are considered to have the highest socioeconomic status and the lowest level of student need; DRG-I districts are considered to have the lowest socioeconomic status and the highest level of student need. Each district's enrollment is used as a weight to calculate the weighted average within each DRG.

Cost-adjusted current spending per pupil has a wider range than unadjusted current spending per pupil among school districts and is generally lower in districts with lower socioeconomic status (Figure 2). Except for DRG-A, all of the DRGs had similar unadjusted current spending per pupil in fiscal year 2013. However, due to differences in their cost indexes, there was significant inequity in cost-adjusted current spending per pupil among the DRGs. On the one hand, DRG-I had the lowest average cost-adjusted current spending per pupil, but not because it had the lowest unadjusted current spending per pupil; it was because the DRG had the highest cost index. On the other hand, DRG-A had the highest cost-adjusted current spending per pupil, because it had both the highest unadjusted current spending per pupil and the lowest cost index.

To evaluate the adequacy of school spending, policymakers first need to know how much money each district must spend at a state-selected common efficiency level to achieve a state-selected common target for student test performance given the district's cost factors. In this report, every district's efficiency is held at the same level, so that less efficient districts are not rewarded or more efficient districts are not penalized. This report calls the required spending derived from this calculation the "predicted cost."

Table 4	Calculating the Predicted Cost for Sample School Districts Connecticut Average District, Hartford, and New Canaan (Fiscal Year 2013)

Panel A	Student Test Performance Target Set at 90 Percent Proficiency, and Efficiency Set at Statewide Average Level

Cost Variables:		Average District			Hartford		New Canaan	
	Factor Weight (1)	Factor Value (2)	Contribution to Cost (3) = (1) x (2)	Factor Value (4)	Contribution to Cost (5) = (1) x (4)	Factor Value (6)	Contribution to Cost (7) = (1) x (6)
Percentage of School-age Children from Families Living in Poverty	0.012	13.30	0.16	40.39	0.48	3.16	0.04
Percentage of Students Living in Single-parent or Non-family Households	0.003	34.84	0.10	74.20	0.22	14.20	0.04
Indicator for Enrollment < 2,000	0.072	0.08	0.01	0.00	0.00	0.00	0.00
Indicator for Regional District	0.077	0.08	0.01	0.00	0.00	0.00	0.00
Student Test Performance Target:							
Percentage of Students Reaching of Exceeding Proficiency in Math, Reading, and Writing	0.010	90.00	0.90	90.00	0.90	90.00	0.90
Efficiency-related Variables			1.66		1.66		1.66
Sum			2.83		3.26		2.64
Predicted Cost per Pupil in $1,000 (= e^{sum})			16.99		26.16		13.98

Source: Authors' calculations
Notes: Factor weights are the estimated regression coefficients in Table 1 in the online appendix. A district's predicted cost per pupil is an exponential function of the sum of its contributions to cost.

Table 4 illustrates how to calculate the predicted cost for the sample districts, with different policy choices for the student performance target and the common district efficiency level. In Panel A, it is assumed that the performance target for all districts is to have 90 percent of students reach or exceed the proficiency level and every district's efficiency is held at the same statewide average level.[17] This allows school districts to vary only in the values of the cost factors when their predicted costs are calculated. The calculations show that the predicted cost per pupil is nearly 1.9 times as high for Hartford as it is for New Canaan.

17 Under this assumption, the same enrollment-weighted statewide average values of the efficiency-related variables are assigned to each district. This report uses the estimated coefficients from the regression analysis as "weights" to indicate how much each factor contributes to the predicted cost.

Table 4	Calculating the Predicted Cost for Sample School Districts Connecticut Average District, Hartford, and New Canaan (Fiscal Year 2013)

Panel B	Student Test Performance Target Set at Statewide Average Level, and Efficiency Set at Statewide Average Level

		Average District			Hartford		New Canaan	
Cost Variables:	**Factor Weight (1)**	**Factor Value (2)**	**Contribution to Cost (3) = (1) x (2)**	**Factor Value (4)**	**Contribution to Cost (5) = (1) x (4)**	**Factor Value (6)**	**Contribution to Cost (7) = (1) x (6)**
Percentage of School-age Children from Families Living in Poverty	0.012	13.30	0.16	40.39	0.48	3.16	0.04
Percentage of Students Living in Single-parent or Non-family Households	0.003	34.84	0.10	74.20	0.22	14.20	0.04
Indicator for Enrollment < 2,000	0.072	0.08	0.01	0.00	0.00	0.00	0.00
Indicator for Regional District	0.077	0.08	0.01	0.00	0.00	0.00	0.00
Student Test Performance Target:							
Percentage of Students Reaching of Exceeding Proficiency in Math, Reading, and Writing	0.010	82.68	0.83	82.68	0.83	82.68	0.83
Efficiency-related Variables			1.66		1.66		1.66
Sum			2.76		3.19		2.56
Predicted Cost per Pupil in $1,000 (= e^{sum})			15.79		24.31		12.99

Source: Authors' calculations
Notes: Factor weights are the estimated regression coefficients in Table 1 in the online appendix. A district's predicted cost per pupil is an exponential function of the sum of its contributions to cost.

In Panel B, the student performance target is lowered to the statewide average student test performance level, which is 82.7 percent of students reaching or exceeding the proficiency level. Each district's efficiency is still held at the statewide average efficiency level, as in Panel A. Under the lower student performance target, the predicted cost per pupil accordingly declines for all districts. Nonetheless, the ratio of Hartford's predicted cost to New Canaan's predicted cost remains unchanged, because this ratio depends on only the cost factors.

Table 4	Calculating the Predicted Cost for Sample School Districts Connecticut Average District, Hartford, and New Canaan (Fiscal Year 2013)						

Panel C	Student Test Performance Target Set at Statewide Average Level, and Efficiency Set at Statewide Top 25 Percent Level						
		Average District			Hartford		New Canaan	
Cost Variables:	Factor Weight (1)	Factor Value (2)	Contribution to Cost (3) = (1) x (2)	Factor Value (4)	Contribution to Cost (5) = (1) x (4)	Factor Value (6)	Contribution to Cost (7) = (1) x (6)
Percentage of School-age Children from Families Living in Poverty	0.012	13.30	0.16	40.39	0.48	3.16	0.04
Percentage of Students Living in Single-parent or Non-family Households	0.003	34.84	0.10	74.20	0.22	14.20	0.04
Indicator for Enrollment < 2,000	0.072	0.08	0.01	0.00	0.00	0.00	0.00
Indicator for Regional District	0.077	0.08	0.01	0.00	0.00	0.00	0.00
Student Test Performance Target:							
Percentage of Students Reaching of Exceeding Proficiency in Math, Reading, and Writing	0.010	82.68	0.83	82.68	0.83	82.68	0.83
Efficiency-related Variables			1.59		1.59		1.59
Sum			2.69		3.12		2.50
Predicted Cost per Pupil in $1,000 (= e^{sum})			14.77		22.74		12.15

Source: Authors' calculations
Notes: Factor weights are the estimated regression coefficients in Table 1 in the online Appendix. A district's predicted cost per pupil is an exponential function of the sum of its contributions to cost.

In Panel C, the student performance target continues to be the statewide average student test performance level, but the common district efficiency level is raised to the statewide top 25 percent district efficiency level.[18] As a result, the predicted cost per pupil drops further across the state.

The state faces tradeoffs in using a student performance target and a common district efficiency level as policy levers to influence the predicted cost. As Table 4 shows, the state can reduce each district's predicted cost and therefore ultimately decrease the state's funding responsibility

18 This report first calculates the actual contribution of the efficiency-related variables to the predicted cost per pupil for each district and then ranks them from low to high. Next, it takes the 25th percentile value from this distribution as the top 25 percent district efficiency level in the state.

Table 5	Calculating the Spending-to-cost Ratio and Additional Spending Needed for 82.7 Percent of Students to Reach or Exceed Proficiency for Sample School Districts Connecticut Average District, Hartford, and New Canaan (Fiscal Year 2013)		
	Average District	**Hartford**	**New Canaan**
Current Spending per Pupil in $1,000 (1)	15.12	16.53	18.93
Predicted Cost per Pupil in $1,000 (2)	16.99	26.16	13.98
Spending-to-cost Ratio (3) = (1) / (2)	0.89	0.63	1.35
Additional Spending Needed per Pupil in $1,000 (4) = (2) - (1)	1.87	9.62	0.00
Additional Spending Needed as Percentage of Current Spending (%) (5) = [(4) / (1)] × 100	12.37	58.20	0.00
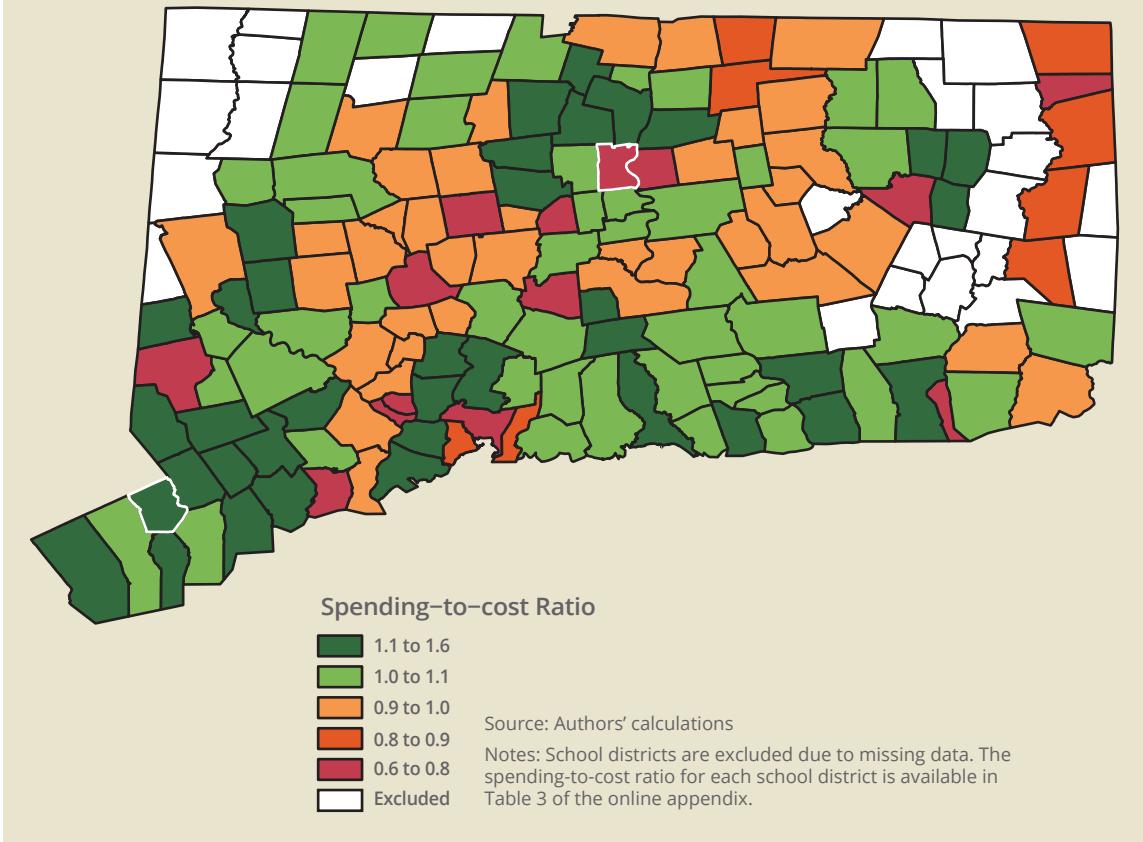
Source: Authors' calculations

by lowering the student performance target and/or raising the assumed common level of district efficiency. However, a lower student performance target would mean lower-quality education for many districts. Also, a higher-than-average efficiency level may not be feasible for many districts in the short term, especially if it requires large upfront investments in hiring more and higher-quality teachers and upgrading teaching equipment. For illustration purposes, the rest of this report makes the same assumptions as those in Panel B, that the common student performance target is equal to the statewide average percentage of students reaching or exceeding the proficiency level and the common district efficiency level is equal to the statewide average district efficiency level. In addition, it should be noted that spending the same amount of money as the predicted cost does not guarantee that a school district will achieve the student test performance target on which the predicted cost is based. If the district operates at an efficiency level that is lower than the level that was assumed in calculating the predicted cost, the district will not effectively help students learn and will not achieve the performance target. The question of how the state can increase school efficiency is beyond the scope of this report, but it is an important issue that deserves a separate study.

Having the predicted cost to achieve a performance target provides policymakers with a scientific basis to evaluate the adequacy of each school district's spending. Using the sample districts in fiscal year 2013, Table 5 shows that a ratio of current spending to the predicted cost can be

Figure 3	Ratio of Current Spending to Predicted Cost for 82.7 Percent of Students to Reach or Exceed Proficiency by School District Connecticut, Fiscal Year 2013

Spending–to–cost Ratio

- 1.1 to 1.6
- 1.0 to 1.1
- 0.9 to 1.0
- 0.8 to 0.9
- 0.6 to 0.8
- Excluded

Source: Authors' calculations

Notes: School districts are excluded due to missing data. The spending-to-cost ratio for each school district is available in Table 3 of the online appendix.

calculated as a measure of spending adequacy for achieving a common performance target, which in this case is assumed to be the statewide average percentage of students reaching or exceeding the proficiency level: 82.7 percent. In fiscal year 2013, Hartford's current spending was 32 percent lower than its predicted cost, which suggests that its spending was inadequate for achieving this target. Raising Hartford's current spending to the adequate level (which is the same amount as its predicted cost) would have required an additional spending of $7,780 per pupil, or a 47 percent increase in current spending. In contrast, New Canaan's current spending was 46 percent higher than its predicted cost in fiscal year 2013. This suggests that the district's spending was adequate for achieving the performance target and therefore New Canaan would not have needed additional spending.[19]

There is large variation in spending adequacy across the state (Figure 3). Spending exceeded predicted costs in most of Fairfield

Current spending adjusted by the cost index portrays inequity more accurately than does unadjusted current spending.

19 See Tables 2 and 3 in the online appendix for the values of the spending-to-cost ratio and additional spending needed per pupil for other school districts to achieve the target of 82.7 percent of students reaching or exceeding the proficiency level in fiscal year 2013.

Table 6	Spending-to-cost Ratio and Additional Spending Needed for 82.7 Percent of Students to Reach or Exceed Proficiency by District Reference Group Connecticut, Fiscal Year 2013								
	District Reference Groups								
	A	**B**	**C**	**D**	**E**	**F**	**G**	**H**	**I**
Current Spending per Pupil in $1,000	18.15	15.31	14.73	14.75	14.93	14.69	15.01	14.83	14.84
Predicted Cost per Pupil in $1,000	13.24	13.57	14.47	14.13	14.82	15.33	15.98	16.68	21.51
Spending-to-cost Ratio	1.37	1.13	1.01	1.04	1.01	0.96	0.94	0.90	0.69
Additional Spending Needed per Pupil in $1,000	0.00	0.00	0.43	0.25	0.33	0.90	1.36	2.26	6.67
Additional Spending Needed as Percentage of Current Spending (%)	0.00	0.00	3.35	1.89	2.38	6.51	10.01	16.95	45.28
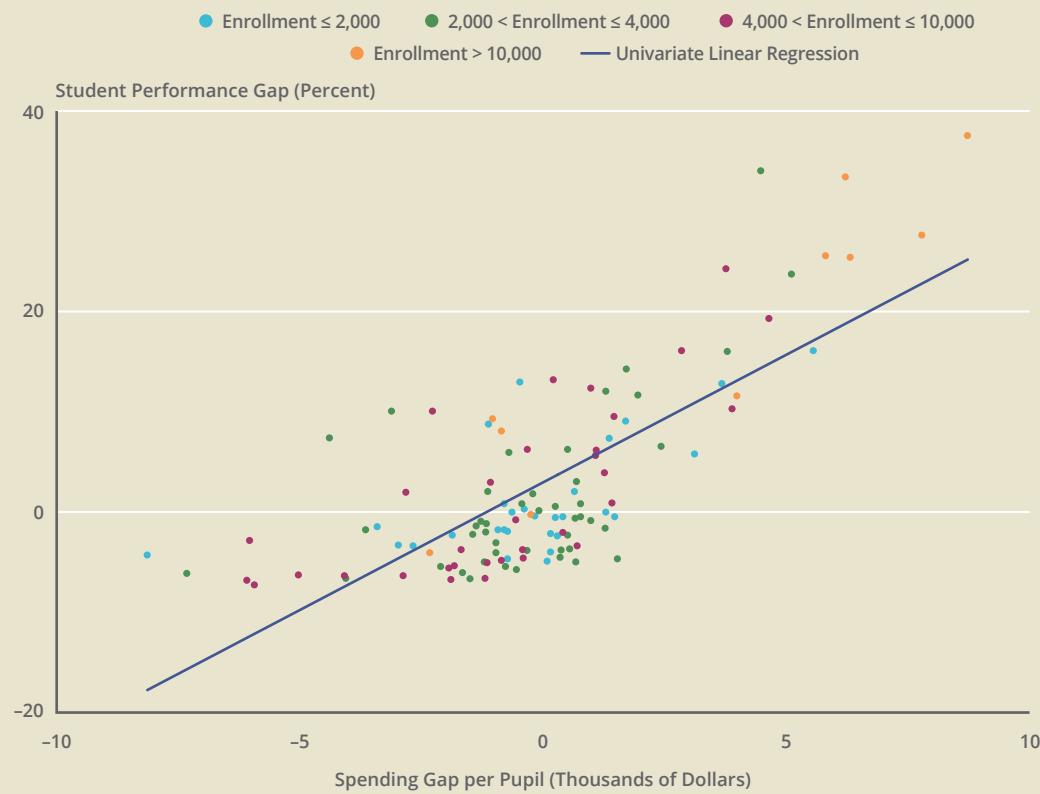
Source: Authors' calculations
Notes: Districts in Distric Reference Group A (DRG-A) are considered to have the highest socioeconomic status and the lowest level of student need; DRG-I districts are considered to have the lowest socioeconomic status and the highest level of student need. Each district's enrollment is used as a weight to calculate the weighted average within each DRG.

County, coastal districts, and some inland suburban districts in fiscal year 2013; however, in 45 percent of Connecticut school districts, spending was inadequate for achieving the target of 82.7 percent of students reaching or exceeding the proficiency level. Statewide, 51.5 percent of public school students were enrolled in districts where spending was inadequate for achieving this target.

Spending inadequacy is more severe in districts with lower socioeconomic status and a higher level of student need (Table 6). On the one hand, in fiscal year 2013, districts in DRG-I—all of which are large, high-need, low-socioeconomic-status, urban districts—on average, spent 31 percent less than what was required to achieve a target of 82.7 percent of students reaching or exceeding the proficiency level.

> To evaluate adequacy, policymakers need to know a district's "predicted cost"—how much it must spend to achieve a performance target given its cost factors.

Figure 4

Student Performance Gap versus Spending Gap per Pupil
117 K–12 School Districts in Connecticut, Fiscal Year 2013

Source: Authors' calculations

Notes: Student performance gap is calculated by substracting the percentage of students reaching or exceeding the proficiency level from 82.7. Spending gap per pupil is calculated by subtracting current spending per pupil from the predicted cost per pupil of achieving the target of having 82.7 percent of students reach or exceed the proficiency level. The blue straight line is generated from a univariate regression that describes a simple linear relationship between the two variables in question.

Statewide, 51.5 percent of public school students were enrolled in districts where spending was inadequate for achieving the average student performance level.
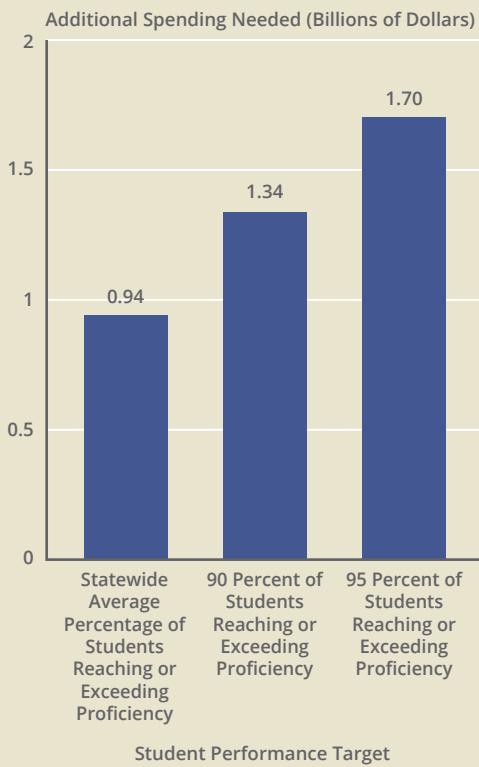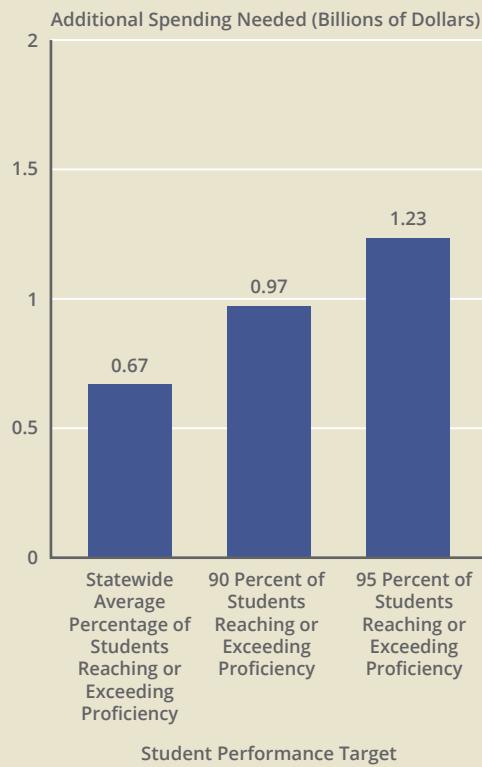
Their spending needed to increase more than 45 percent to be adequate for achieving this target, by this report's definition. On the other hand, the affluent, low-need, suburban districts of DRG-A, on average, spent 37 percent more than their predicted costs for achieving the target of 82.7 percent of students reaching or exceeding the proficiency level. Because they already spent more than enough to achieve this target, they did not need additional spending.

Inadequate school spending has a negative impact on student test performance. Figure 4 shows that the larger the gap is between current spending and the predicted cost, the larger it is between student test performance and the given performance target. Many school districts need more spending to close the performance gap.

Figure 5

Statewide Additional Spending Needed to Achieve Student Performance Targets
Connecticut, Fiscal Year 2013

Panel A. Efficiency Set at the Statewide Average Level

Additional Spending Needed (Billions of Dollars)

Student Performance Target		
Statewide Average Percentage of Students Reaching or Exceeding Proficiency	90 Percent of Students Reaching or Exceeding Proficiency	95 Percent of Students Reaching or Exceeding Proficiency
0.94	1.34	1.70

Panel B. Efficiency Set at the Statewide Top 25 Percent Level

Additional Spending Needed (Billions of Dollars)

Student Performance Target		
Statewide Average Percentage of Students Reaching or Exceeding Proficiency	90 Percent of Students Reaching or Exceeding Proficiency	95 Percent of Students Reaching or Exceeding Proficiency
0.67	0.97	1.23

Source: Authors' calculations

Note: In 2013, the statewide average percentage of students reaching or exceeding the proficiency level was 82.7 percent.

The additional spending needed increases with the performance target when the common district efficiency level is held constant (Figure 5). In Panel A, where the common district efficiency level is assumed to be the statewide average, the state as a whole would have needed about $940 million in additional spending, which is a 12.3 percent increase from the $7.63 billion statewide current spending for 2013, for every district to have achieved the statewide average student test performance level. If the performance target were hiked to 90 or 95 percent of students reaching or exceeding the proficiency level, statewide school spending would have needed to increase $1.34 billion (17.6 percent) or $1.70 billion (22.3 percent), respectively.

Furthermore, the additional spending needed decreases with the assumed common level of district efficiency when the student performance target is held constant. In Panel B, where the common district efficiency level is assumed to be the statewide top 25 percent level, the state as a whole would have needed about $670 million in additional spending for every district to have achieved the statewide average student test performance level. That amount is about 28 percent less than the additional spending needed statewide to achieve the same student performance target in Panel A, which assumes a lower common level of district efficiency.

V. Conclusion

This report shows great inequity in education costs and cost-adjusted spending across Connecticut school districts. Holding student test performance and efficiency constant across districts, it finds that four district characteristics, each of which is outside the direct control of local officials at any given point in time, affect education costs: (1) the percentage of school-age children from families living in poverty, (2) the percentage of public school students living in single-parent or non-family households, (3) whether a district enrolls fewer or more than 2,000 students, and (4) whether it is a regional school district or a local school district. On average, districts with lower socioeconomic status have a higher cost index and lower cost-adjusted spending.

This report also reveals inadequacy in many school districts' spending, which has a negative impact on student test performance. In fiscal year 2013, more than half of Connecticut's public school students were enrolled in districts where spending was insufficient to cover the predicted cost of achieving the statewide average student test performance level, which was 82.7 percent of students reaching or exceeding the proficiency level on the state's standardized tests in that year. Spending inadequacy is more severe in districts with lower socioeconomic status. More important, spending inadequacy is linked to student underperformance relative to the common target.

To better address school spending inequity and inadequacy, the state should consider implementing the measure of the predicted cost for achieving a common student performance target given each district's cost factors. The predicted cost could be used as the basis of a new formula that allocates more state education aid to districts with higher costs. Because the cost factors, their "weights," and the predicted cost are derived from data research, they are more rational and scientifically defensible than the foundation amount and the "need-student" weights used in Connecticut's current ECS formula. The state uses the foundation amount to represent the cost of educating a typical public school student who does not have any additional learning needs. However, each year's foundation amount is "based on past foundation amounts and not derived using verifiable education spending data" (CSFP 2019, p. 49). Also, the foundation amount is not based directly on any student performance target. And although the current formula contains three "need-student" weights (low-income student, concentrated poverty, and English-learner) to adjust the foundation amount for each district, these weights are not derived from data analysis.

This report also suggests that many districts need to increase their spending in order to close the gap between their student performance level and the common target. In general, districts with lower socioeconomic status need the larger increases in school spending. For example, districts in DRG-I would have needed to increase their 2013 spending by more than 45 percent to achieve the common target of 82.7 percent of students reaching or exceeding the proficiency level.

Meeting these needs for additional spending would require significantly more funding from the state and municipalities. Given that the districts in greater need of more spending are often poor and lack property wealth to tap for additional tax revenue, they will likely require a large increase in state education aid to help close their spending gaps and performance gaps.

It remains important that school districts improve their efficiency, because increasing school funding is not a cure-all. Low efficiency in a district undoubtedly hurts student performance, even if school spending is sufficient for covering the predicted cost, which in this report is calculated mostly at the assumed average efficiency level. School districts and the state, therefore, should work together to determine the best ways to teach students and the most efficient ways to run schools. Only the combination of equitable and adequate spending and high efficiency will ensure that all Connecticut public school districts will reach the common student performance target.

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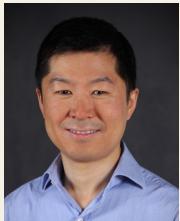
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