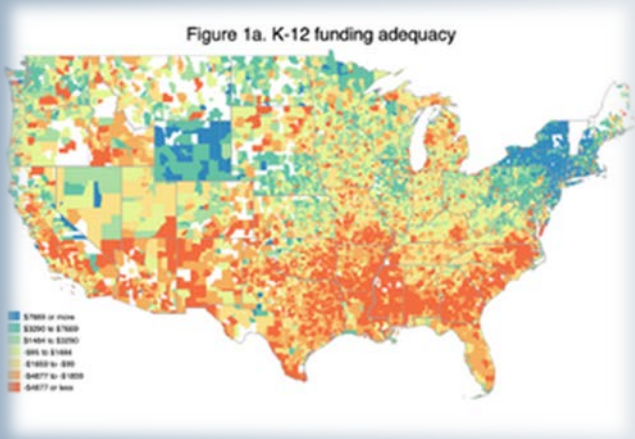
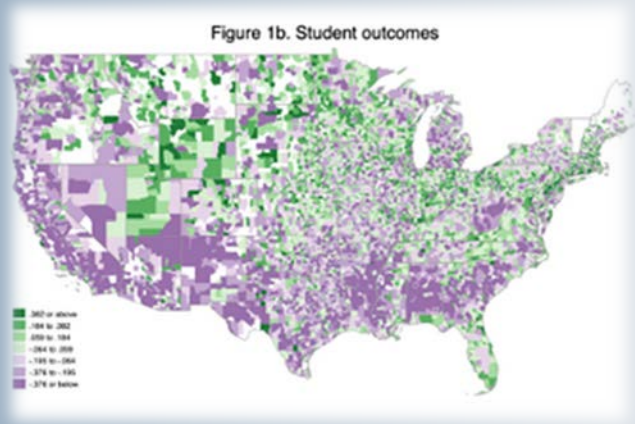
SchoolFinance101.com
SchoolFinanceData.org





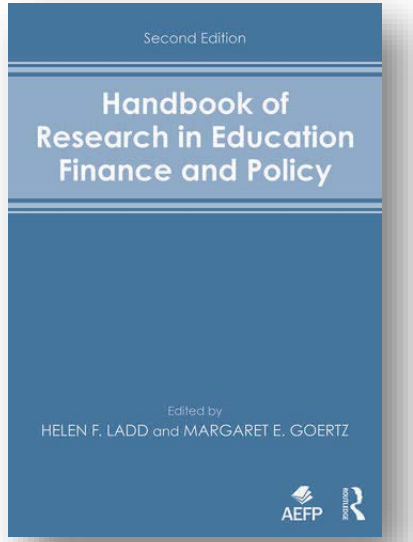
Framework for Evaluating and Reforming School Finance Systems

Bruce D. Baker
University of Miami

UNIVERSITY OF MIAMI
SCHOOL of EDUCATION
& HUMAN DEVELOPMENT

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)

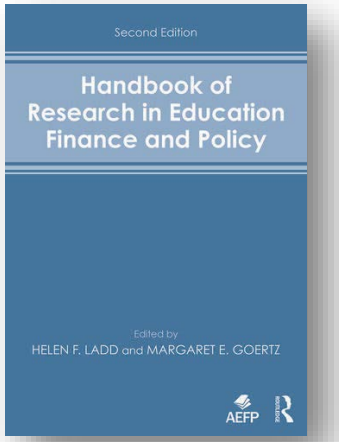


14 Conceptions of Equity and Adequacy in School Finance

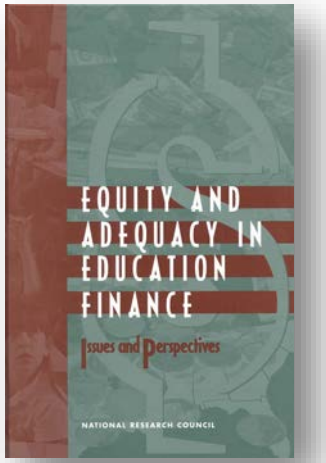
16 Measurement of Cost Differentials

Basic Principles of "Costs" & "Equal Opportunity"

- It costs more to achieve higher than lower outcomes
  - All else equal, the per pupil spending required to achieve higher, and broader outcome goals is higher than the per pupil spending required to achieve narrower and/or lower goals
- It costs more to achieve the same outcomes with some children than others
  - Collective, social context effects (poverty)
  - Specific student needs (ELL, Disability)
- It costs more to achieve the same outcomes with some children than others in some settings than others
  - Economies of Scale – Small, sparsely populated remote school districts
  - Regional variations in the competitiveness of wages (labor market effects)



16 Measurement of Cost Differentials



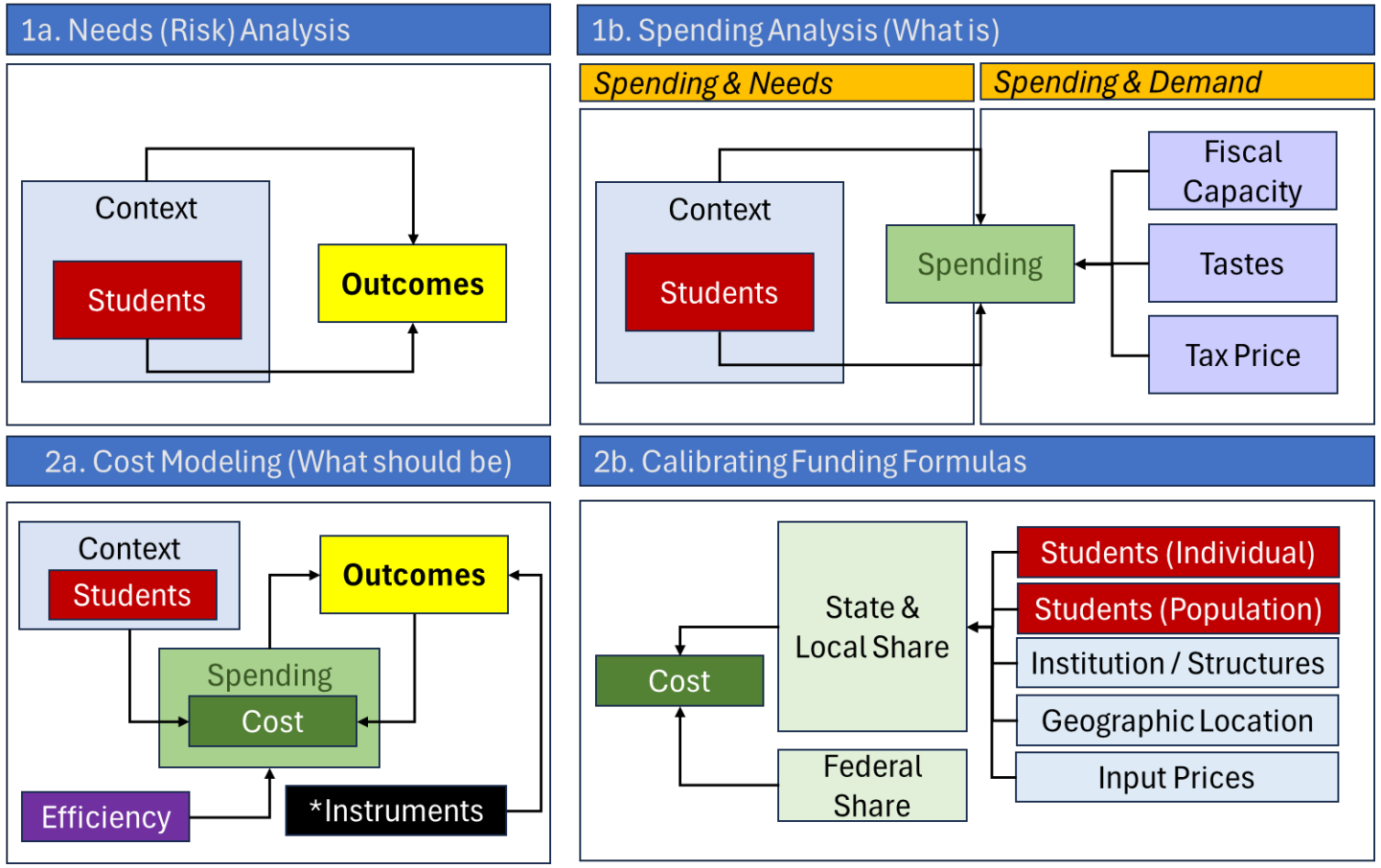
8 Performance Standards and Educational Cost Indexes: You Can't Have One Without the Other

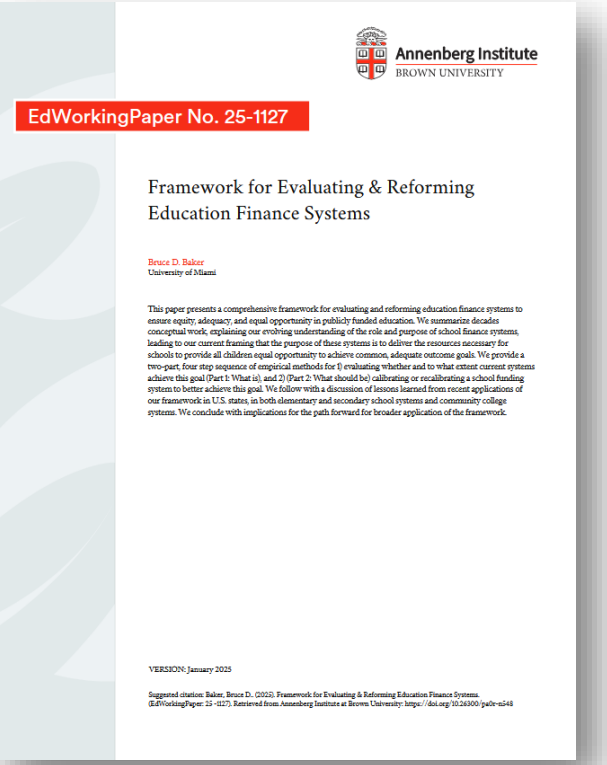
Cost analysis methodologies

- Input Oriented
  - Determine the personnel and non-personnel resources and corresponding costs associated with the educational services used to generate student outcomes. [Ingredients Method (Levin et al., 2018; Baker & Morphew, 2007)]
  - Resource Cost Models or Ingredients methods
  - Institutional production/delivery or student consumption

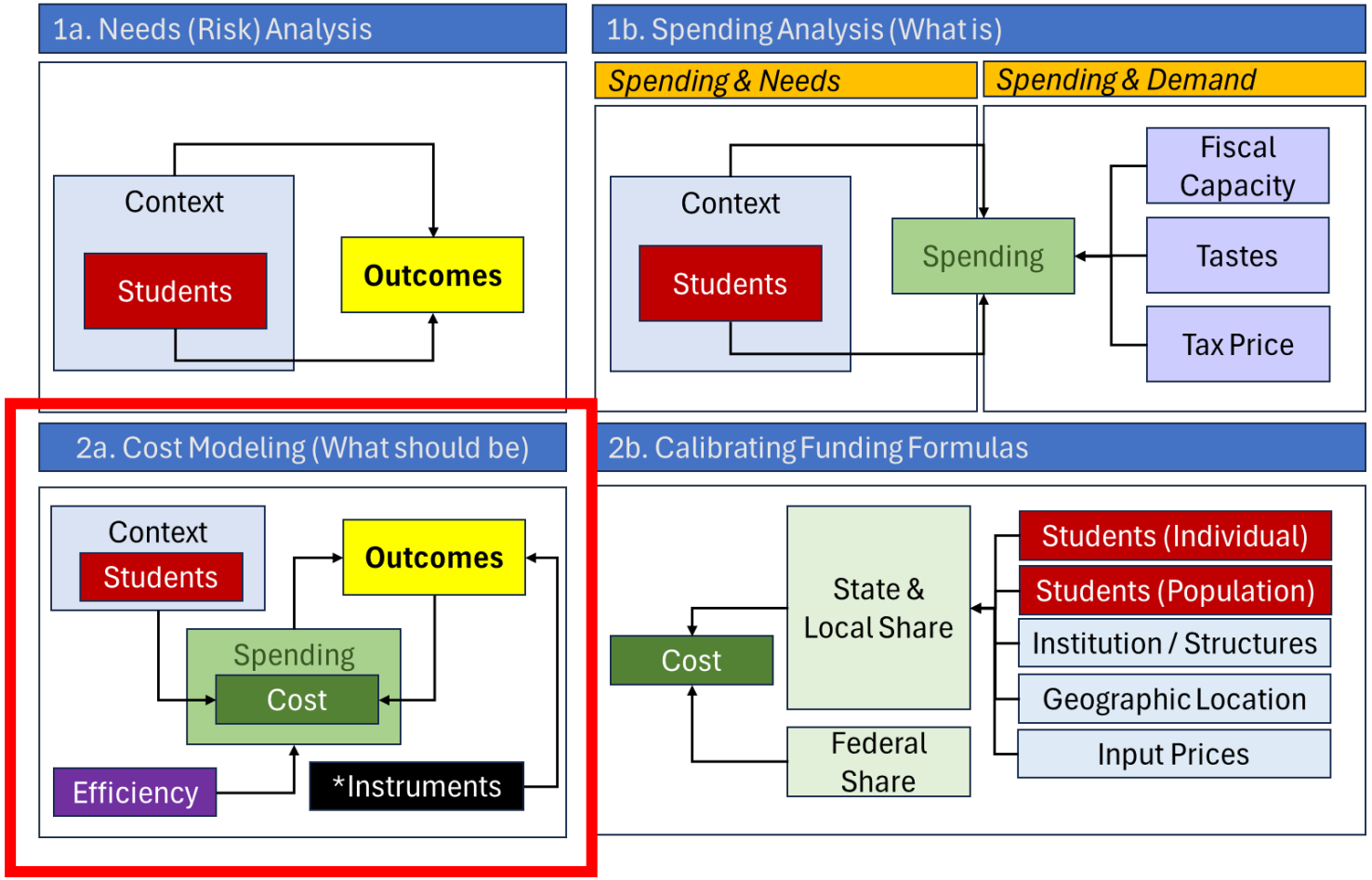
- Outcome Oriented
  - Evaluate aggregate spending per-student as a function of student outcomes and several cost factors including needs, labor price levels, scale of operations and other institutional characteristics. [Education Cost Function Analysis (Duncombe & Yinger, 2011; Levin et al., 2022)]

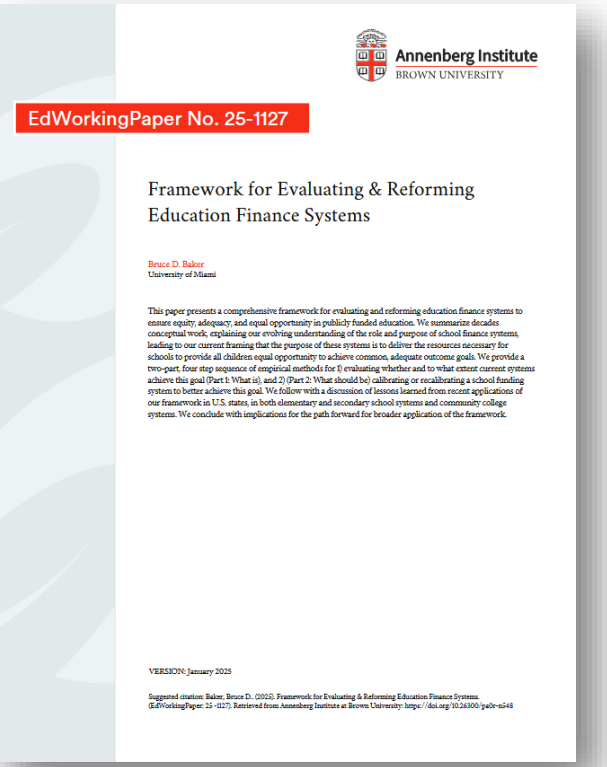
Framework for Outcome Oriented Analysis





Framework for Outcome Oriented Analysis




Annenberg Institute
BROWN UNIVERSITY

EdWorkingPaper No. 25-1127

Framework for Evaluating & Reforming Education Finance Systems

Bruce D. Baker
University of Miami

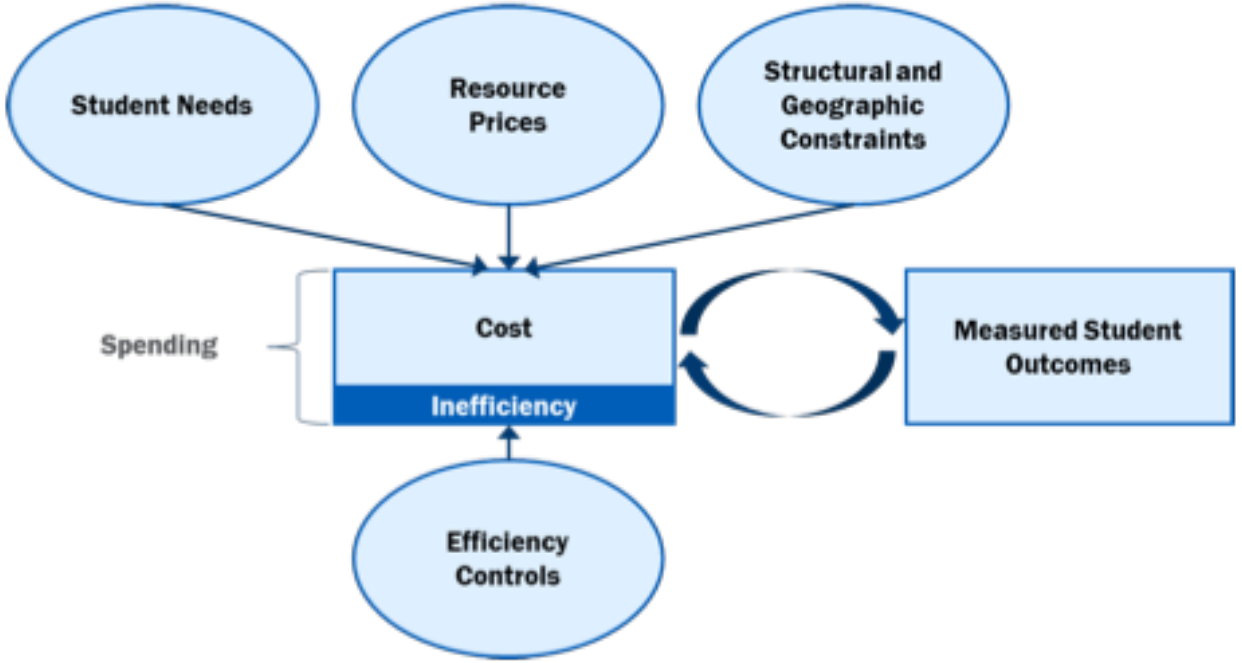
This paper presents a comprehensive framework for evaluating and reforming education finance systems to ensure equity, adequacy, and equal opportunity in publicly funded education. We summarize decades conceptual work, explaining our evolving understanding of the role and purpose of school finance systems, leading to our current framing that the purpose of these systems is to deliver the resources necessary for schools to provide all children equal opportunity to achieve common, adequate outcome goals. We provide a two-part, four step sequence of empirical methods for 1) evaluating whether and to what extent current systems achieve this goal (Part I: What is); and 2) (Part 2: What should be) calibrating or recalibrating a school funding system to better achieve this goal. We follow with a discussion of lessons learned from recent applications of our framework in U.S. states, in both elementary and secondary school systems and community college systems. We conclude with implications for the path forward for broader application of the framework.

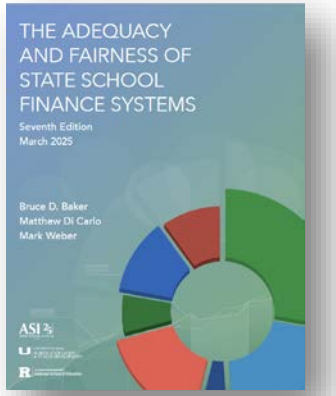
VERSION: January 2025

Suggested citation: Baker, Bruce D.. (2025). Framework for Evaluating & Reforming Education Finance Systems. (EdWorkingPaper: 25 -1127). Retrieved from Annenberg Institute at Brown University: https://doi.org/10.26300/pa0r-ni48

Illustration of outcome-oriented approach to cost analysis

- 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

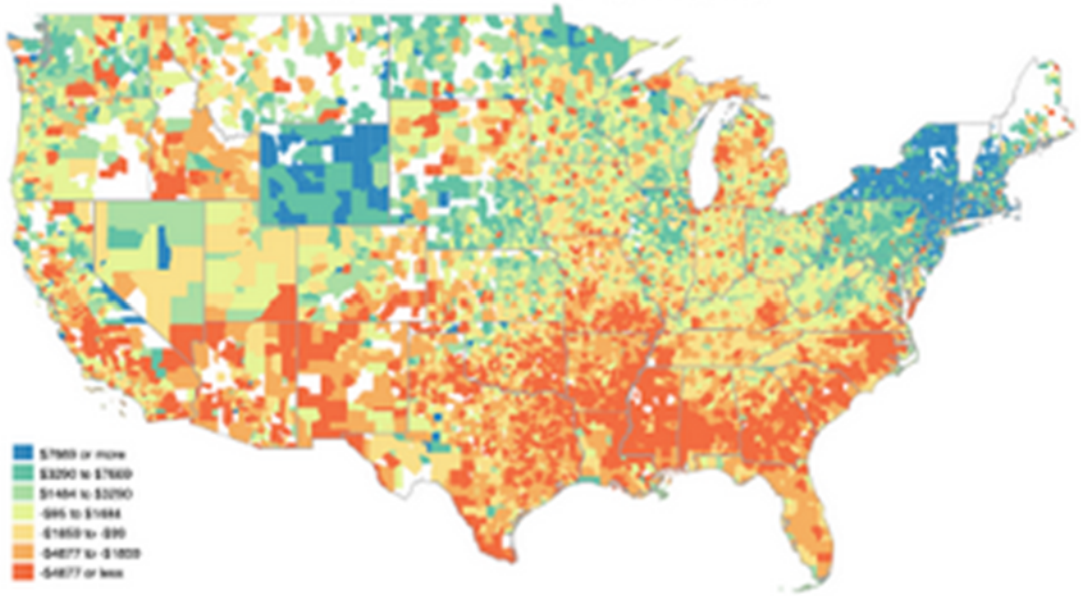
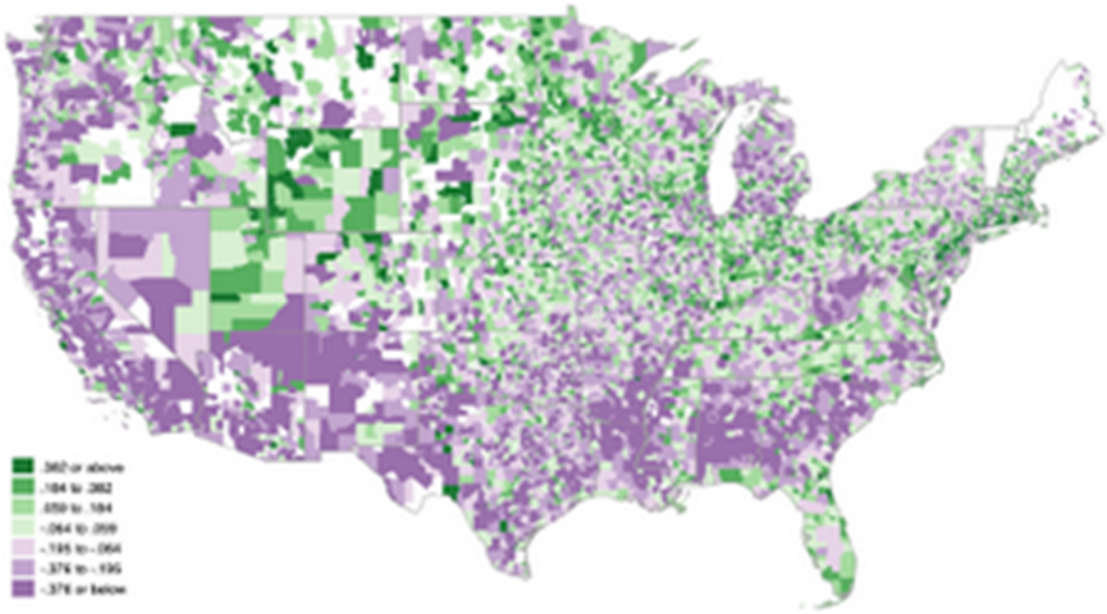
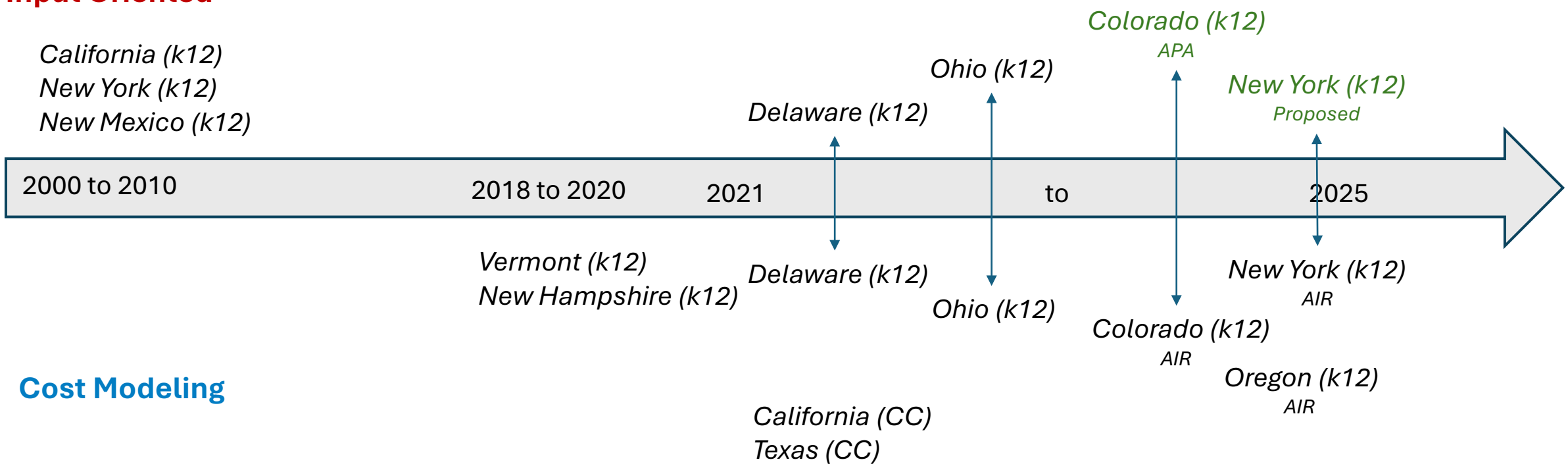


Figure 1b. Student outcomes



Evolution of State Cost Analyses

Input Oriented



Cost Modeling

California (CC)
Texas (CC)

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
Students with complex disabiliti		3.75
English learner proportion		1.15
Programming/grade range		
Vocational/technical units propo		4.58
Middle school enrollment propo		0.99
High school enrollment proporti		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 R^2	0.976	0.979

Low-income students should be funded at about 80% higher levels than non-low-income students.

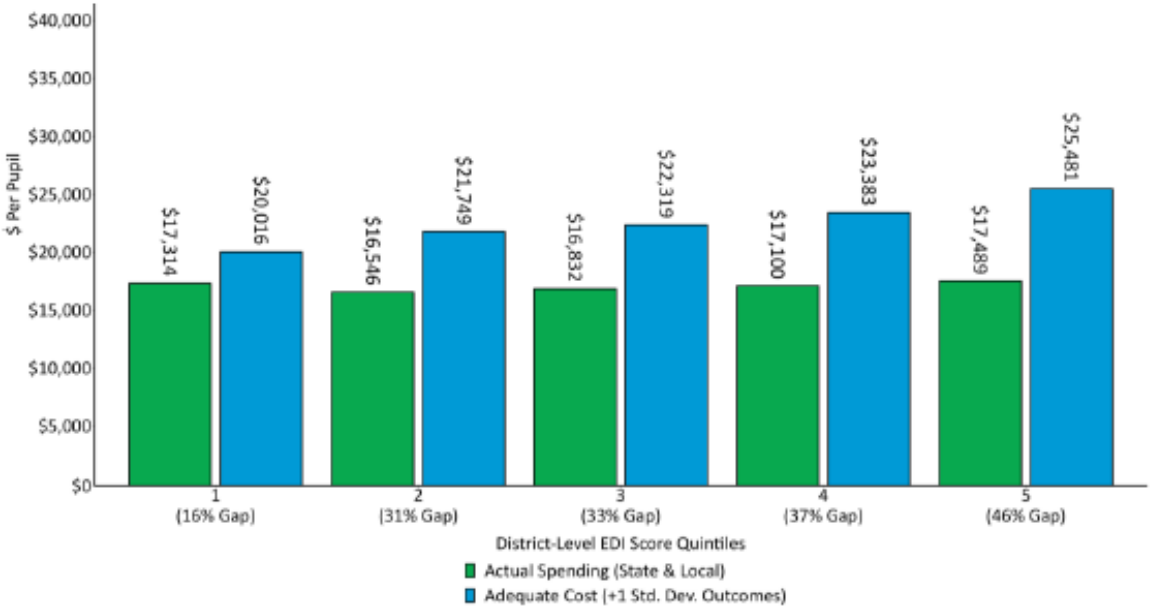
More Recent Findings - Oregon

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.

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- (*Per Pupil Adequate Cost/Per Pupil Actual Spending*).
Source. Calculations based on data from ODE; Baker et al., 2024; NCES n.d. -a.

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

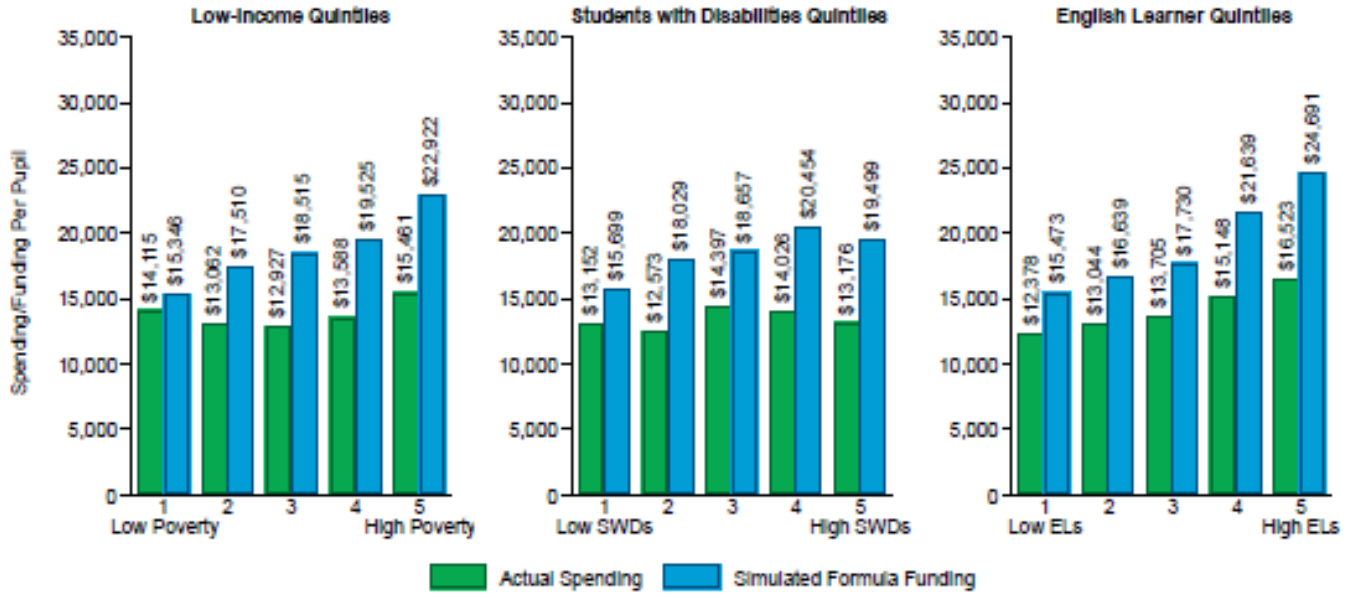
More Recent Findings - Colorado

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.

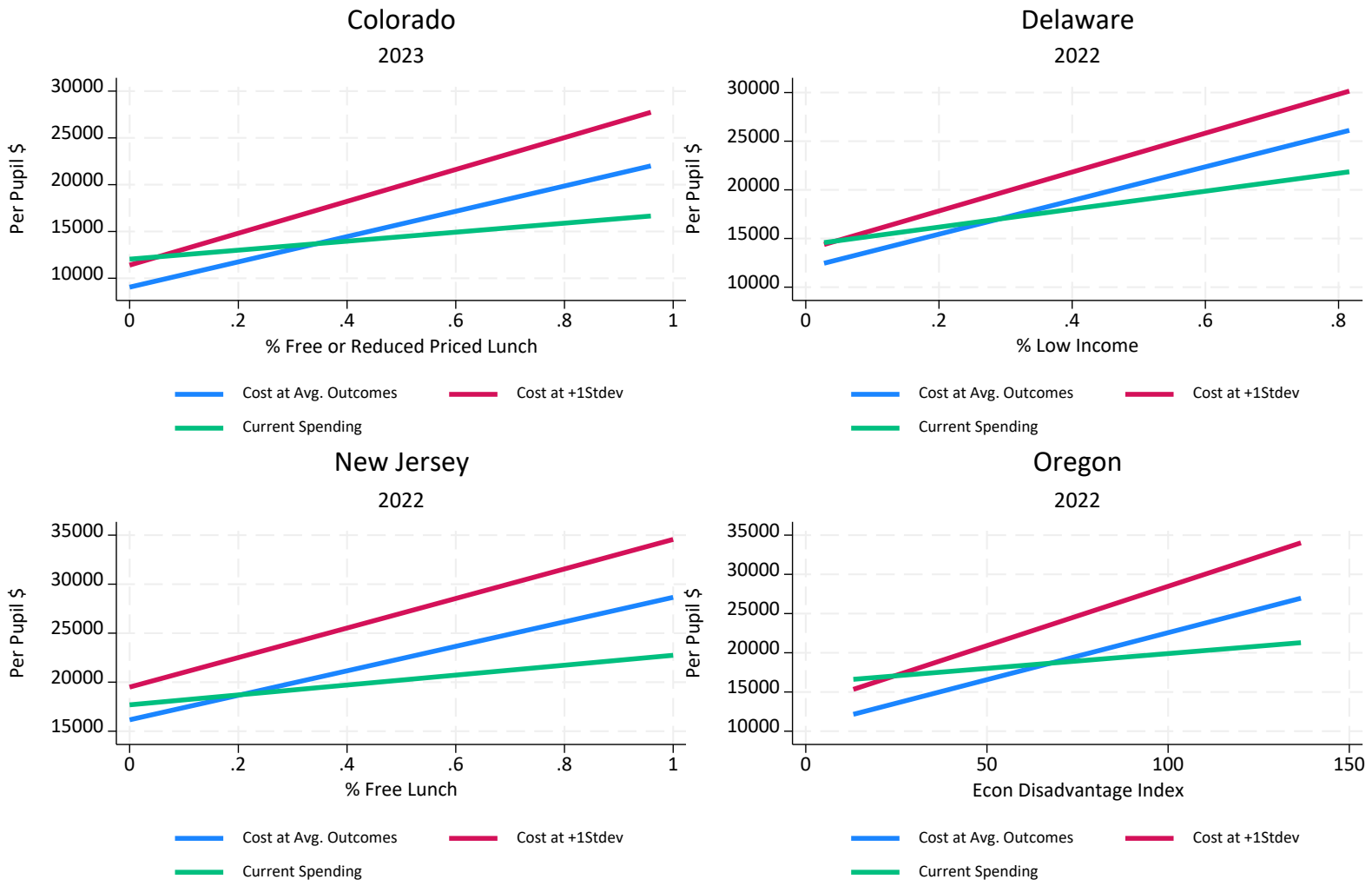
Exhibit 40. Comparing Actual State and Local Spending and Simulated Formula Funding Across Student-Need Quintiles (2022–23)



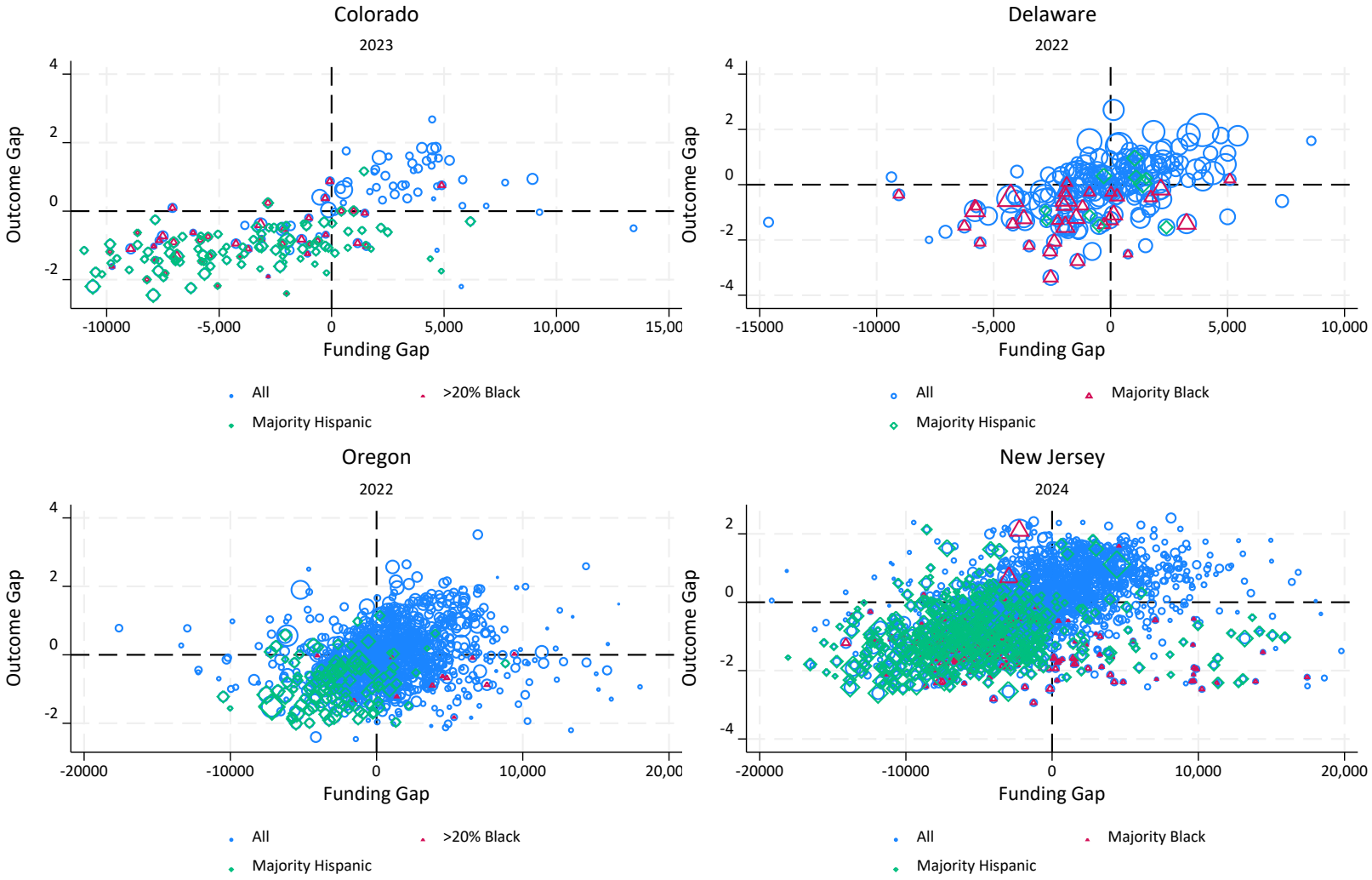
Note. Calculations are based on data from the CDE and the U.S. Department of Education.

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

Comparing State Specific (school level) Models



Comparing State Specific (school level) Models



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 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 3: RESOURCE COST MODEL

Convene panels of expert educational practitioners (PJ panels) to:

Propose resource configurations for schools to meet desired outcome goals, including civic engagement, arts/enrichment/cultural growth goals, 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 4: RECONCILIATION & FORMULA DEVELOPMENT

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

Policy Influence of Cost Modeling Studies

Formula Changes

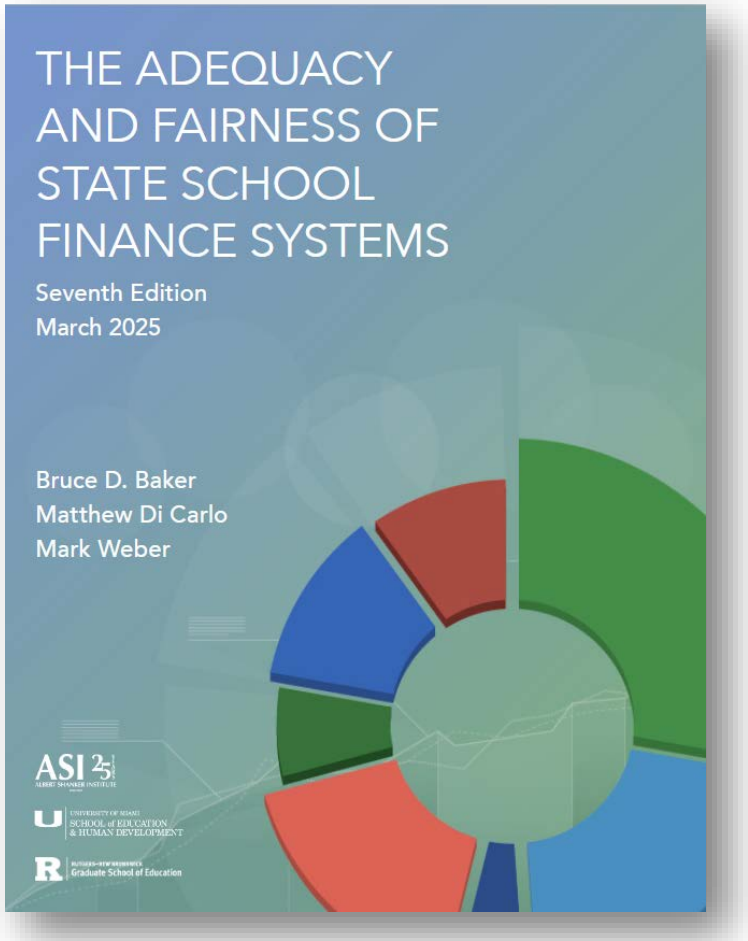
- Texas Community College formula
  - Levin, J., Baker, B., Lee, J., Atchison, D., & Kelchen, R. (2022). An Examination of the Costs of Texas Community Colleges. REL 2023-142. Regional Educational Laboratory Southwest.
- Vermont K12 Formula Weights
  - Kolbe, T., Baker, B.D., Atchison, D., Levin, J. (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 JLARC Report
  - https://jlarc.virginia.gov/landing-2023-virginias-k-12-funding-formula.asp
- Missouri DESE Report
  - https://dese.mo.gov/media/pdf/missouri-school-funding-march-2023

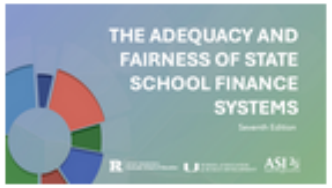
U.S. School Finance Indicators Database

- Adequacy
  - Funding with respect to (cost of achieving) Outcome Benchmark
- Equal Opportunity
  - within states to achieve common outcomes across contexts by race & poverty
- Effort
  - Share of state capacity spent on k-12 education, where capacity is measured by: GDP-State and Aggregate Personal Income



School Finance Indicators Database

FEATURED RESOURCES



The Adequacy and Fairness of State School Finance Systems

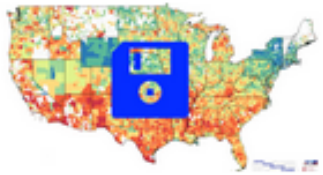
Our annual research report—currently in its seventh edition—presents a national summary of state K-12 finance systems in the United States.

One-page state profiles

One-page summaries of the K-12 school finance systems of all 50 states and D.C., which accompany the annual report.

Data visualizations

Customizable online visualizations of key measures from our datasets for your state or district.



Download full datasets

Download our full state and district datasets in Excel or Stata format, including user-friendly guides.

School Finance Indicators Database

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Data visualization tools

The links below direct to different data visualizations, all of which present data from either our State Indicators Database or District Cost Database. The visualizations are all updated annually with the latest data, and they are divided into three categories:

1. **One-page state profiles:** view one-page PDF summaries of each state's system
2. **District visualization:** display adequacy estimates for over 12,000 individual school districts
3. **State visualizations:** display individual states' estimates for a selection of measures

Additional information about each visualization can be found on its webpage. You can also download the full datasets in Excel or Stata format.

One-page state profiles

One-page state finance profiles

Single-page summaries of the effort, adequacy and fairness of each state's school finance system.

SFID data source: State Indicators Database

District visualization

District spending adequacy profiles

Compare actual and estimated adequate spending levels for 12,000 U.S. public school districts between 2009-22.

SFID data source: District Cost Database

State visualizations

Statewide spending adequacy

The percentage of students in districts with below adequate funding and average adequacy gaps, by state and year (2009-2022).

SFID data source: State Indicators Database

Latest News

NEW

UPDATED ANNUAL REPORT, PROFILES, AND DATASETS AVAILABLE

March 2025: Read the seventh edition of our annual report, view your state's one-page finance profile, use our data visualizations, or download the full state-level dataset.

Latest Annual Report

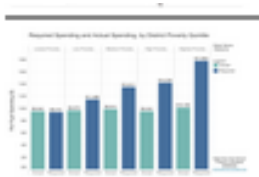
The Adequacy and Fairness of State School Finance Systems (7th edition)

The seventh edition of our annual report presenting findings on effort, statewide adequacy, and equal opportunity in state school finance systems. Published March 2025.

Latest Research Briefs

State School Finance System Profiles (2021-22 school year)

One-page profiles summarizing the key results on effort, statewide adequacy, and equal opportunity for all 50 states and D.C. View your state's profile. Published March 2025.



Equal opportunity (adequacy by district poverty)

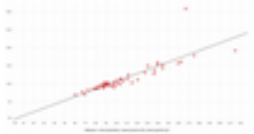
K-12 spending adequacy by district poverty quintile and equal opportunity gaps (2009-2022).

SFID data source: State Indicators Database

State fiscal effort

State and national trends in the proportion of states' economies devoted to K-12 schools (2006-2022).

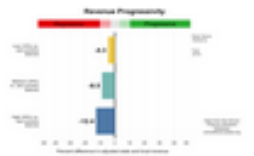
SFID data source: State Indicators Database



Relationships between state indicators

Create scatterplots comparing the relationships between your choice of two state indicators (2022 only).

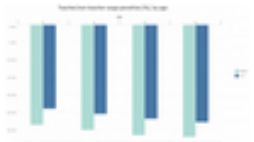
SFID data source: State Indicators Database



State funding progressivity

Differences in adequacy and local K-12 revenue between high and zero poverty districts (1993-2022).

SFID data source: State Indicators Database



State teacher wage penalties

Teacher/non-teacher wage gaps for each state and nationally, by teacher age (2000-2022).

SFID data source: State Indicators Database

Visualizations designed by Bilan Jama, Emilee O'Brien, and Lauren Schneider

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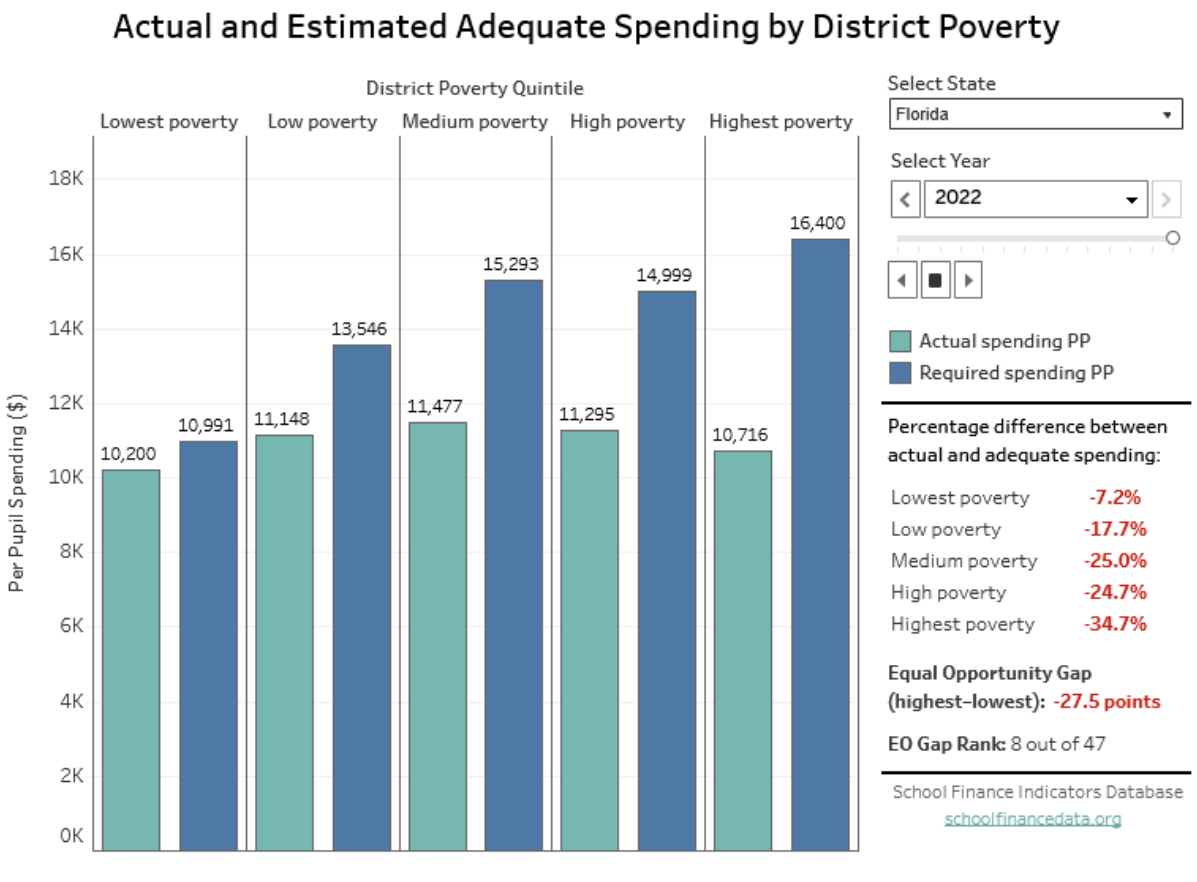
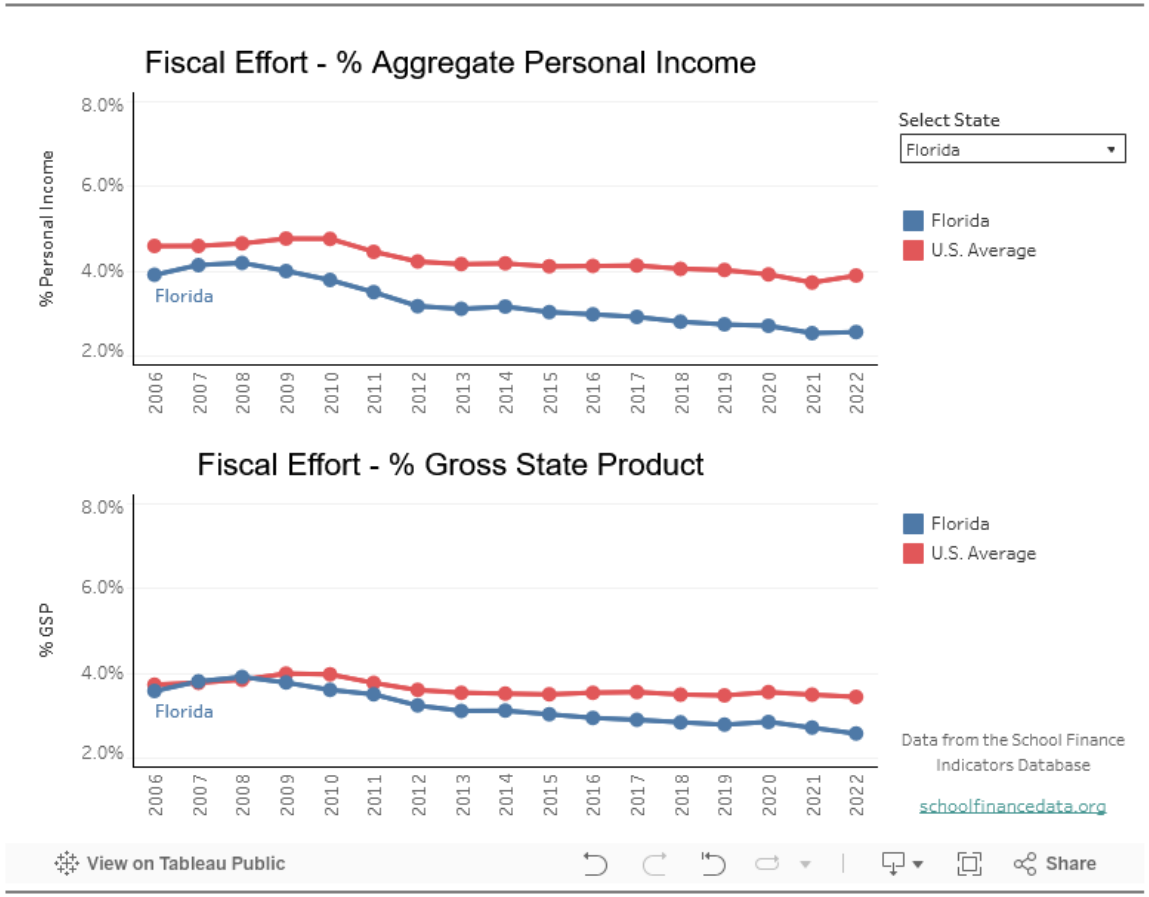
School Finance Indicators Database





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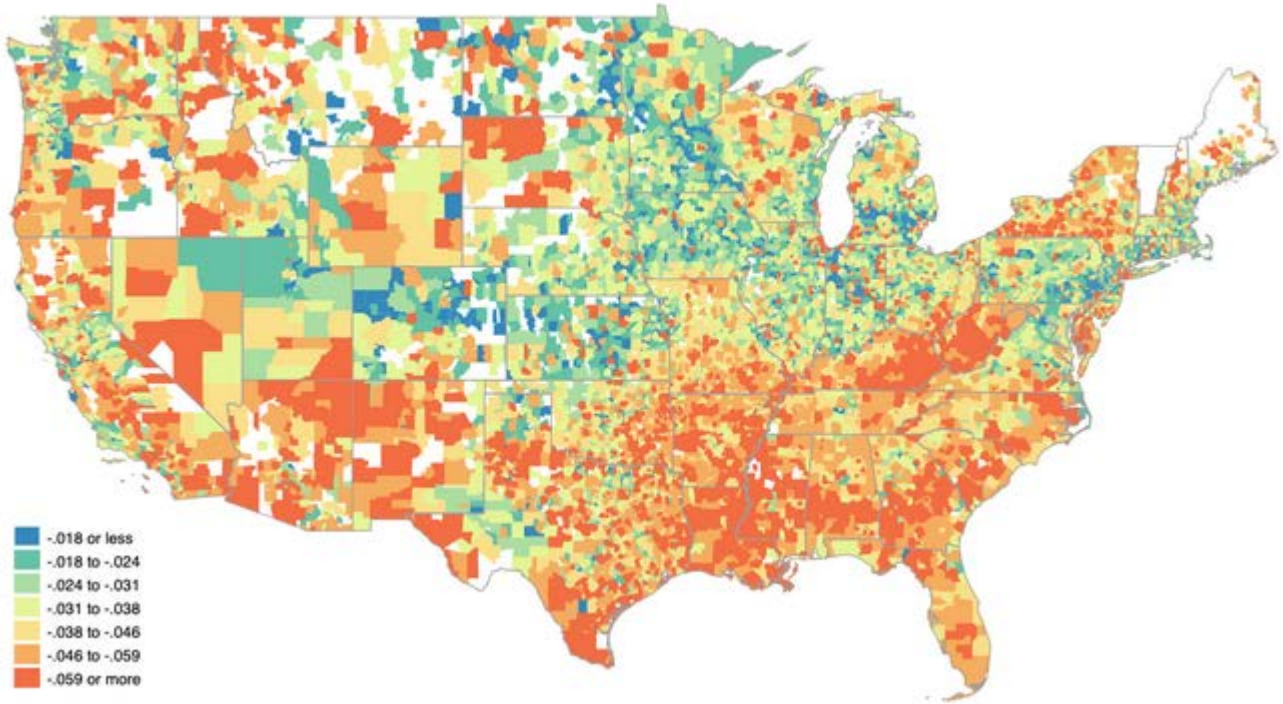
& HUMAN DEVELOPMENT

Recent Report

Figure 3. Estimated test score losses from elimination of federal aid



https://www.shankerinstitute.org/blog/cutting-federal-aid-schools

Table 1. ELIMINATION SCENARIO
Estimated impact of eliminating federal K-12 aid on spending and test scores

		Change in test scores	
	Spending (dollars PP)	Average score (s.d)	Days of learning
All students	-1060	-0.039	-28
Student race and ethnicity			
White	-874	-0.032	-23
Black	-1341	-0.049	-35
Hispanic	-1269	-0.047	-33
Asian	-924	-0.034	-24
American Indian	-1381	-0.063	-46
District urbanicity			
City	-1365	-0.050	-36
Suburb	-852	-0.031	-22
Town	-1111	-0.041	-29
Rural	-1005	-0.037	-27
District child poverty quintile			
Lowest	-608	-0.022	-16
Low	-900	-0.033	-24
Medium	-1078	-0.040	-28
High	-1332	-0.049	-35
Highest	-1677	-0.061	-44
District majority Congressional party			
Democrat	-1139	-0.042	-30
Republican	-992	-0.036	-26

Summary

- Increased longitudinal data availability enables cost modeling
  - Harmonized outcomes
  - Student characteristics
  - Context & institutional characteristics
- Cost models are producing increasingly consistent, robust results
- Applications in both elementary & secondary as well as post-secondary (U.S. Community Colleges) settings
- Can be used to evaluate school funding systems
- Can be used to inform, redesign/recalibrate school funding formulas
  - Toward equal opportunity & adequacy goals
  - To calibrate basic levels of funding & weights or cost adjustments

Recent Applications of Cost Modeling

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, 1-32.
- 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.

State Studies

- Colorado: https://www.cde.state.co.us/cdedepcom/schoolfinancecostmodelingadequacystudyreport
- Oregon: https://olis.oregonlegislature.gov/liz/2025R1/Downloads/CommitteeMeetingDocument/291280
- D. Atchison, B.D. Baker, J. Levin, S. Fatima, A. Trauth, A. Srikanth, C. Herberle, N. Gannon-Slater, L. Junk, K.: Wallace (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
- Baker, B.D., Atchison, 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_version_v5_draft_1.pdf
- 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