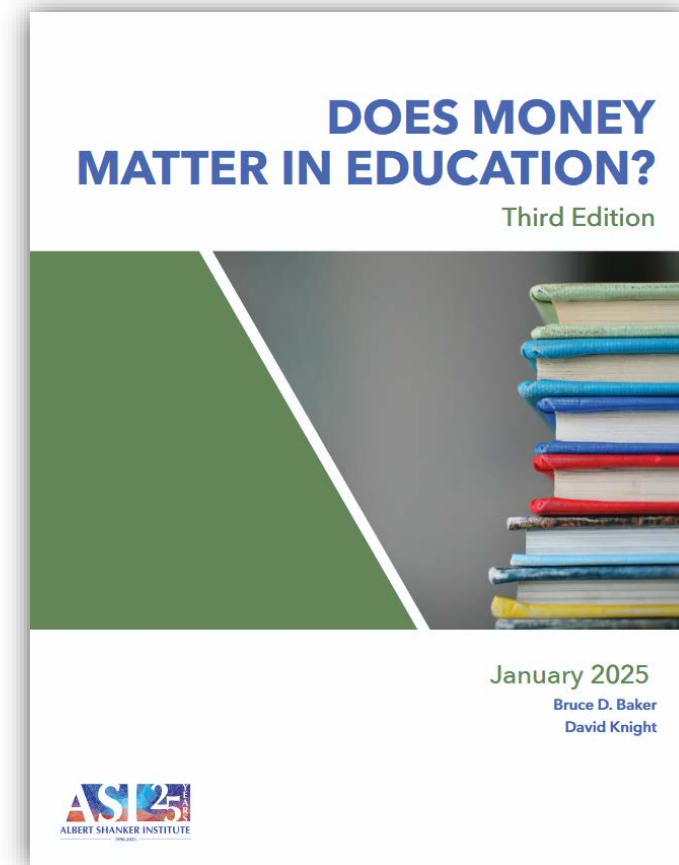


Reforming School Finance in Connecticut

Bruce D. Baker
University of Miami

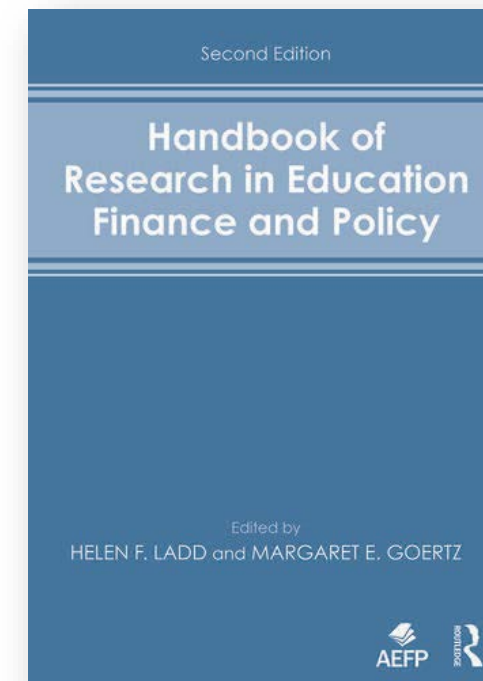
Money Matters

- **Money matters whether it's going up or down:** Increases to school funding lead to improved student outcomes and decreased in funding lead to decreases in outcomes;
- **Money matters whether that money is driven into annual operating expenditures or capital investments:** Increased funding for annual operations typically leads to better teacher wages and smaller class sizes, showing positive effects on student outcomes. Increases to capital spending, from improved classroom facilities, to heating/cooling system improvements lead to improved student outcomes, but often with a lag between when the money is raised and spent and when students have access to the improved facilities.
- **Money matters more- and has a more profound impact – for children experiencing poverty and in school districts and communities in which states have historically underinvested:** Progressive funding matters, often yielding a several fold difference in the return on investment to spending additional dollars in previously low spending and/or higher poverty settings than in lower poverty settings.
- **Money matters regardless of how changes in funding come about:** That is, whether funding increases result from legislative action, fluctuations in economic conditions, federal stimulus, local voter approval or judicial order increases to funding yield improvements to student outcomes.



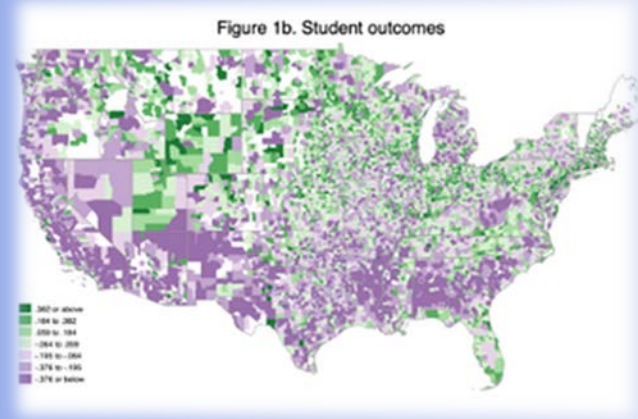
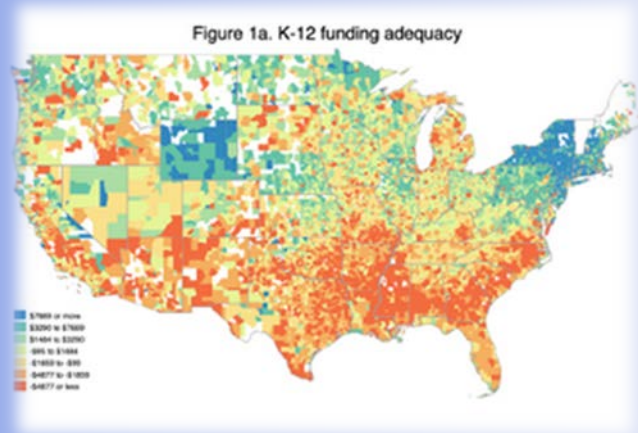
Goals of School Finance Systems

- The goal of school finance systems is to provide all children, regardless of where they live or attend school, ***equal opportunity to achieve common, adequate outcome goals***
 - Providing equal educational opportunity toward common goals costs different amounts in different settings, and across children (individually and collectively) by needs and contexts
 - In the U.S., State accountability systems set common goals - rate, rank and evaluate schools on whether they meet those goals
 - A fair system requires funding sufficient to provide equal opportunity to meet these goals (which are often used for articulating constitutional rights)



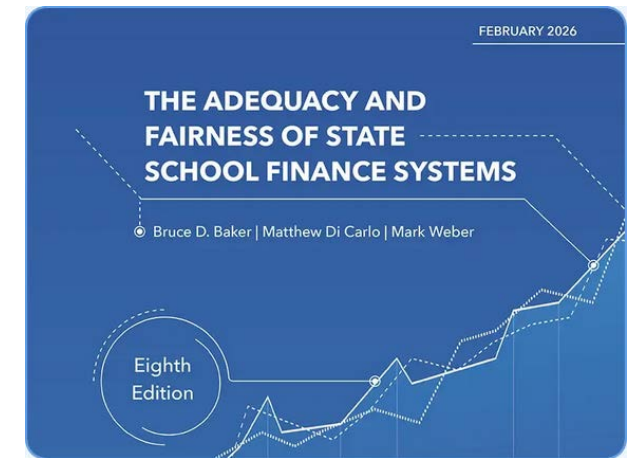
14 Conceptions of Equity and Adequacy in School Finance

16 Measurement of Cost Differentials



The Condition of Education in Connecticut

Bruce D. Baker
University of Miami



Summaries from our National Report

○ Effort

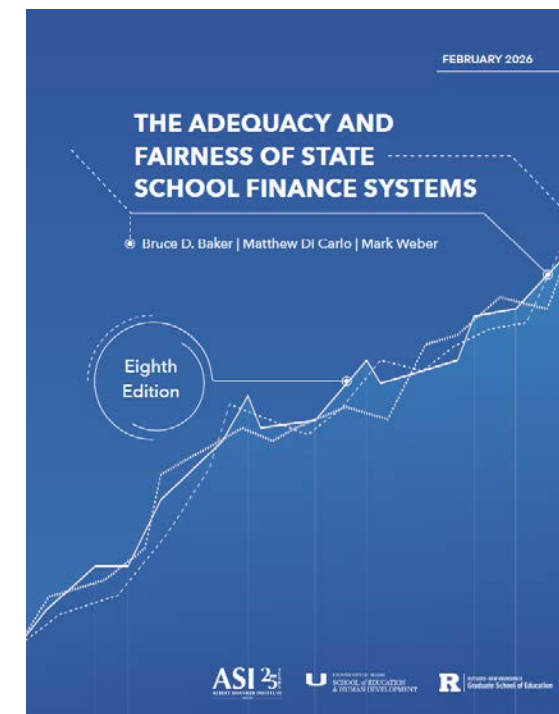
- CT devotes 3.91 percent of its economic capacity (gross state product) to its K-12 public schools.
- This effort level is 0.78 percentage points higher than the unweighted U.S. average of 3.13 percent (rank #3 of 50)

○ Statewide “Adequacy”

- The average CT student’s district spends 56.6 pct. above spending levels needed for achieving national average outcomes in reading and math (rank #4)

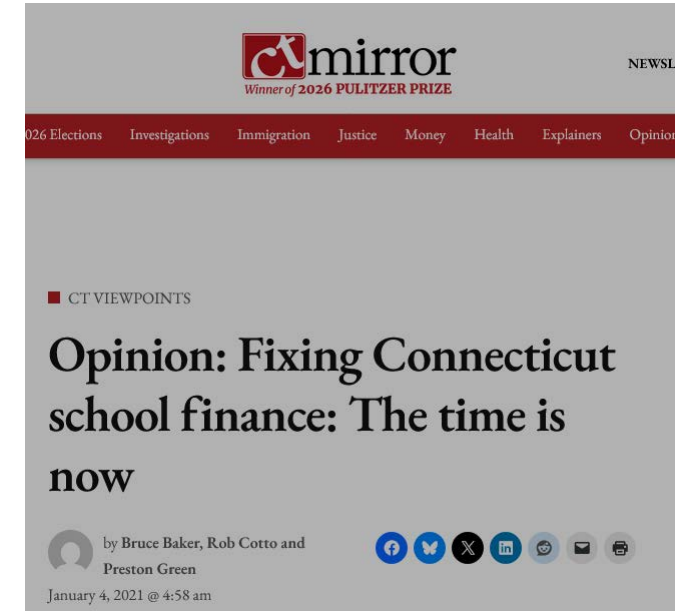
○ Equal Educational Opportunity

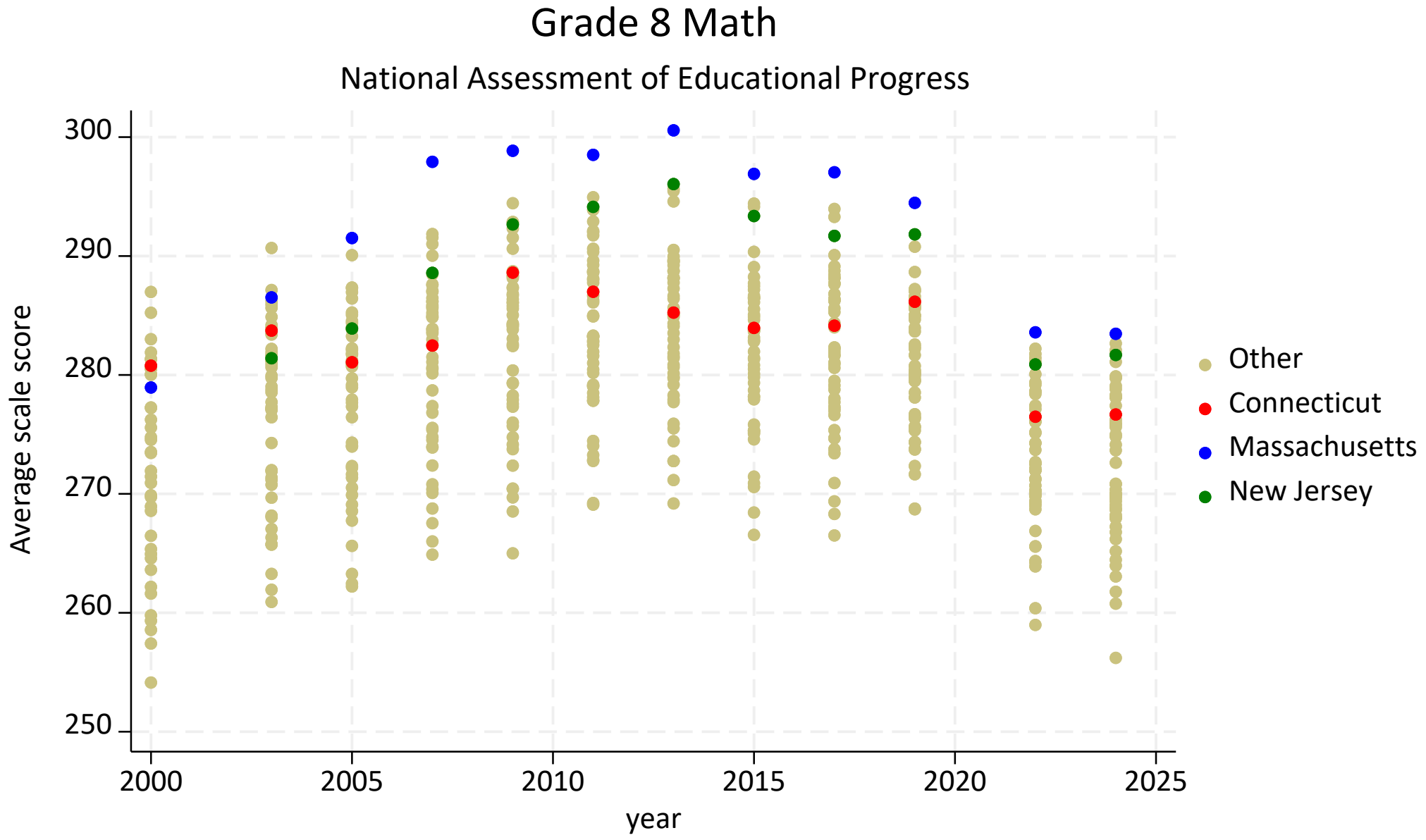
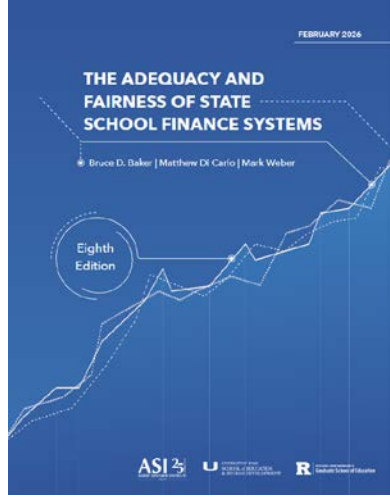
- **CT’s opportunity gap of -148.1 points is ranked #46 out of 47 (#1=most equal)**



Recommendations from 2021

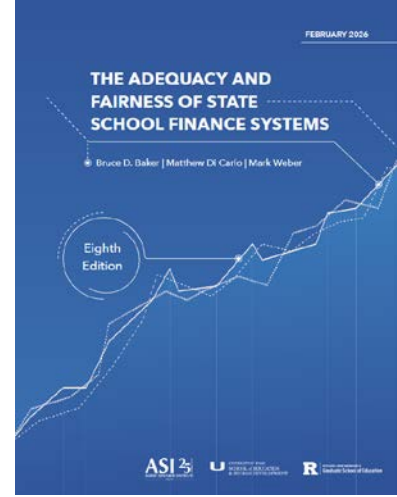
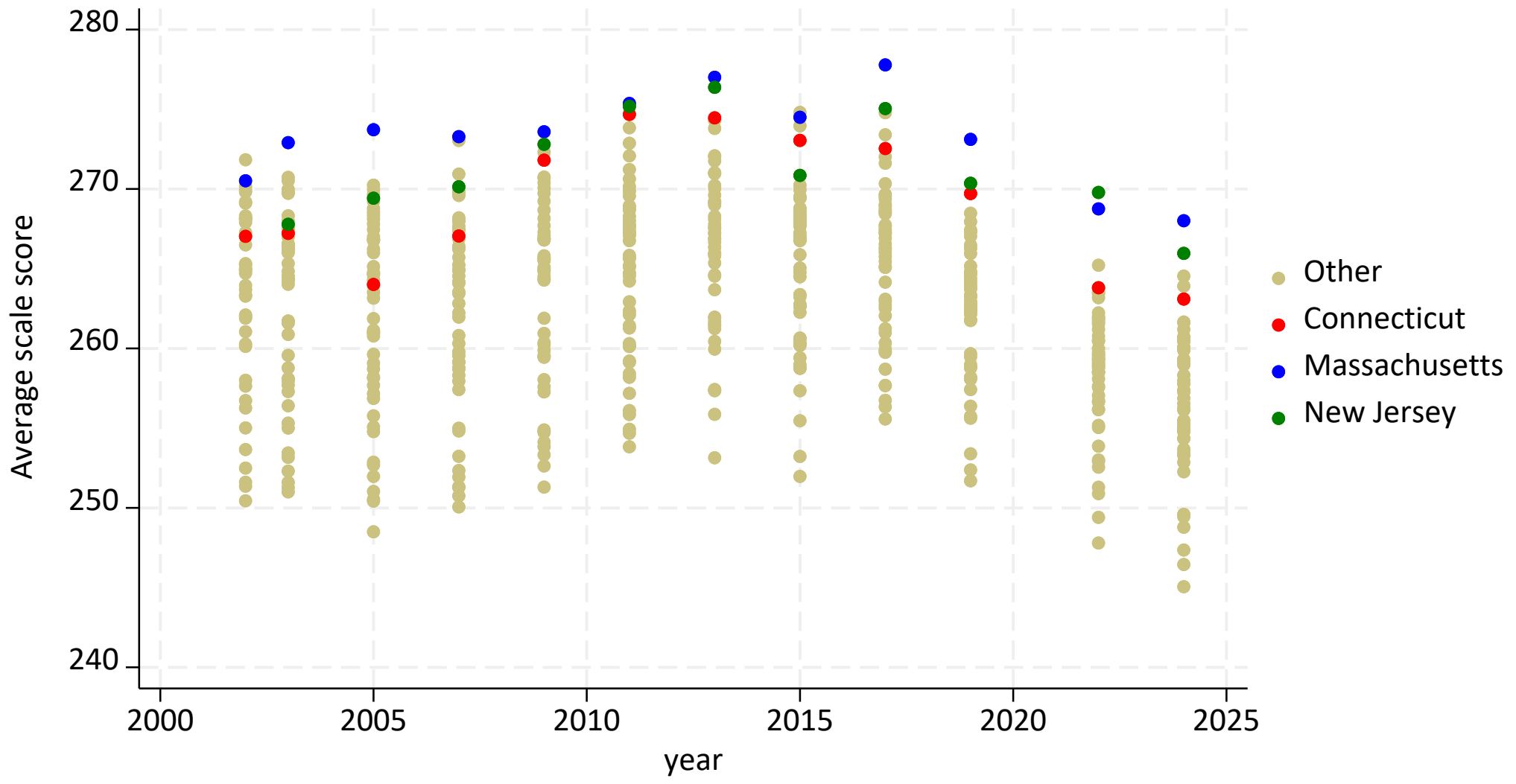
- **Step 1:** Conduct rigorous analyses to answer the question: *What is needed to achieve equal opportunity for all of the state's children to achieve a sufficiently robust set of outcomes?*
- **Step 2:** Recalibrate ECS with a formula specifically designed to hit these cost targets through a combination of a) equitable local effort and b) sufficient state aid;
- **Step 3:** Fund it! (Raise sufficient tax revenues to support the system.)





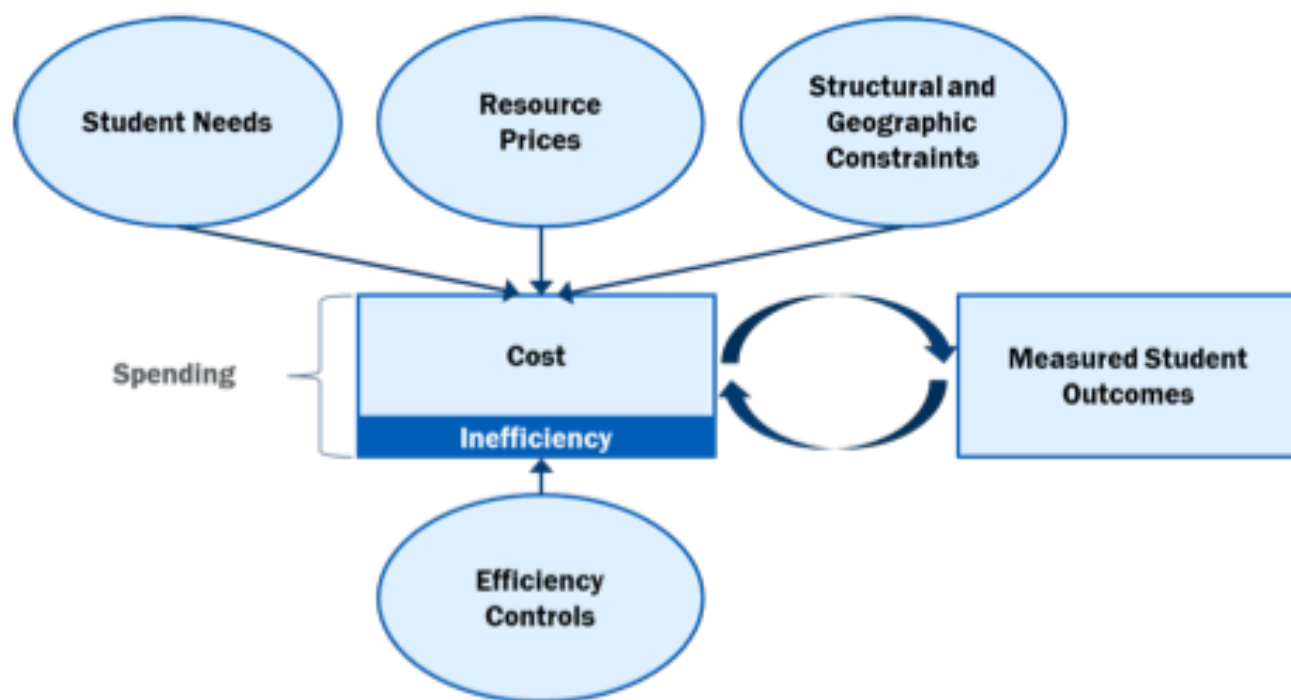
Grade 8 Reading

National Assessment of Educational Progress



National Education Cost Model

- Model using multiple years of data on all schools and/or districts in a state (or nation)
 - 13,000 Local Education Agencies
 - Across 50 State Systems
 - 12 years of data
- Identifying the statistical relationships represented by each connection in the figure (based on the best available data from state and federal sources)
- Using that model to project the spending needed to achieve a given level of outcomes
 - Across all children
 - Across all settings





Distribution of Funding Gaps and Outcome Gaps in the U.S.

Figure 1a. K-12 funding adequacy

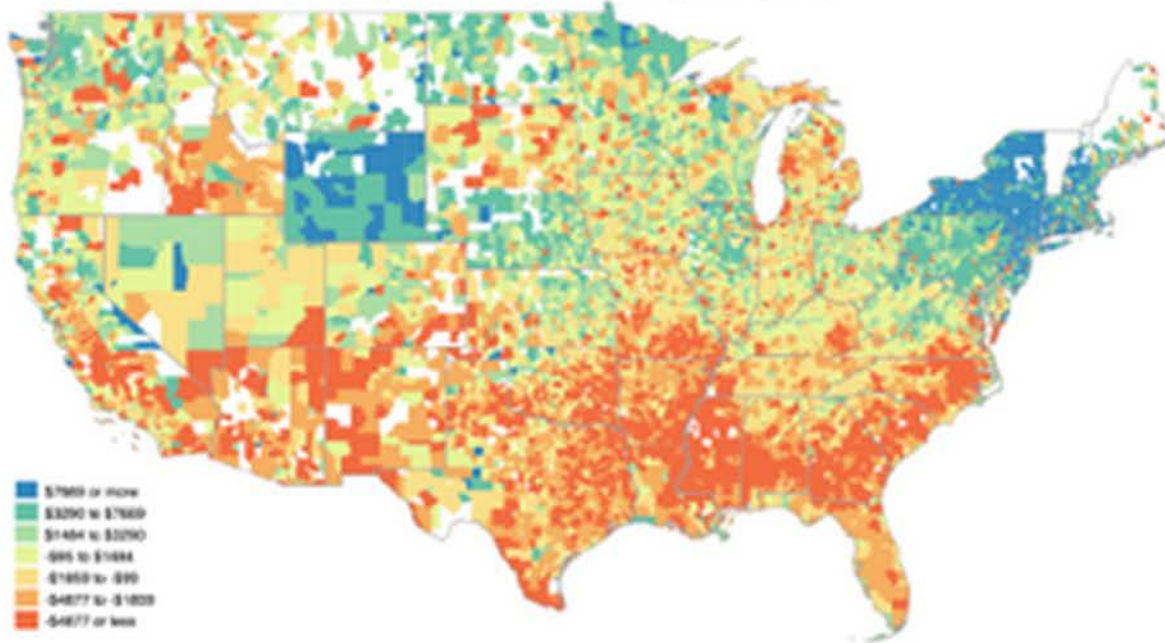
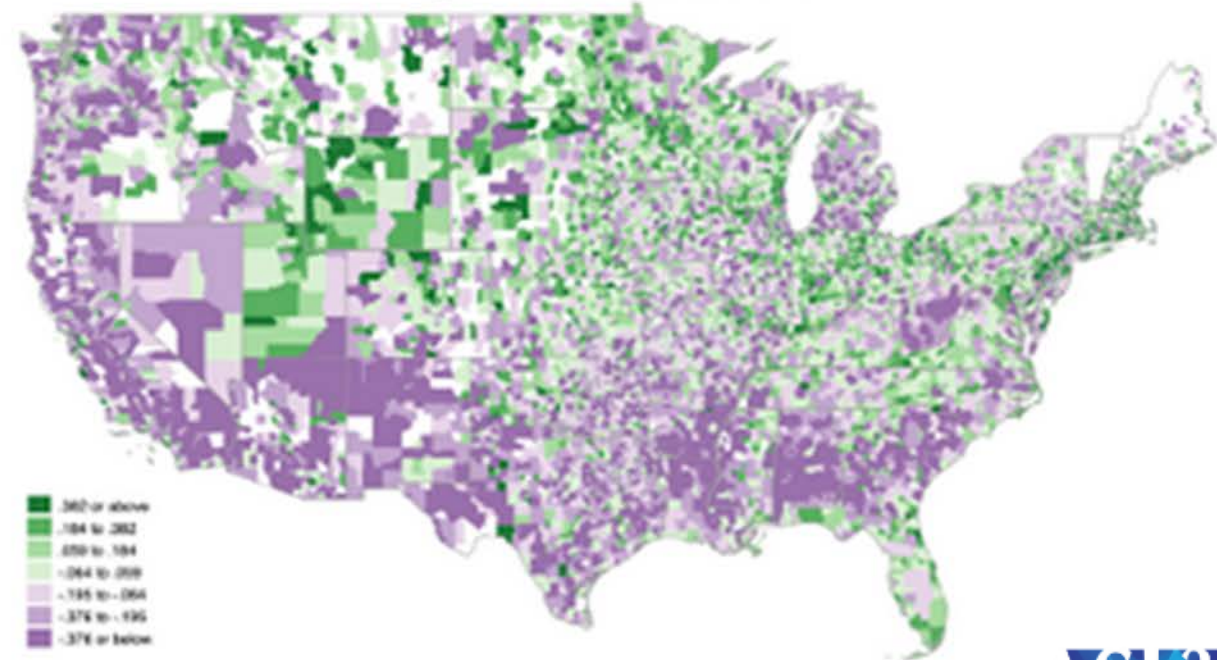
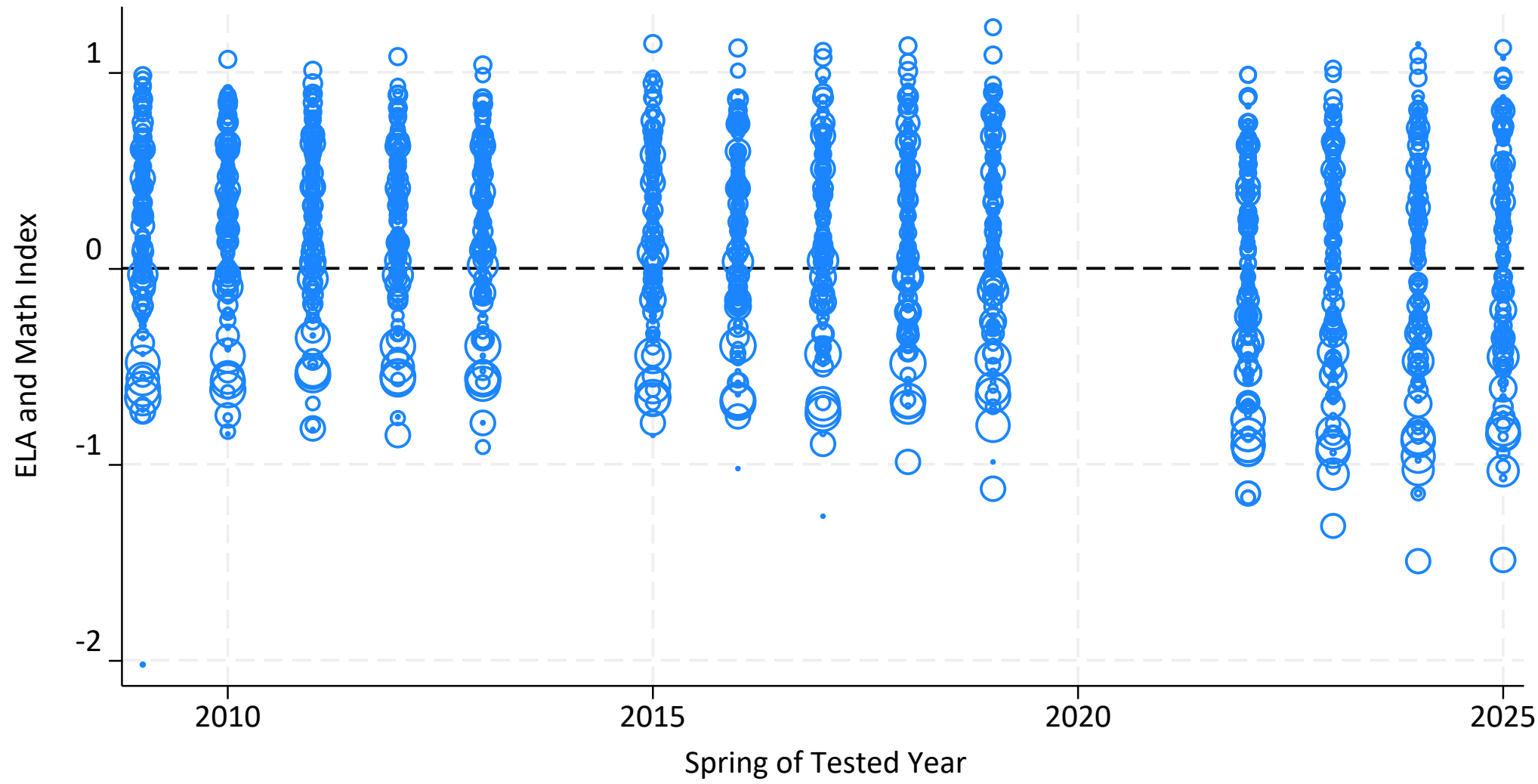


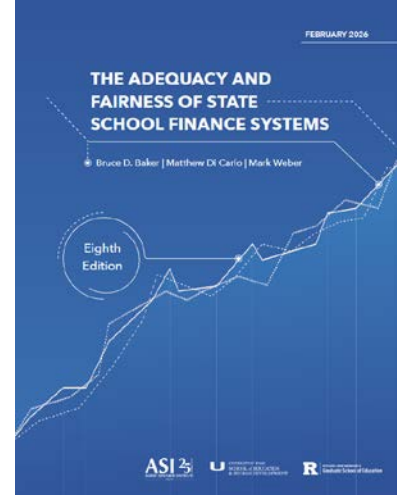
Figure 1b. Student outcomes



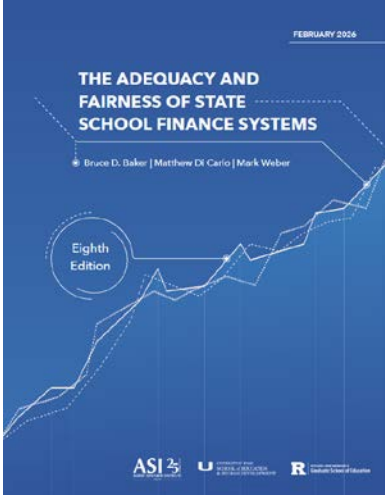
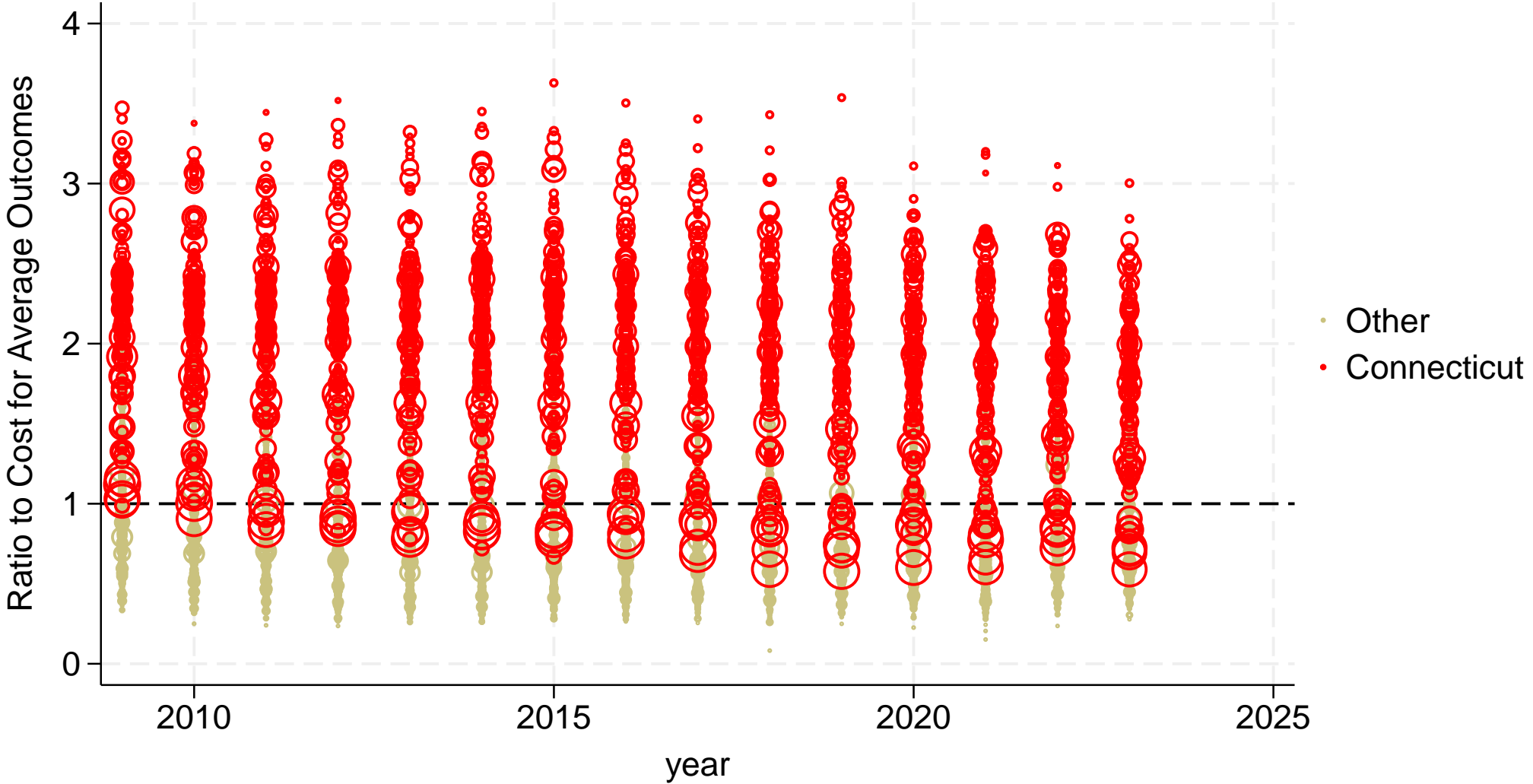
Connecticut Outcome Index



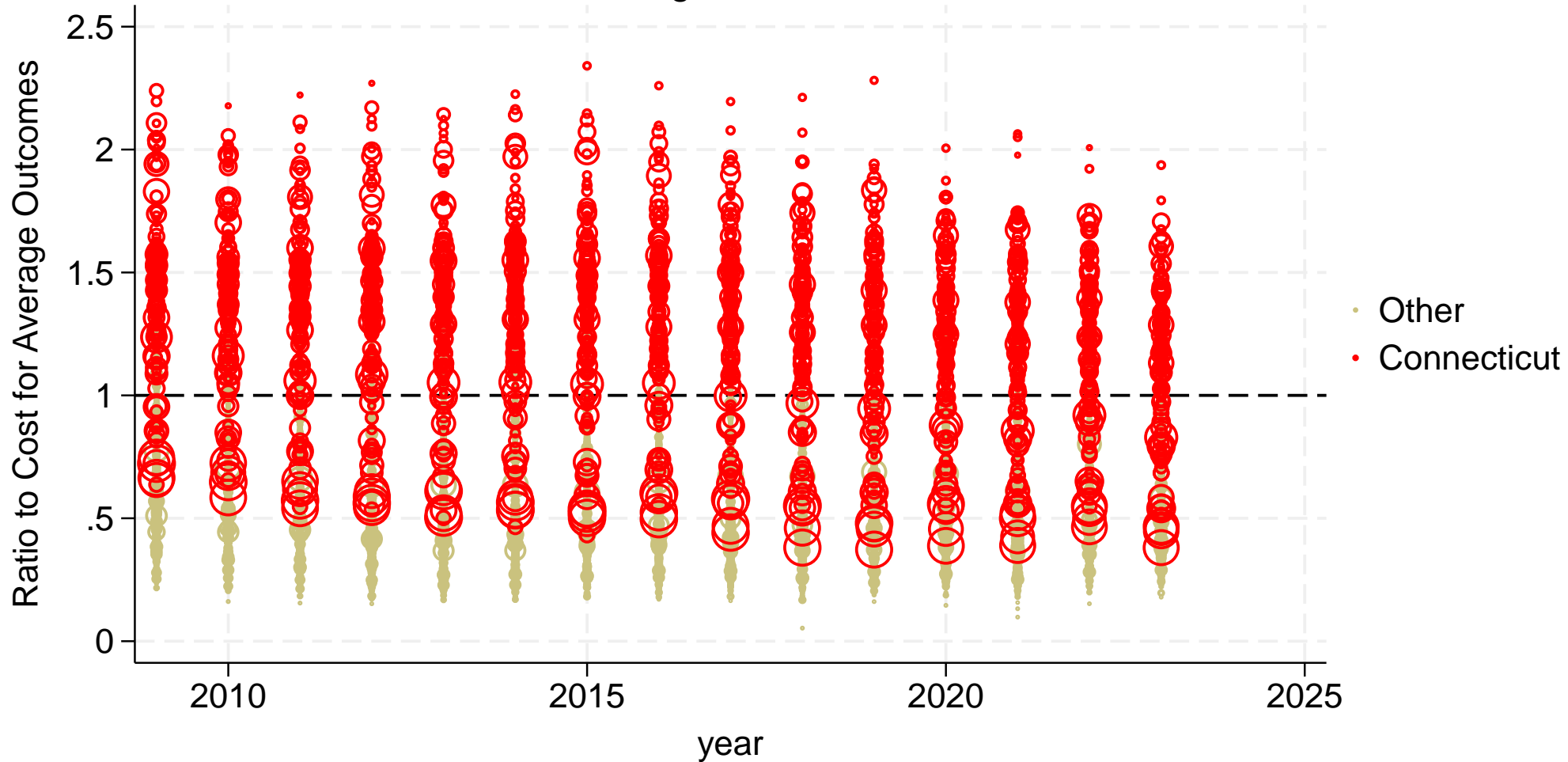
Data Source-Stanford Education Data Archive



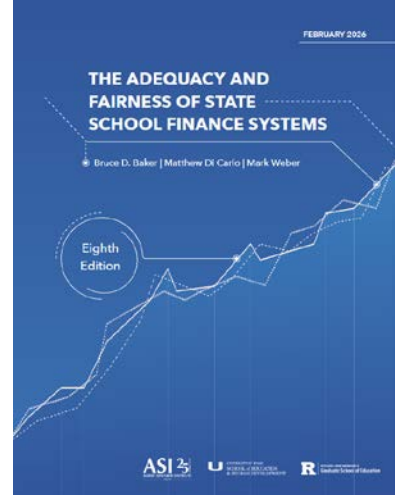
Connecticut Funding Adequacy For National Average Outcomes



Connecticut Funding Adequacy For High Outcomes

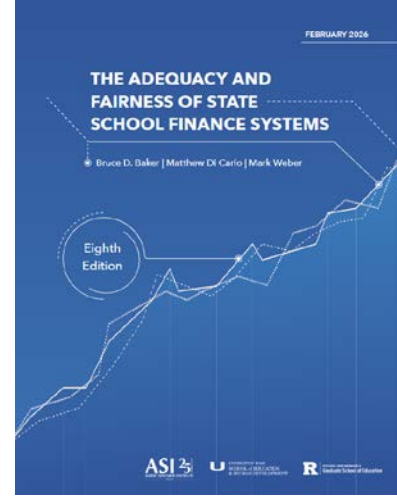
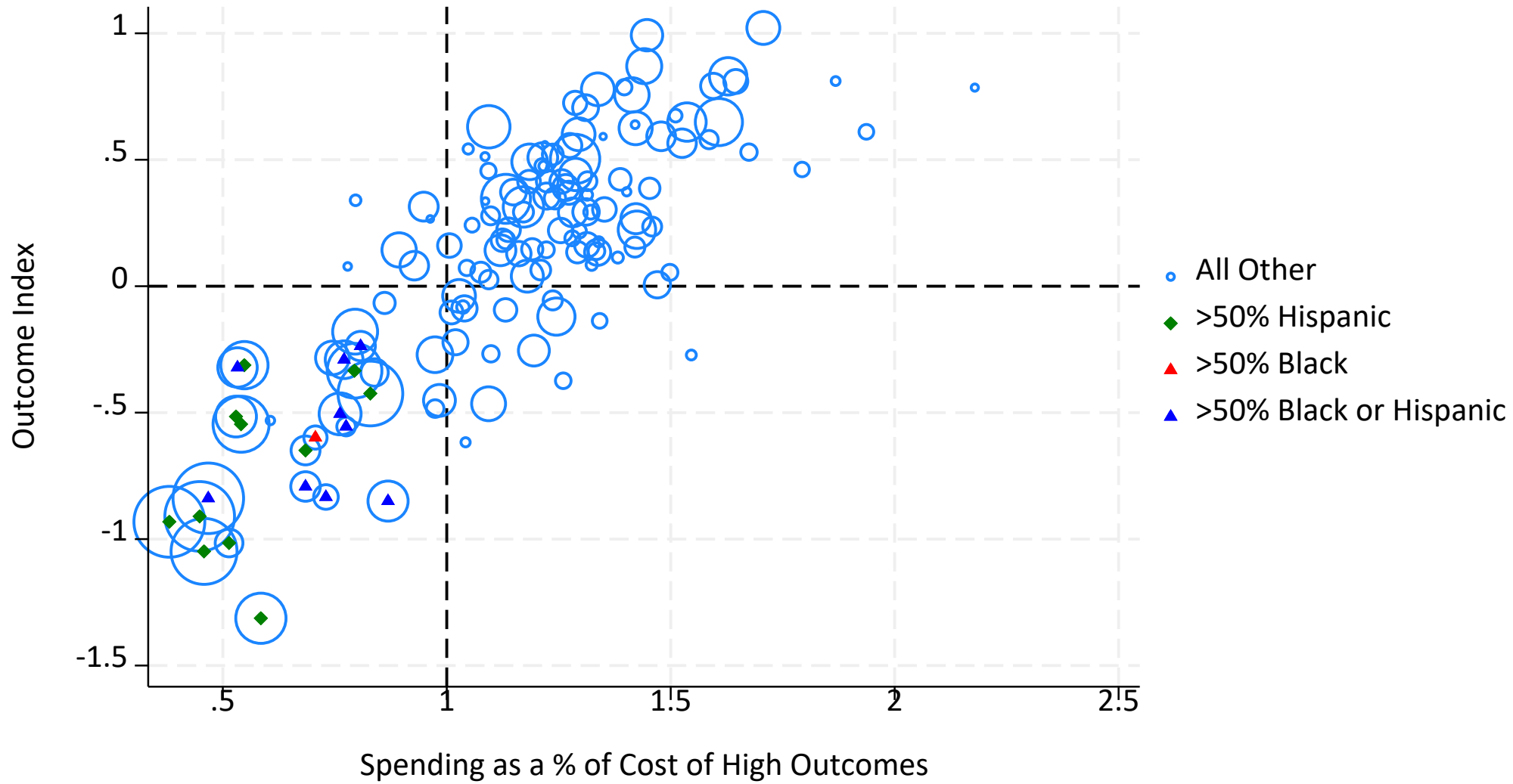


High Outcomes = +.37 stdev over National Mean



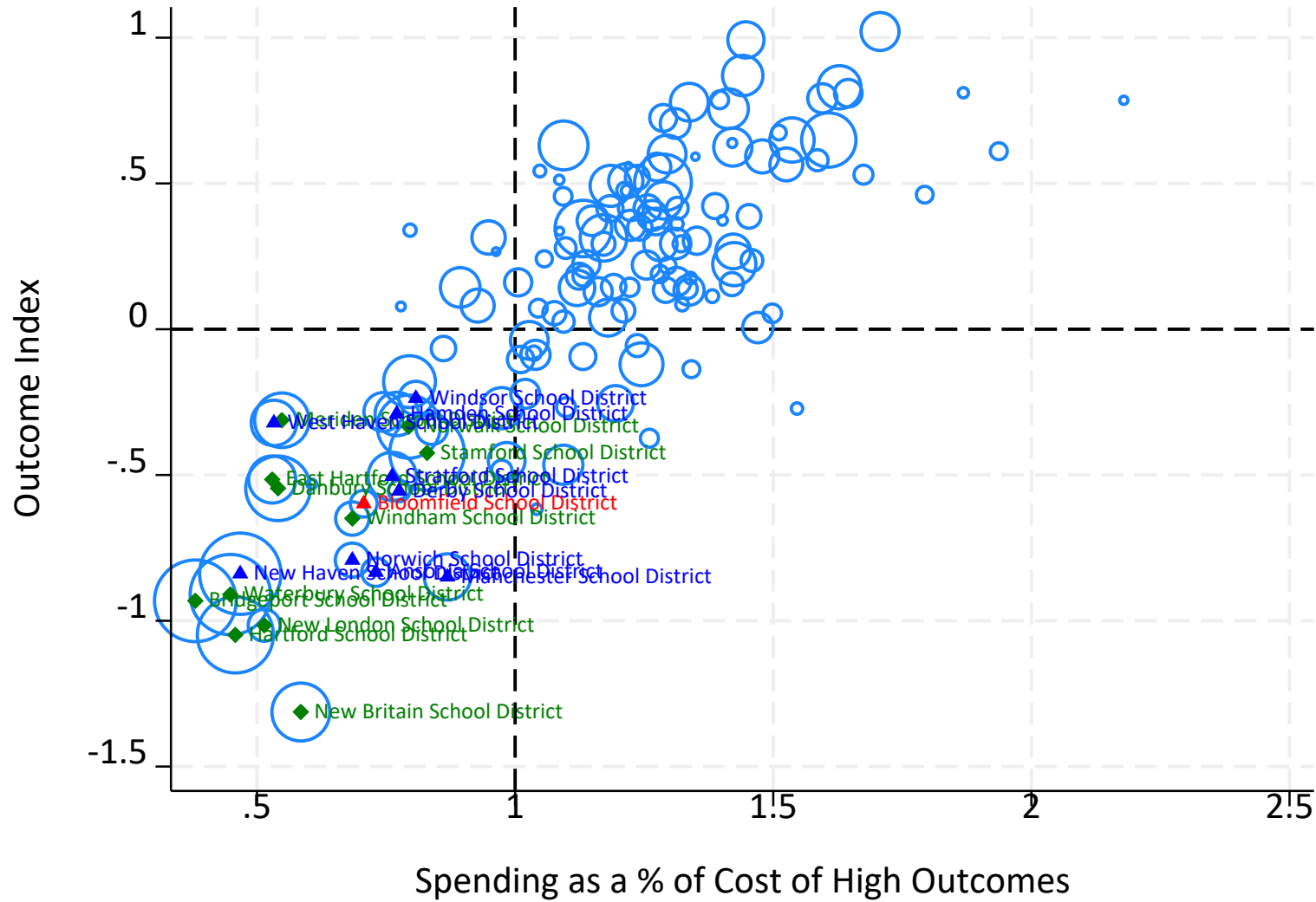
Connecticut Racial Disparities

2023

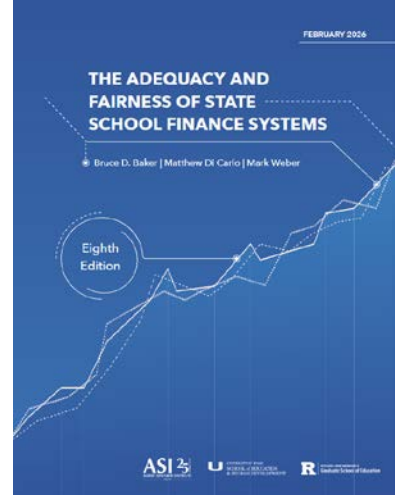


Connecticut Racial Disparities

2023



- All Other
- ◆ >50% Hispanic
- ▲ >50% Black
- ▲ >50% Black or Hispanic



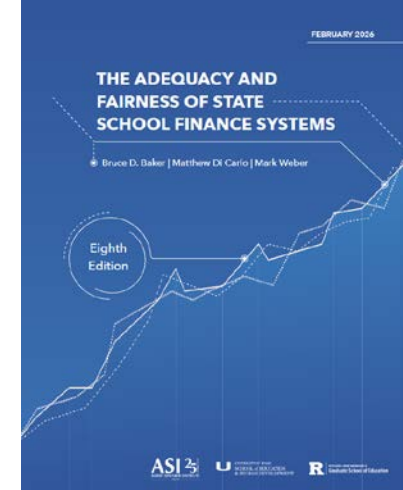


Table 1. Disparities among example districts

District Name	Socioeconomic Index[1]	% Hispanic[2]	% Black[2]	% Free or Reduced Lunch[2]	Ratio of Neighborhood Income to Poverty Income[3]	Current Spending per Pupil[4]	Spending as a Percent of Adequacy Cost[5]	Outcome Index[6]
Bridgeport	-1.53	58%	29%	81%	197	\$20,514	0.50	-0.93
New Canaan	2.32	6%	1%	0%	1,026	\$27,979	2.21	1.02
New Britain	-1.33	68%	11%	76%	287	\$24,023	0.77	-1.31
Farmington	1.62	11%	5%	16%	435	\$23,030	1.74	0.78

[1] <https://edopportunity.org/opportunity/data/downloads/> (covariates file)

[2] National Center for Education Statistics Common Core of Data, Local Education Agency Universe

[3] National Center for Education Statistics, EDGE. Neighborhood Poverty Index

<https://nces.ed.gov/programs/edge/Economic/NeighborhoodPoverty>

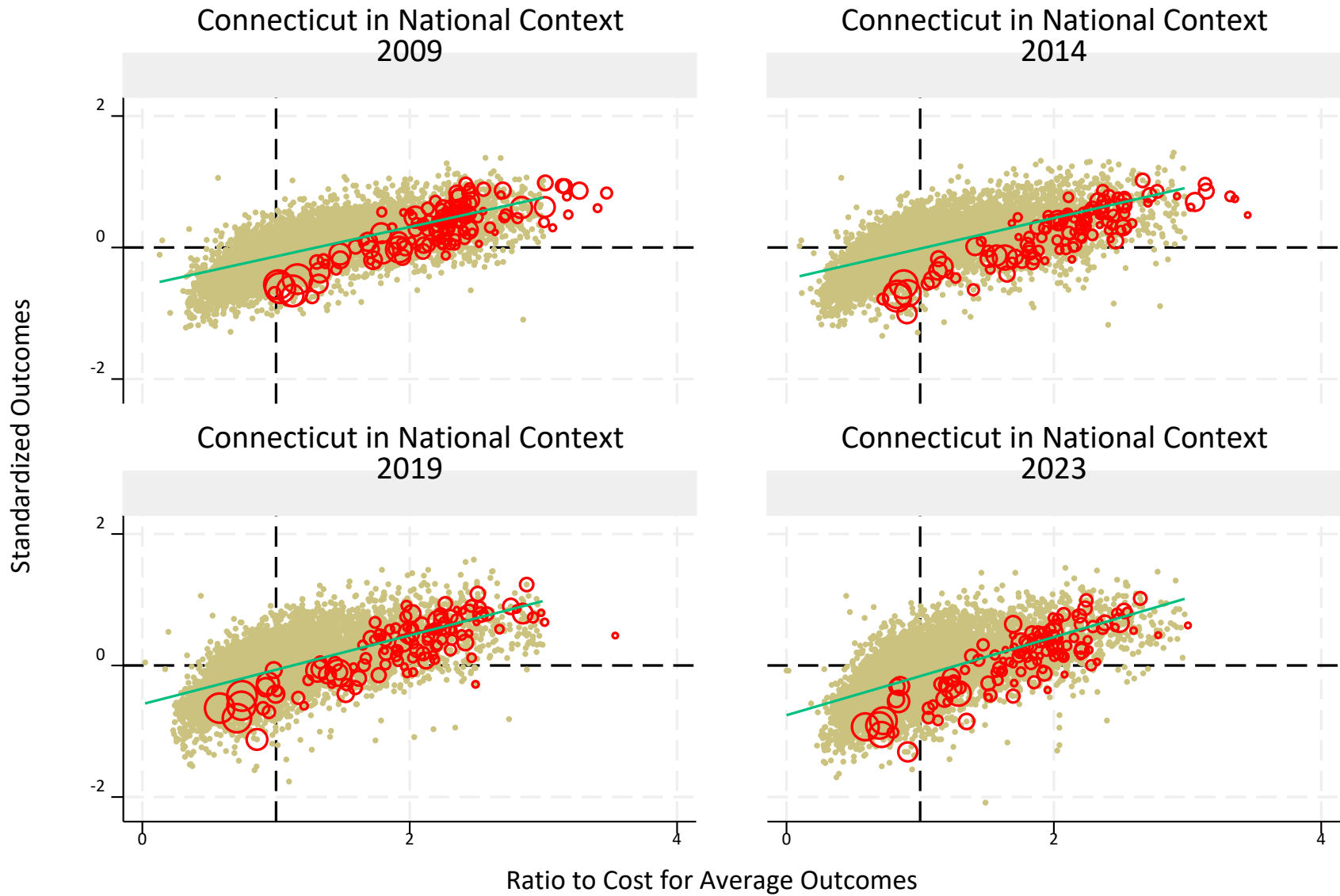
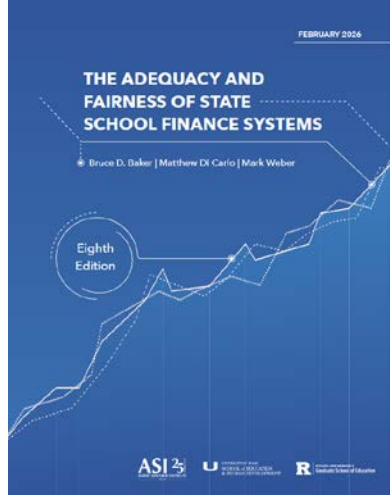
[4] U.S. Census Bureau, Fiscal Survey of Local Governments (F33) Public Elementary and Secondary Finances.

<https://www.census.gov/programs-surveys/school-finances/data/tables.html>

[5] School Finance Indicators Database. District Cost Database. <https://www.schoolfinancedata.org/download-data/>

[6] constructed using data from the Stanford education data archive, Education Opportunity Trends project.

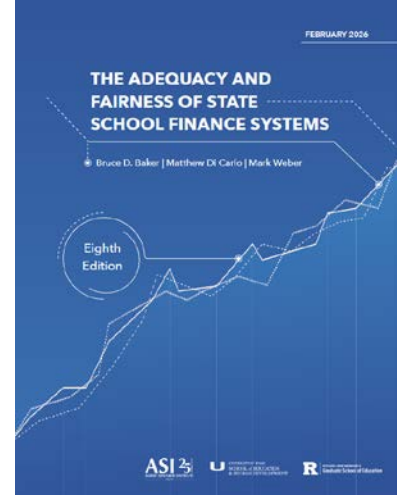
<https://edopportunity.org/trends/data/>



- Other
- Connecticut
- Best Fit

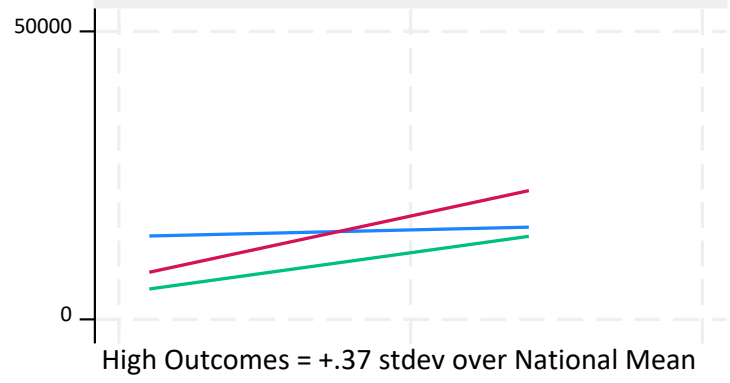
Graphs by year





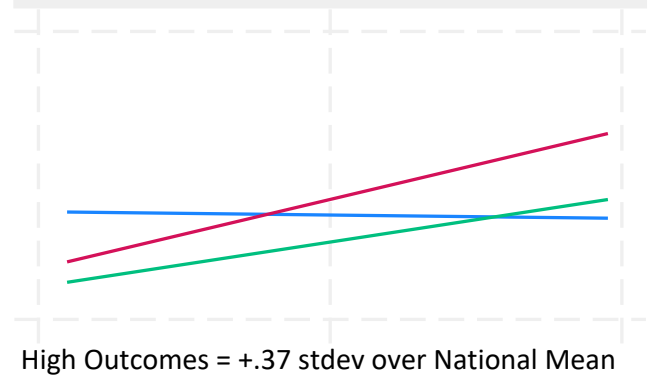
Connecticut School Funding Adequacy

2009



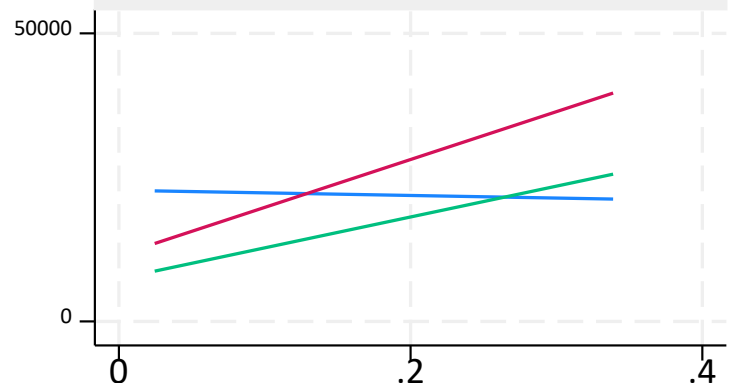
Connecticut School Funding Adequacy

2014



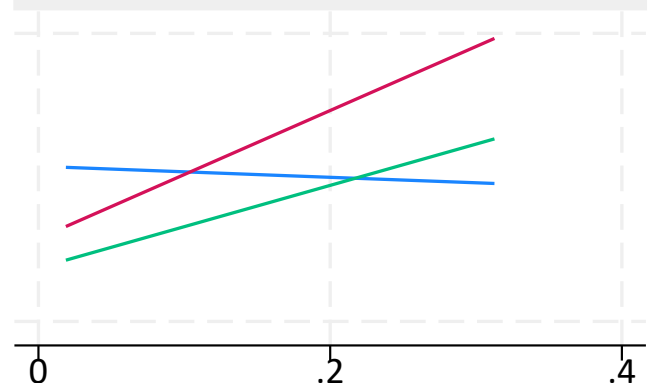
Connecticut School Funding Adequacy

2019



Connecticut School Funding Adequacy

2023



- Current Spending
- Cost of High Outcomes
- Cost of Average Outcomes

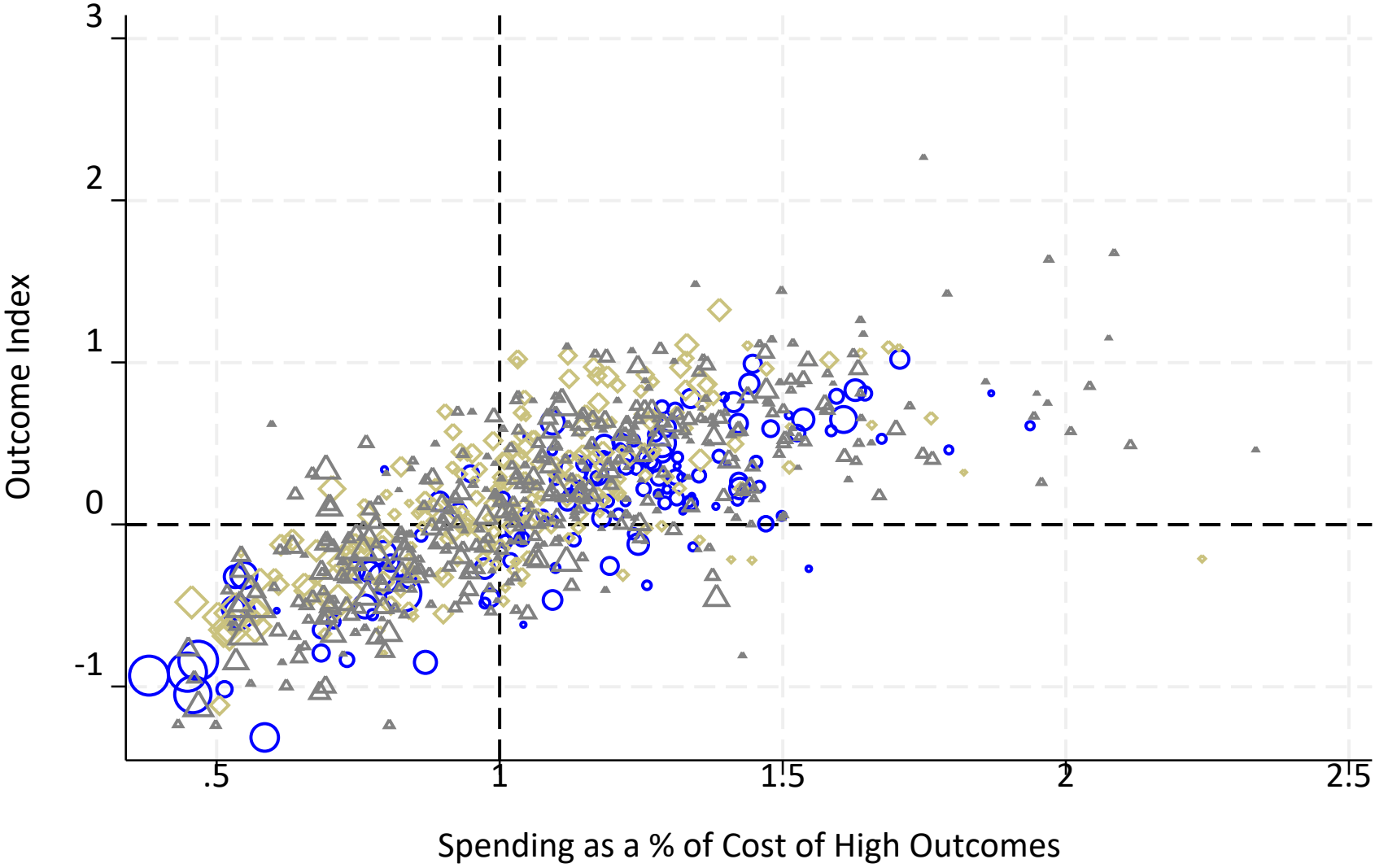
Census Poverty Rate 5 to 17 yr Olds

Graphs by year



Connecticut & Peer States

2023



- Connecticut
- ◆ Massachusetts
- ▲ New Jersey

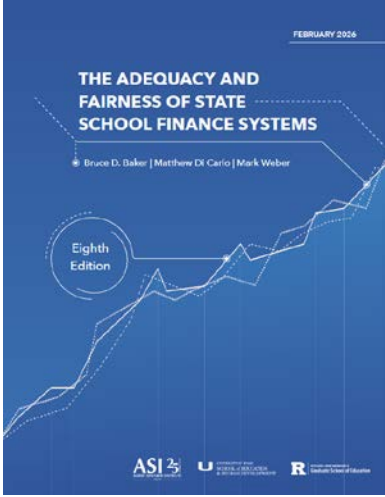


Figure 1a. K-12 funding adequacy

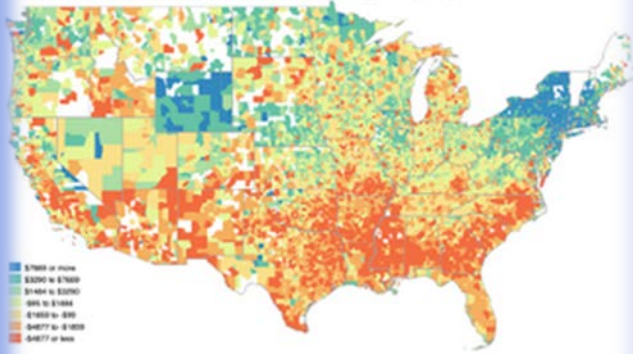
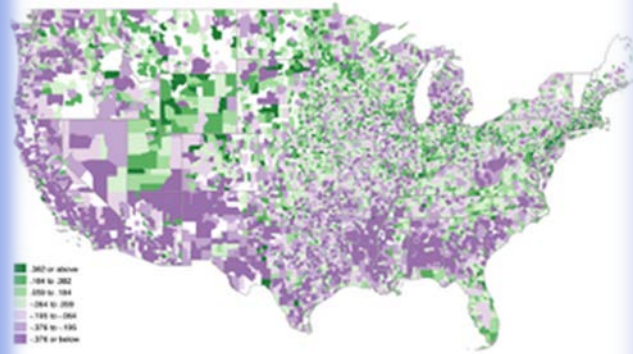


Figure 1b. Student outcomes

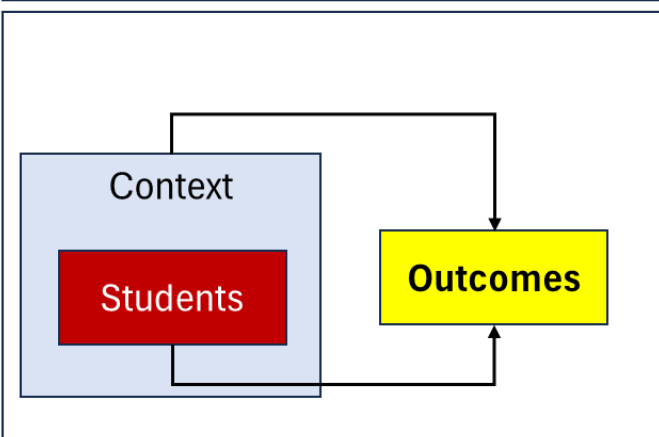


Applications of Education Cost Modeling

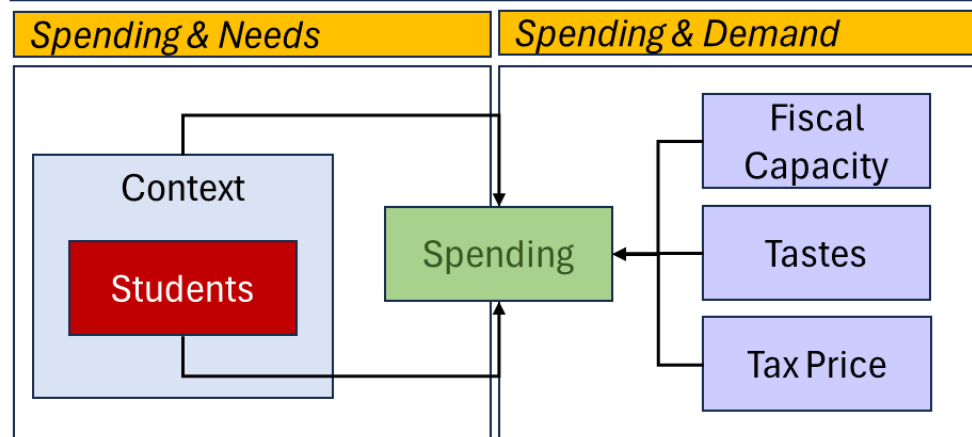
Select States

Framework for Outcome Oriented Analysis

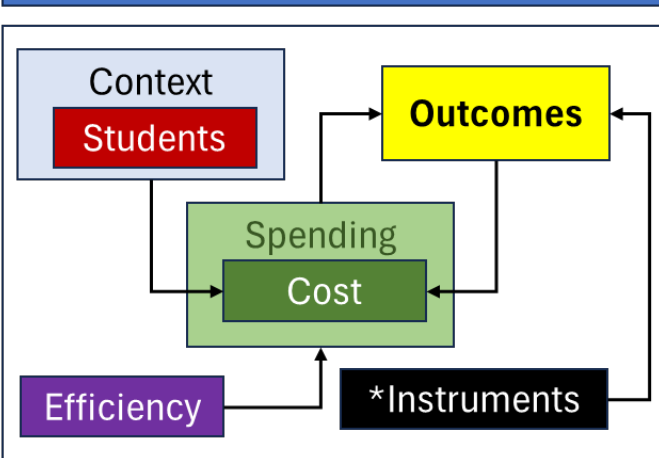
1a. Needs (Risk) Analysis



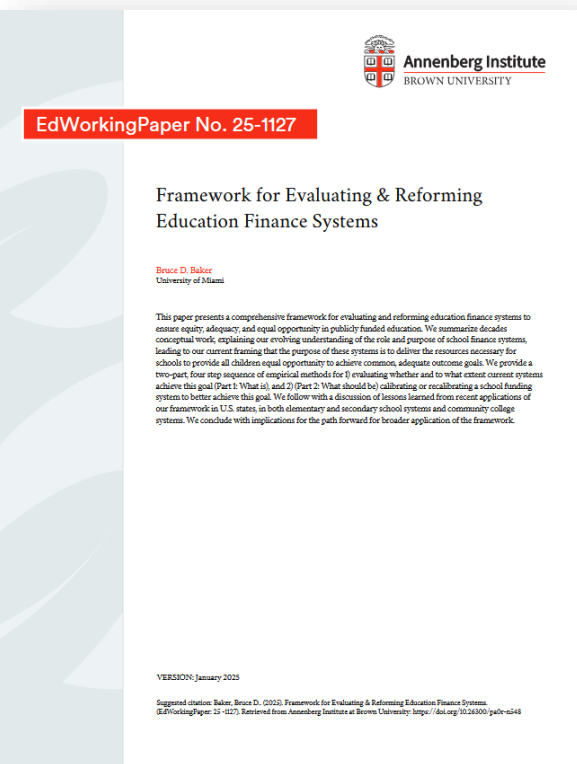
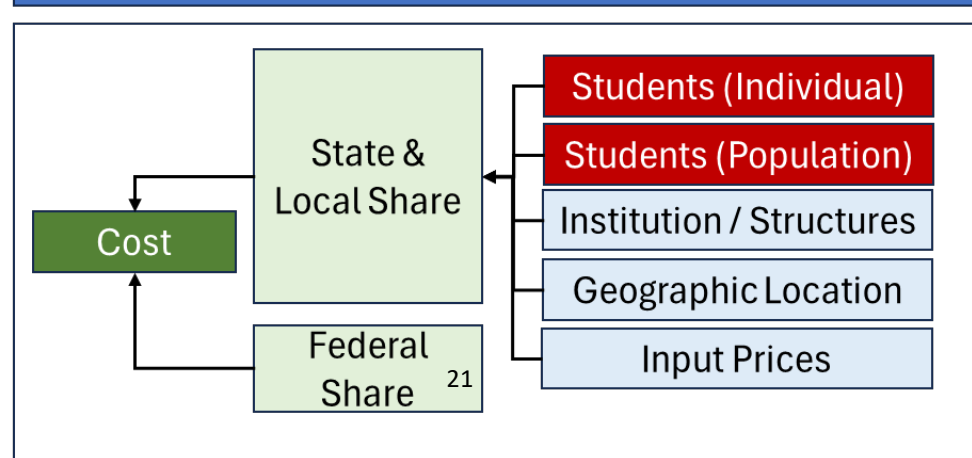
1b. Spending Analysis (What is)



2a. Cost Modeling (What should be)



2b. Calibrating Funding Formulas



Selecting Measures

- Creating comprehensive outcome measures
- Creating comprehensive spending measures (of attributed & allocated funds for mission centers)
- Identifying/constructing relevant instruments
- Exploring/identifying efficiency measures

Outcomes, Spending & Efficiency Measures used in Recent & Ongoing Studies

	Outcomes	Instruments	Spending Measures	Efficiency Measures
Elementary & Secondary	<i>Outcome Factor Score (OFS)</i> ^[1] ELA & Math Assessments Absenteeism Cohort Graduation Adv. Diplomas Dropout Rates	<i>Neighbor</i> ^[2] <i>Outcomes</i> Assessments OFS <i>Neighbor Demographics</i> Income/Poverty Ratio Racial Composition Education Levels (% BA or higher)	Annual Operating Expenditures per Pupil Excluding Debt (Principal/Interest) & Tuition Transfers	<i>Fiscal Capacity</i> Relative Income Taxable Wealth <i>Public Monitoring</i> % School Aged % Over 65 % Intergov. Aid % Residential Value <i>Competition Density</i> Herfindahl Index Charter/Private Market Share
Community College	150% or 200% Time Completion “Success Points” Persistence and Completion Milestones (Texas) ^[3]	% of Students in K–12 Special Education in the County % K–12 Students in County from Low-Income Families Outcome Index of K–12 Students in County (SEDA) ^[4]	Annual Operating Expenditures per Headcount (or FTE) Student Instructional Spending per Headcount (or FTE) Student	Fiscal Capacity Public Monitoring Competition Density

[1] Weighted factor score generated via structural equation modeling.

[2] Neighbors have been defined in a few different ways. At the district level, we have used averages of all other districts in the same labor market (or metro area) space. At the school level, we have used averages of the nearest (e.g., 5 or 10) schools outside of the observed district.

[3] Texas Higher Education Coordinating Board. See Levin et al. (2022).

[4] Stanford Education Data Archive (<https://edopportunity.org/>).

Identifying Student Needs & Context Measures

- Student need measures should be those that explain the largest shares of variation in the outcome measures
 - The goal is to identify those factor that present the greatest individual or collective “risk” of lower educational outcomes in order to identify the costs of mitigating that risk
- Context measures typically include
 - Institutional characteristics
 - Geographic characteristics
 - Labor market characteristics

Outcomes, Spending & Efficiency Measures used in Recent & Ongoing Studies

	Student Needs		Context		
	<i>Individual</i>	<i>Collective</i>	<i>Institutional/ Structural</i>	<i>Geographic Location</i>	<i>Input Prices</i>
Elementary & Secondary	<i>English Learners</i> By WIDA ^[1] <i>Disability</i> By Severity ^[2]	<i>Child Poverty</i> ^[3] SAIPE NSLP (FRL) Direct Cert Predicted Index Income/Poverty Ratio <i>Racial Isolation</i> ^[5] Homelessness Migrant Students	<i>Grade Range Distributions</i> % in 6 to 8 % in 9 to 12 <i>Institution Size/Scale</i> Enrollment groups (up to 2,000)	Population (or Enrollment) Sparsity	Regional Comparable Wage Index for Teachers ^[4]
Community College	% PELL % First Generation Household Income % >24 years of age % English Learners		Program Enrollments % Sci/Technical % Dual-Credit	Institution Size (Enrollment) Categories Population Density	Regional Comparable Wage Index for Teachers Regional Faculty Wage Index

[1] WIDA refers to the Access for English language learner standards which identify language proficiency at multiple levels and have been adopted by several states. Data reporting remains too sparse for use, as of yet, in our models (<https://wida.wisc.edu/assess/access>).

[2] Learning Disability/Brain Damage/Other Health Impairment versus Other, or state-defined severity categories.

[3] Residential location measures include Census Small Area Income and Poverty Estimates (SAIPE) <https://www.census.gov/programs-surveys/saie/data/datasets.html> and the Neighborhood Poverty Index, or Income to Poverty Ratio <https://nces.ed.gov/programs/edge/Economic/NeighborhoodPoverty>.

[4] Comparable Wage Index for Teachers <https://nces.ed.gov/programs/edge/Economic/TeacherWage>.

[5] See Baker (2024).

Delaware Example

2a

Estimate Cost Models

Exhibit 45. Data Elements Included in the Regional and Delaware Models

Measure category	Measure	Regional	Delaware
Outcomes	Standardized assessments (Grades 3–8, mathematics and reading)	✓	✓
	Graduation rates		✓
	Absence rates		✓
	Suspension rates		✓
	Dropout rates		✓
	3-year teacher retention (school environment)		✓
Student needs	Census poverty rate	✓	
	Low-income rate based on direct certification		✓
	English learner rate	✓	✓
	Special education rate	✓	✓
	Students with disabilities		✓
	Black student enrollment share	✓	✓
Scale	Small district size	✓	
	Small school size		✓
	Population density	✓	✓
Grade ranges	Percentage of vocational/technical units		✓
	Percentage of students in prekindergarten	✓	
	Percentage of students in middle school grades	✓	✓
	Percentage of students in high school grades	✓	✓
Price of inputs (geographic cost)	Comparable Wage Index for Teachers (CWIFT)		✓
	Education Comparable Wage Index (ECWI)	✓	
Efficiency controls	Herfindahl Index (sum of squared district shares of enrollment within the labor market)	✓	
	Percentage of population between 5 and 17 years old	✓	
	Ratio of median housing values to labor market neighbors	✓	
	Median age by 2027 by zip code		✓
	Share of revenue from state sources		✓
Instruments	Percentage female		✓
	Population percentage between 0 and 4 years old		✓
	Labor market neighbors' percentage of Black or Hispanic populations	✓	
	Labor market neighbors' income-to-poverty ratio	✓	

2b

Convert to Formula Weights

Exhibit 50. Weight Estimation Regression Models

Weight categories	A. Average outcomes	B. High outcomes
Student needs		
Low-income proportion	1.79	1.81
Students with disabilities proportion	3.40	3.34
	3.66	3.75
	1.15	1.15
	4.58	4.58
	0.99	0.99
	1.05	1.04
Population density		
300 to <800	1.03	1.03
800 to <2,000	1.05	1.05
2,000 to <5,000	1.06	1.06
>=5000	1.08	1.08
School enrollment		
<300	1.29	1.29
300 to <450	1.12	1.12
450 to <600	1.07	1.07
600 to <800	1.04	1.04
Geographic cost (CWIFT)	1.38	1.38
Base funding	8,670	10,074
Number of school-by-year observations	948	948
Number of unique schools	192	192
Pseudo R²	0.976	0.979

Low-income students should be funded about 79% higher than those who are not low income.

More Recent Findings - Oregon

Exhibit 21. Regression Model Estimates of Raw Pupil Cost Weights and Base Funding

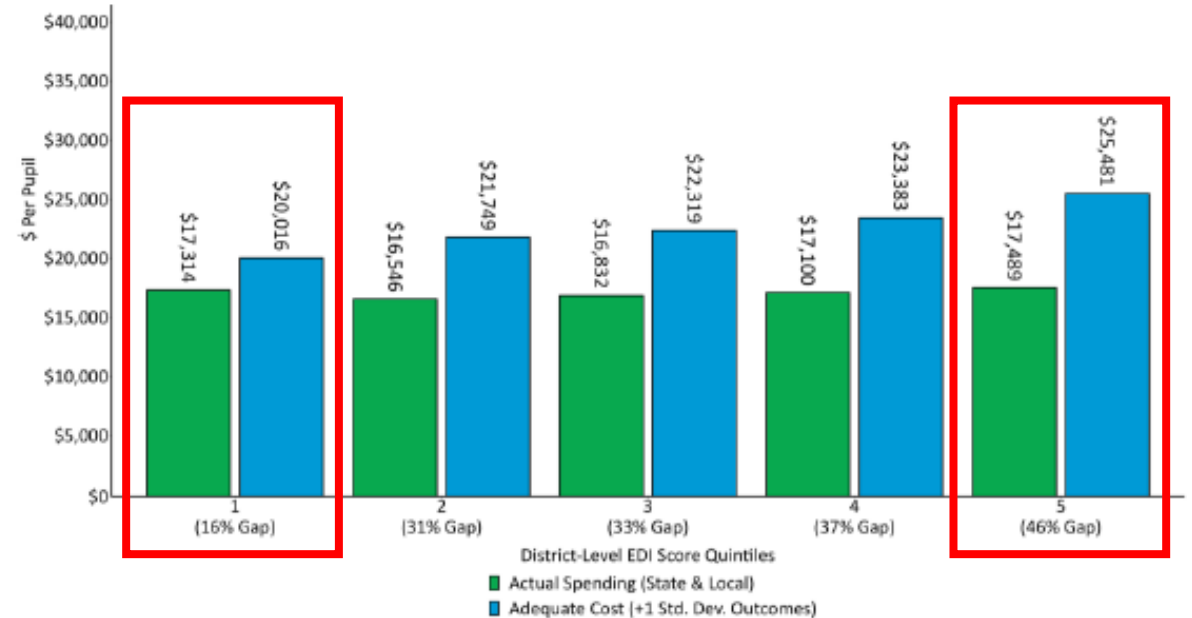
DV = District cost per pupil—pre-COVID- federal funding per pupil	State average	Statewide average + 1 standard deviation
Student needs		
EDI	1.422	1.452
% Students with low-cost disabilities	5.289	5.269
% Students with middle- and high-cost disabilities	6.173	6.145
% EL	1.709	1.682
School and district factors		
Grade range distribution		
% in grades K–8	(Reference)	
% grades 9 to 12	1.061	1.057
District enrollment		
Under 100	1.833	1.837
101 to 300	1.434	1.430
301 to 600	1.217	1.216
601 to 1,200	1.111	1.110
>1,200	(Reference)	
Time (Base year = 2025)	1.068	1.066
Constant (Base cost in 2025)	11,648.98	14,643.47
Number of observations	1,599	1,599

Note. Figures are exponentiated coefficients from Poisson regression. The reference group is a district serving students in grades K-8 with enrollment greater than 1,200. All percentage variables range from 0–1. All measures are calculated or reported at the district level. All variables are statistically significant at the .01 level.

Source. The ODE; Baker et al., 2024; NCES n.d. -a.

<https://olis.oregonlegislature.gov/liz/2025R1/Downloads/CommitteeMeetingDocument/291280>

Exhibit 27. Comparing Actual State and Local Spending Per-Pupil and Adequate Spending Estimates Per-Pupil Across EDI Quintiles, School Year 2022–23



Note. Actual spending is defined as current per-pupil spending from state and local sources reported in Oregon that removes non-current expenditures (capital expenditures, debt services, and internal service funds). Adequate cost is the projected per-pupil funding required to raise all students to one standard deviation above the statewide average outcome factor score. The cost projections omit federal funding and non-current expenditures. Gap is calculated as: $(1 - (\text{Per Pupil Adequate Cost} / \text{Per Pupil Actual Spending}))$.

Source. Calculations based on data from ODE; Baker et al., 2024; NCES n.d. -a.

More Recent Findings - Colorado

Exhibit 34. Weight Estimation Regression Models

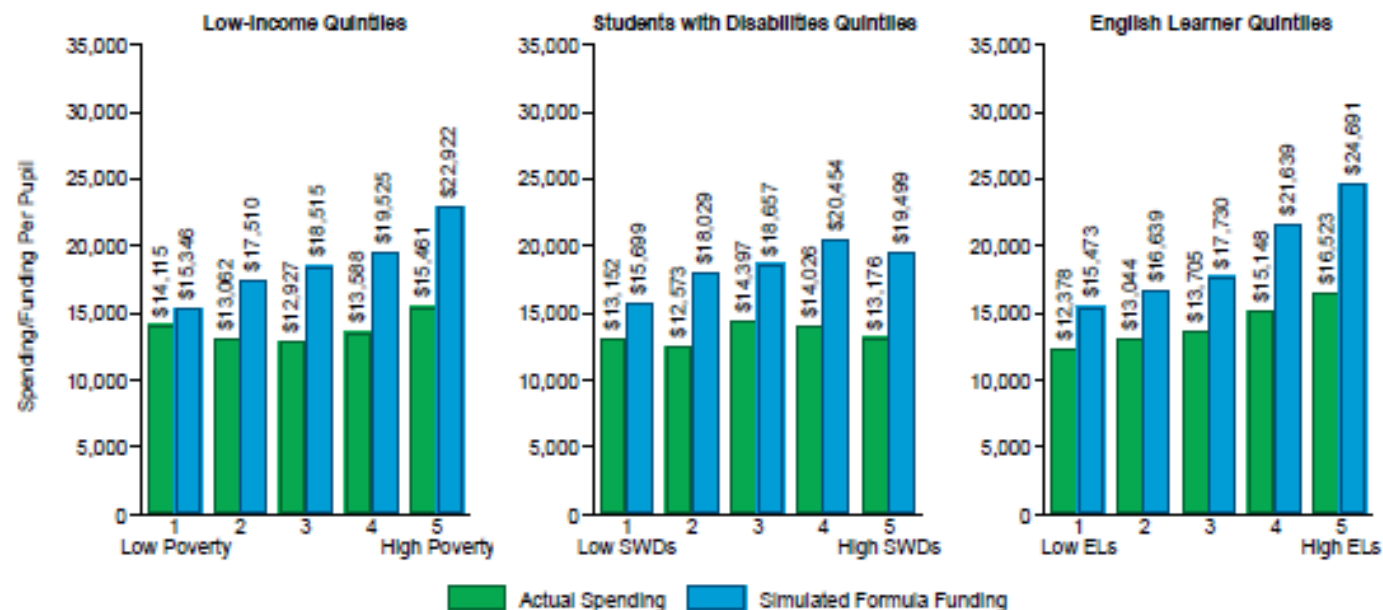
Weight categories	A. Average outcomes	B. High outcomes
Student needs		
At-risk (FRL) proportion	1.05	1.07
SWD proportion	1.19	1.20
ELL proportion	1.28	1.28
Grade range		
Middle school enrollment proportion	0.12	0.12
High school enrollment proportion	0.36	0.36
School enrollment		
<300	0.45	0.46
300 to <450	0.19	0.19
450 to <600	0.12	0.12
600 to <800	0.08	0.07
Geographic cost (CWIFT)	1.05	1.05
Base funding	6,648	8,443
Number of school-by-year observations	9,654	9,654
Number of unique schools	1701	1701
Pseudo R^2 / R^2	0.959	0.960

Exhibit Reads. An increase in the low-income student proportion from 0 to 1 (i.e., from no low-income students to 100% low-income students) is associated with an additional target funding level of 105% of the base funding level, on average, to base funding when using an average-outcome target. The weights presented are additive.

Note. FRL = free or reduced-price lunch eligible, SWD = students with disabilities, ELL = English language learner. Additive weights shown are from an Ordinary Least Squares regression, where regression coefficients were expressed in dollar terms. Weights were calculated by dividing the coefficient by the base funding amount. Models also include year-specific indicator variables (where Fiscal Year 2023 serves as the reference group for all models). The base funding represents target funding per pupil in Fiscal Year 2023, when there are no students represented in the other weight categories and the geographic cost (CWIFT) is set to zero. Regression models are weighted by enrollment. The reference enrollment category is schools with more than 800 students. The grade range weights are interpreted relative to enrollment in elementary grades. Data are from the CDE and the U.S. Department of Education.

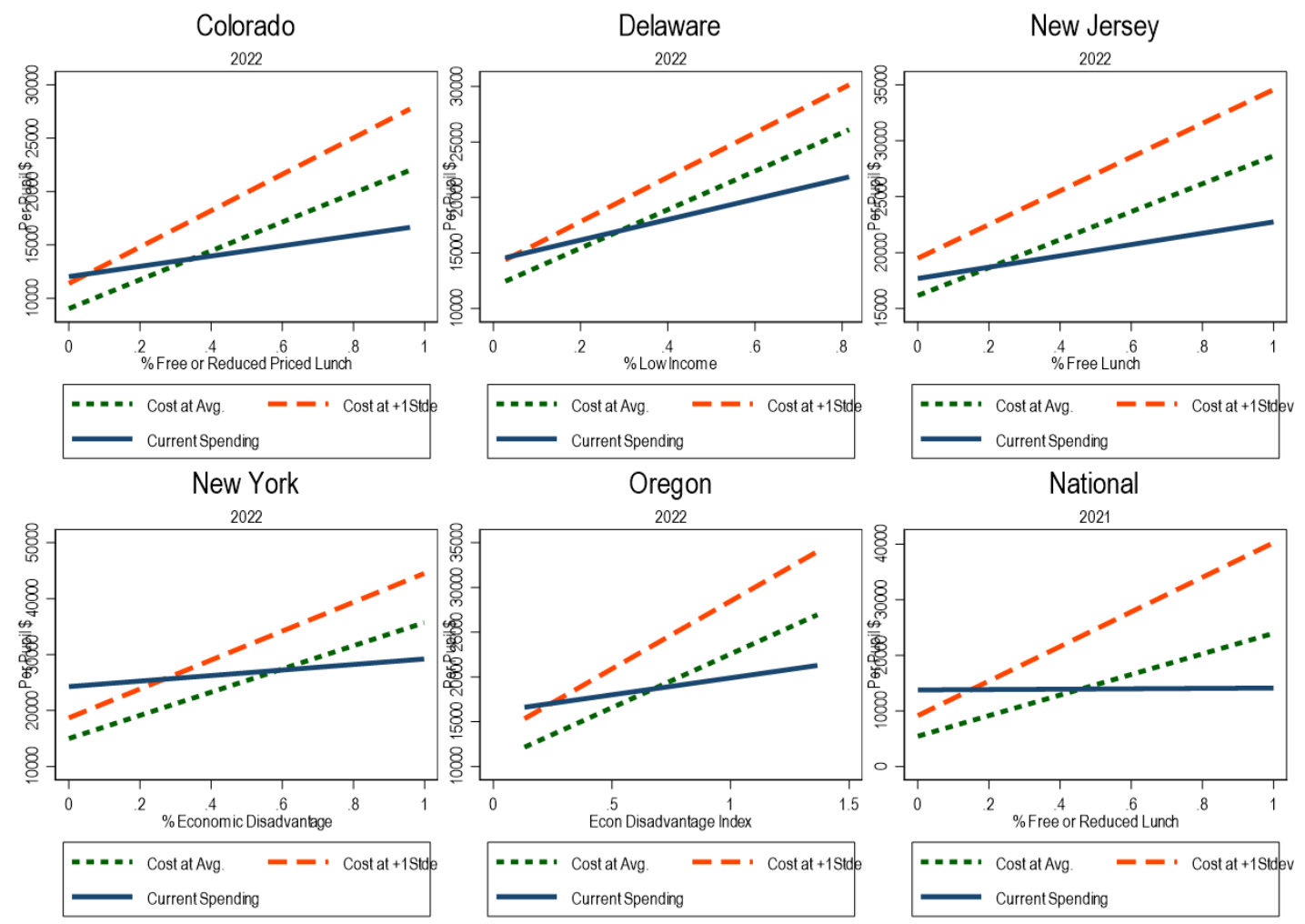
<https://www.cde.state.co.us/cdedepcom/schoolfinancecostmodelingadequacystudyreport>

Exhibit 40. Comparing Actual State and Local Spending and Simulated Formula Funding Across Student-Need Quintiles (2022–23)



Note. Calculations are based on data from the CDE and the U.S. Department of Education.

Comparing School-Level Models Across Five States (and the Nation)



Elements of a Comprehensive Study

STEP 1: EDUCATION COST MODEL (ECM)

Estimate ECM to determine:

- Base per-pupil cost of providing adequate education
- Additional cost-based funding adjustments to account for cost factors, including student needs, resource price levels, scale of operations, and other contextual characteristics
- Variation in adequate cost with respect to different target level goals for outcomes included in the model

STEP 3: RESOURCE COST MODEL

Convene panels of expert educational practitioners (Professional Judgment Panels) to:

- Propose resource configurations for schools to meet desired outcome goals, including civic engagement, arts/enrichment/cultural growth, mental health, etc., which may not be reflected in cost modeling goals
- Propose how those resource needs (schooling inputs) need to vary by: student needs, resource price levels, scale of operations, and other contextual characteristics

STEP 2: IDENTIFY EFFICIENT SCHOOLS AND DISTRICTS

Use estimated ECM to identify sample of schools/districts serving different student populations in different contexts and operating above, below, and at statewide average efficiency to:

- Determine adequate cost projections for sampled schools/districts
- Develop resource profiles for sampled schools/districts, including staffing ratios for different types of key staff and per-pupil spending for categories of non-personnel resources
- Explore differences in how schools/districts that are more versus less efficient allocate resources

STEP 4: RECONCILIATION & FORMULA DEVELOPMENT

Compare/evaluate and reconcile findings from Steps 1, 2 and 3.

Outcome Oriented (Cost Function Modeling)



Input Oriented (Professional Judgment)

Recent Applications of Cost Modeling

Professional Reports

- Colorado – Atchison, D., Levin, S., Levin, J., Kolar, A., Blair, D., Srikanth, A., & Salvato, B. (2024). Equity and Adequacy of Colorado School Funding: A Cost-Modeling Approach. <https://www.cde.state.co.us/cdedepcom/schoolfinancecostmodelingadequacystudyreport>
- Delaware – D. Atchison, B.D. Baker, J. Levin, S. Fatima, A. Trauth, A. Srikanth, C. Herberle, N. Gannon-Slater, L. Junk, K., Wallace, L., & Baker, B. (2023) Assessment of Delaware Public School Funding. https://education.delaware.gov/wp-content/uploads/2023/12/23-22933_1_Delaware_Full_Report-FMT-ed103023-Version-2.pdf
- New Hampshire – Atchison, D., Baker, B.D., Levin, J., Kearns, C. (2020) New Hampshire Commission to Study School Funding, Final Report. https://carsey.unh.edu/sites/default/files/media/2020/09/20-12685_nh_final_report_v10.pdf
- Ohio – Levin, J., Brooks, Baker, B., C., Fatima, S., Blair, D., Salvato, B., Srikanth, A., London, B., Atchison, D., Jacobson, A., Hadley, L., Dotson, B., Harrington, H., Yeshitla, B. (2025). Study of the Educational Costs of Serving Students Who Are Economically Disadvantaged. <https://education.ohio.gov/getattachment/About/Annual-Reports/Economic-Disadvantage-Finance-Study-American-Institutes-for-Research.pdf.aspx?lang=en-US>
- Oregon – Brooks, C., Levin, J., Baker, B., & Salvato, B. (2025). Understanding the Cost of Providing Adequate Educational Opportunity in Oregon. <https://olis.oregonlegislature.gov/liz/2025R1/Downloads/CommitteeMeetingDocument/291280>
- Vermont – Kolbe, T., Baker, B.D., Atchison, D., Levin, J. (2019) Pupil Weighting Factors Report. <https://legislature.vermont.gov/assets/Legislative-Reports/edu-legislative-report-pupil-weighting-factors-2019.pdf>

Peer Reviewed Articles & Working Papers

- Baker, B. D. (2024). *How and Why Racial Isolation Affects Education Costs & the Provision of Equal Educational Opportunity*. EdWorkingPaper No. 24-1047. Annenberg Institute for School Reform at Brown University.
- Baker, B. D., Weber, M., & Srikanth, A. (2021). Informing Federal School Finance Policy with Empirical Evidence. *Journal of Education Finance*, 47(1), 1-25.
- Levin, J., Baker, B., Lee, J., Atchison, D., & Kelchen, R. (2022). *An Examination of the Costs of Texas Community Colleges*. REL 2023-142. Regional Educational Laboratory Southwest.
- Kolbe, T., Baker, B. D., Atchison, D., Levin, J., & Harris, P. (2021). The additional cost of operating rural schools: Evidence from Vermont. *AERA Open*, 7, 2332858420988868.
- Zhao, B. (2022). Estimating the cost function of Connecticut public K–12 education: implications for inequity and inadequacy in school spending. *Education Economics*, 31(4), 439-470.
- Gronberg, T. J., Jansen, D. W., & Taylor, L. L. (2017). Are charters the best alternative? A cost frontier analysis of alternative education campuses in Texas. *Southern Economic Journal*, 83(3), 721-743.

Policy Influence of Cost Modeling Studies

Formula Changes

- Texas Community College Formula
 - Levin, J., Baker, B., Lee, J., Atchison, D., & Kelchen, R. (2022). An Examination of the Costs of Texas Community Colleges. REL 2023-142. Regional Educational Laboratory Southwest.
https://ies.ed.gov/sites/default/files/rel-southwest/document/2025/07/REL_2023142.pdf
- Vermont K12 Formula Weights
 - Kolbe, T., Baker, B.D., Atchison, D., Levin, J. (2019) Pupil Weighting Factors Report. State of Vermont, House and Senate Committees on Education.
<https://legislature.vermont.gov/assets/Legislative-Reports/edu-legislative-report-pupil-weighting-factors-2019.pdf>
- Kansas School Funding

Other State Uses of NECM/SFID

- Virginia Joint Legislative Audit & Review Commission Report
 - <https://jlarc.virginia.gov/landing-2023-virginias-k-12-funding-formula.asp>
- Missouri Department of Elementary and Secondary Education Report
 - <https://dese.mo.gov/media/pdf/missouri-school-funding-march-2023>