Assessing the Costs of K–12 Education in California Public Schools

By Jennifer Imazeki, Department of Economics, San Diego State University

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The objective of this study is to estimate the costs for California districts to meet the achievement goals set for them by the state and examine how these costs vary across districts with different student characteristics. The author asks:

1. What do the data show about the current relationship in California school districts between spending and both costs and student outcomes?

2. What would it cost for California districts to meet the achievement goals set for them by the state, and how do these costs vary across districts with different student characteristics?

This is one of three studies in the Getting Down to Facts *project that estimate the costs for California school districts to meet the achievement goals set for them by the state.*

Study Methods

The primary methodology used in this study is the econometric cost-function approach. Cost functions for K–12 education provide estimates of base costs (i.e., per-pupil costs in a district with relatively low levels of student need) and marginal costs (i.e., the additional costs associated with specific student characteristics) for poverty, lack of proficiency in English, and special education. The author also conducted a parallel production-function analysis of the data, which looks at outcomes as a function of spending to test the robustness of the cost-function model. These statistical methods attempt to quantify the relationship between student outcomes and costs for districts with a variety of characteristics. To evaluate the validity of her estimates, the author compares her results with findings from more than 20 cost studies in other states.

Data on current expenditures, students, district characteristics, and performance are used in the analysis

This study uses existing state data provided by school districts within California. The data in the analysis[1] include:

Spending data based on general fund per-pupil expenditures for 2004–05.

Cost factors, including:

- A teacher-cost index (developed by Heather Rose, 2007) based on variations in compensation arising from factors outside districts' control.

Terms used in this analysis

- **Cost of education:** the minimum amount of money that a school district must spend in order to achieve a given educational outcome. Costs generally differ across school districts for reasons that are outside the control of local school boards or state government, such as the number of children with special needs, cost-of-living differences that can affect salary levels, and the extra costs—or diseconomies of scale—associated with very small and very large districts.

- **Base cost:** the cost for a low-need district to achieve the state standard (i.e., a district with relatively low levels of poverty, few English learners, etc.).

- **Marginal costs:** the additional costs associated with specific student or district characteristics. These are generally expressed as additional per-pupil weights. For example, if the base per-pupil cost were $5,000 and the weight for a student in poverty was 50%, the district would receive an extra $2,500 for that student, for a total of $7,500.

- Student demographic data related to special needs:
  - Poverty: a two-year average (2003–04 and 2004–05) for the percentage of students who qualify for free/reduced-priced meals.
  - Disabilities: the percentage of students classified as having any disability and the percentage who have a high-cost disability.[2]
  - English learners (ELs): two-year averages for the percentage of EL students with a primary language of Spanish (to account for assumed economies of scale in schools with significantly higher proportions of Spanish speakers) and for the percentage of EL students who speak some other language.
- The proportion of each district's student body enrolled in high school to accommodate differences in cost based on grade level.
- Enrollment data for each district (and enrollment squared) to reflect potentially high costs (diseconomies) associated with both small and large districts.

Performance measures that reflect test scores for the 2004–05 school year, used in separate regressions:
  - School district API scores.
  - Percent scoring proficient or above on the California Standards Tests (CSTs) in English language arts and math.[3]

Summary of Key Findings

Current variations in per-pupil spending in California school districts are not strongly connected to variations in the cost of education

The data used in this analysis show that there is significant variation in spending per pupil across the state as a whole. They also reveal few consistent patterns in the distribution of funds based on student characteristics. Spending is slightly higher in districts with high proportions of students in poverty, English learners, or special education students.

However, in each case, the 20% of districts with the highest proportions of those students do not have the highest average spending. Spending is highest in the smallest and largest districts.

Performance measures, on the other hand, are highly consistent with student characteristics. As the percent of students in poverty, the percent of English learners, and district size all rise, the average API and CST scores consistently fall.

The study also estimated the extent to which each of the spending and cost variables affected student performance. The cost- and production-function approaches produce widely different estimates. For example, a district that has an API of 750 and is currently spending $8,000 per pupil would need only $181 more per pupil to reach an API of 800 using cost-function estimates. But this same district would need an increase in spending of $11,600 using production-function estimates.

The analysis also shows that costs related to district performance rise with:
- The percent of students in poverty,
- The percent of students who have disabilities,
- The percent enrolled in high school, and
- Regional teacher wage costs.

Costs also vary based on district size, with average costs lowest in a district with 28,992 students and higher as the size either increases or decreases. The data also suggest that non-Spanish ELs are more costly to educate than Spanish-speaking ELs. This may reflect economies of scale associated with the large concentrations of Spanish speakers in some districts.

The cost-function model estimates that California school districts need up to $1.7 billion more overall to achieve state API goals, but the production-function model estimates $1.5 trillion more

Using the cost-function approach, the study provides an estimated base

cost—or minimum—of $5,832 per pupil (in 2004–05 dollars, including food service and transportation) for a low-need district to reach an API of 800. Then it adds marginal costs based on the "observed data" (i.e., the existing funding patterns in California). The calculated marginal costs related to student characteristics are:
- Poverty 30%
- ELs/Spanish speakers 8%
- ELs/non-Spanish speakers 24%
- Special Education/all disabilities 113%
- Special Education/high-cost disabilities 668%

Adding these marginal costs, the total per pupil "cost of education" for districts varies from the minimum base cost of $5,832 to a high of $23,818, with an average of $8,268. However, 90% of districts fall between $6,678 and $11,011.

Taken in the aggregate, the estimated total cost for all districts to reach an 800 API is $45.1 billion. This is in contrast to a total cost of $43.4 billion for all districts to simply sustain their current API scores, a difference of $1.7 billion.

The study provides an additional estimate based on student weights derived from the cost function. The total based on those calculations rises to $49 billion, which is $5.7 billion or 13% more than current funding levels. It is noteworthy that the estimates imply that the current system of school finance appreciably underfunds districts with the highest needs. For example, among the districts with the highest levels of poverty, actual per-pupil expenditures are an average of 16% lower than the estimates of cost-adjusted spending.

The production-function estimates bring into question the accuracy of the results from the cost-function model. Production functions estimate the effect of spending on outcomes instead of starting with the outcomes and examining their relationship to spending. Using the production-function method, the author finds only a weak relationship between spending and

outcomes. As a result, she estimates that to improve outcomes *only through spending increases* would require a large influx of dollars—$1.5 trillion.

Author's Conclusions

In sum, the current distribution of spending per pupil across California districts is not well-correlated with factors that increase costs and decrease performance, such as students living in poverty or English learners. Although the cost-function methodology provides only weak evidence of the quantitative relationship between overall spending and outcomes, the cost-function estimates of *marginal cost* (i.e., the additional cost for specific factors such as poverty) are consistent with other studies in California that use alternative methodologies. However, the estimates are somewhat lower than those found in studies from other states. It is also noteworthy that even the conservative cost-function estimates imply that the current system of school finance appreciably underfunds districts with the highest needs.

Jennifer Imazeki is an associate professor in the department of economics at San Diego State University. She received her Ph.D. in economics from the University of Wisconsin-Madison, where she also worked as a researcher for the Consortium for Policy Research in Education. Her research includes work on adequacy and school finance reform, teacher salaries and teacher mobility, and school choice. This study was completed in January 2007.

Endnotes

1 The analysis also used a measure of local district competition that proved to not be significant.

2 Examples of such disabilities are autism, deaf, deaf-blind, orthopedic impairment, traumatic brain injury, visual impairment, or multiple disabilities.

3 Separate regressions were estimated using both average scores and scores for subgroups of poor, African American, and Hispanic students.