ADEQUACY ESTIMATES AND THE IMPLICATIONS OF COMMON STANDARDS FOR THE COST OF INSTRUCTION*

by

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I. Introduction

In 2001, the U.S. tradition of local control for schools crashed head on into national initiatives for greater accountability in education. The resulting mash-up was the No Child Left Behind Act of 2001 (NCLB). NCLB requires that all students be tested in grades 3-8 and at the high school level, and withholds federal funding from schools that persistently fail to meet performance standards.[1] However, in the spirit of local control, NCLB requires the states to develop their own standards and assessments.

Some states developed very rigorous assessments and adopted tough standards. Other states did not. For example, the National Center for Education Statistics (2007) estimates that a fourth grader would need to score a 234 on the National Assessment of Educational Progress (NAEP) to meet Massachusetts' proficiency standard in reading, but would only need to score a 170 to meet the reading proficiency standard in Tennessee.

Under NCLB, schools in states with high standards are more likely to be subject to sanctions than are otherwise equal schools in states with lower standards.[2] As a result, it has been difficult implement the NCLB sanctions fairly, and some states may have been encouraged to adopt watered down standards, or discouraged from increasing their existing standards.

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[1] NCLB reauthorized the Elementary and Secondary Education Act of 1965 (ESEA). Under the previous reauthorization of ESEA, the Improving America's Schools Act of 1994, all states were required to test students in reading/language arts and mathematics at the elementary, middle and high school levels. The states were also required to report disaggregate results for student subgroups. However, most states had received waivers or were otherwise not in compliance with the federal testing requirements. As of April 2002, only 19 states were fully compliant with the federal testing requirements under the Improving America's Schools Act of 1994 (Taylor 2002).

[2] Sanctions under NCLB are closely tied to the fraction of students passing each state's proficiency exam. The share of students passing each state's exam is inversely correlated with the NAEP equivalent passing standard (National Center for Education Statistics 2007).

Frustrations with NCLB have led to speculations about the benefits and costs of a more standardized system of student assessment. Advocates argue that a system of common academic standards would be more equitable than is possible under NCLB, and would remove the incentives for states to stop short of excellence when setting educational goals. Opponents argue that there is no political consensus or research foundation for a single set of academic standards, and that standardization can stifle innovation.

Beyond questions of equity and political viability, a move toward a system of common academic standards would undoubtedly have implications for the cost of education. On the one hand, common standards would reduce some of the fixed costs associated with the development and implementation of state-by-state systems of standards, assessments and accountability (Harris et al. 2008). On the other hand, complying with such standards could impose significant costs on states where existing standards are not well aligned with the proposed common standards. The higher the common standards are, the greater the number of states where such costs would be incurred.

Clearly, it is not possible to estimate the incremental costs of common standards without understanding the nature of those standards. At the extreme, one could imagine common standards that were set so absurdly low that all states were already in compliance. The additional cost of meeting such standards would be zero. At the other extreme, one could imagine standards that were set so high that meeting them would require most states to double, triple or quadruple their investments in education, to the detriment of other desirable social projects like public health or bridge maintenance.

Furthermore, reliably estimating the cost implications of a move to common standards would require baseline estimates of the costs of meeting existing standards in each state, so that one could calculate the additional costs of meeting common standards. Such estimates are not widely available, and must be generated on a state-by-state basis.

Therefore, it is beyond the scope of this project to estimate the incremental cost of common standards. Rather, our objective is to evaluate the strategies that could be used to estimate costs if the common standards were fully specified.

Fortunately, a substantial literature has developed around the question of estimating the cost of meeting student performance goals. Unfortunately, no consensus has developed about the most appropriate strategy for conducting such analyses. Numerous types of studies have been employed with varied results. In order to anticipate the issues that would arise when estimating the impact of common standards on the cost of education, we systematically examine the various methodologies used by states and interest groups to measure educational adequacy, compare the estimates generated by the various studies, and discuss the strengths and weaknesses of each approach.

2. An Overview of Adequacy Studies 1997-2007

Over the last decade, public education systems in many states have been the subject of educational adequacy studies.[3] Such studies can be grouped into two broad categories—bottom-up analyses and top-down analyses. Bottom-up analyses estimate

[3] For purposes of this report, we define an "adequacy study" as a publicly-reported attempt by state officials or special interest groups to apply an empirical methodology to estimate the costs of providing an adequate K-12 education. Studies produced for an academic audience (such as Reschovsky and Imazeki's 1998 Cost Function analysis of Wisconsin), studies that produced cost estimates for only a subset of school districts in a state (such as the MAP Professional Judgment analysis of Texas) and studies that produced only school-level cost estimates (such as the Augenblick and Myers Professional Judgment analysis of South Carolina schools) are excluded.

the cost of an adequate education by summing up the costs of building a model school. Top-down analyses look at the spending, performance and other characteristics of existing schools, and then estimate the cost of an adequate education based on the observed relationship between inputs and outputs.

Bottom-up Studies

The most common example of the bottom-up approach is the Resource Cost Study.[4] Resource Cost Studies develop a recommendation regarding the resources (people, time, space, equipment) needed to provide a given set of educational services and then estimate the cost to provide these resources.

There are two principal types of Resource Cost Studies. In ***Professional Judgment*** studies, focus groups of educators and policymakers are typically convened to prescribe the resources required for providing an adequate education in a series of prototype schools. Researchers then interpolate between the prototypes to generate cost estimates for each of the school districts in a state. In ***Evidence-Based*** studies, a team of consultants calculates resource needs based on a "proven effective" school reform model, which need not have ever been implemented in the state under evaluation.[5] [6] The primary distinction between the two approaches is that Evidence-Based studies rely on consultants to prescribe the necessary resources, while Professional Judgment studies rely on the knowledge and experience of local practitioners.

[4] For more on Resource Cost Models, see Chambers (1999) or Hartman et al. (2001).
[5] Early Evidence-Based studies focused on Comprehensive School Reform (CSR) models, such as Robert Slavin's "Roots and Wings/Success for All" model (Goertz and Malik 1999). More recently, Evidence-Based analyses have strived to integrate a variety of "proven effective" input strategies such as class size reduction, specific interventions for special student populations, and comprehensive school reform models, rather than relying on a single reform model.
[6] The quality of the "scholarly research" underlying many Evidence-Based studies has been the subject of dispute. See for example, Hanushek (2006, 2007a, 2007b).

As figure 1 illustrates, 26 U.S. states were the subject of bottom-up analyses between 1997 and 2007. Some states, such as Montana, Maryland and Colorado, were analyzed more than once. Professional Judgment studies were much more common than Evidence-Based analyses, but Evidence-Based analyses were conducted in six of the 26 states. Both Professional Judgment and Evidence-Based analyses were conducted in Kansas, Kentucky, Washington and Wisconsin. As a general rule, the bottom-up analyses described in figure 1 were conducted in the context of school finance litigation.

Top-Down Studies

The most common examples of the top-down approach are Successful Schools studies and Cost Function studies. Successful Schools studies use data on student performance to identify a set of schools or districts that meet or exceed a chosen standard of success.[7] Researchers then estimate the cost of an adequate education as the average level of spending among the chosen set of successful schools.

Cost Function Studies use statistical methods and data on student performance, resource prices and other school characteristics to predict the cost of achieving a designated set of outcomes in each school district, based on the observed relationship between educational inputs and outputs. As such, cost function analysis can be used not only to predict the cost of achieving a desired level of outcomes in an average district, but also to estimate cost differentials arising from differences in school district size or student characteristics. However, like all top-down analyses, Cost Function Studies typically do

[7] Some researchers narrow the set further by excluding districts with peculiar spending patterns or student populations.

not provide much guidance as to the mix of resources that would lead to the desired outcomes.

Figure 2 illustrates the distribution of top-down analyses. As the figure illustrates, top-down analyses were also used frequently over the past decade to measure the cost of education. Again, many states were studied more than once, and most of the analyses were conducted in the context of litigation support or at the behest of a legislative body.

A comparison of figures 1 and 2 demonstrates an intriguing geographic pattern. None of the states in the Southeast Census region were the subject of a publicly available adequacy study during the past 10 years. The reasons for this gap are not clear, but may reflect the general absence of equity litigation in the region (Hanushek 2007a).

3. Reconciling the Estimates

Since the various top-down and bottom-up strategies are aimed at the same target—identifying the costs of an adequate education—they should lead to similar predictions about costs, all other things being equal. Ideally, well-informed professionals advising districts on how to meet a specific performance goal would prescribe the same mix of resources as would Evidence-Based consultants, and that mix, when evaluated at market prices, would cost exactly as much as predicted by a cost function analysis of local expenditure patterns.

The actual estimates are very dissimilar, however. Figure 3 illustrates the baseline cost of an adequate education (per pupil) across the various studies. As the figure illustrates, even after adjustments for inflation and regional cost differences, the estimates

differ by more than 300 percent across states, and by as much as 66 percent within a single state.[8]

There are many reasons why estimates of the cost of an adequate education differ so dramatically. Researchers make an array of judgment calls that can influence the results in large and small ways. Each study needs to be evaluated independently to determine the extent to which those decisions drive the results.

There are a few key factors, however, that can explain most of the differences across studies. First, there are differences from one study to the next in the reported measure of cost. Second, there can be important differences in the definition of adequate. Third, there can be important differences across studies in the treatment of school district size and student need. Finally, there can be important differences across states with respect to the costs imposed by the policy environment. We discuss each source of variation in turn.

Differences in reporting across studies

To construct figure 3, we identified the baseline cost estimate as the minimum per-pupil cost of an adequate education reported for each study. As such, we have extracted from the published report the costs associated with a scale efficient (optimally-sized) school district and excluded wherever possible any incremental cost associated with special student populations. We focus on the minimum reported cost because it gives us a frame of reference that is comparable across states. It represents the cost of

[8] We adjusted dollar figures for year-to-year and state-to-state differences in the price level using the recently developed National Center for Education Statistics Comparable Wage Index (Taylor and Fowler 2006).

education for a low-needs student in a regular education program, in a school district that is large enough to exploit economies of scale.

Unfortunately, not all studies use comparable reporting standards. Therefore, the best available baseline estimates represent four alternative definitions of minimum cost. (See table 1.) To a certain extent, the apparent differences across studies represent inconsistencies in reporting rather than differences in the estimated cost of an adequate education.

Table 1: Alternative Definitions of the Baseline Cost of Education

Average cost	Cost in average district or average cost per pupil
Average Successful Schools cost	Cost in average successful school or district
Basic cost	Cost of regular education programs
Minimum cost	Cost in a district with the least-cost combination of labor costs, scale and pupil needs

For example, figure 3 incorporates six studies that report only the cost of providing an adequate education in the "average" district.[9] Such estimates overstate minimum costs because they include higher-cost small or urban districts and costs associated with students with special needs. Five of the ten studies with the highest adjusted cost estimates—including three of the top five estimates—reported only average costs.

In another 16 studies, the lowest reported cost is an average expenditure for successful schools. Because successful schools are typically those with relatively small shares of higher need students, these expenditures should be closer to minimum costs than the average costs of all districts. However, even successful schools may overstate

[9] It is not always clear whether or not the district average is a pupil-weighted average, or an average of district estimates. Such distinctions are particularly important in states like New York, with one large, high-cost district. The pupil-weighted average cost for the state of New York is much higher than the unweighted average cost. The highest cost estimate in figure 3 is a pupil-weighted district average for the state of New York.

minimum costs if the successful schools use their resources inefficiently or are unable to exploit economies of scale. More importantly, successful schools are those meeting or *exceeding* expectations, so their average expenditures are likely to exceed those required specifically to meet expectations. On the other hand, given the methodology, the average expenditures of successful schools do represent the researcher's lowest estimate of the cost of an adequate education.

Another group of studies report basic costs rather than minimum costs. Basic costs, per se, are the costs of providing core educational services, assuming no additional student needs. In most recent Professional Judgment studies, basic costs were easily identifiable and most often listed as the total of school and district level costs (before student need adjustments) of a large prototype district.

Finally, a few of the studies reported a true estimate of minimum cost—the per-pupil cost in a district with the least-cost combination of labor costs, scale and pupil needs. All of the cost function analyses reported data in such a way that we were able to extract an estimate of minimum cost. Not surprisingly, six of the ten lowest cost estimates reported minimum costs.

Differences in reporting cannot explain all of the differences across studies, however. Even among studies using the same reporting standard there are substantial differences in the costs those studies identify for an adequate education. The highest basic cost estimate is more than double the lowest basic cost estimate. Similarly, the highest minimum cost estimate is more than double the lowest minimum cost estimate. Clearly, other factors also contribute to the variations in figure 3.

Differences in the definition of adequate

Many of the differences in cost estimates that are not attributable to reporting differences likely arise from differences in the evaluated level of student performance. Indeed, the whole motivation behind the idea of common standards is the observation that some states set the bar higher than others. Given the subtext of all these studies—money matters in education if it is spent wisely—it should come as no surprise that higher standards yield higher cost estimates.

In addition to policy-driven differences, some of the differences in the definition of adequate are methodologically-driven. Top-down methods require some measure of student performance to be able to calculate costs, so Successful Schools and Cost Function analyses generate estimates of the cost of achieving some quantifiable standard that is already being achieved in the state. Bottom-up methods face no such restriction. Instead, professional judgment panels are frequently asked to prescribe the resources needed to reach performance standards that are difficult to quantify or well beyond those currently being achieved by local schools. Evidence-based consultants may argue that reforms proven effective against other standards will also lead to improvements on state-specific measures, but they can seldom specify how much improvement, so it is hard to pin down the performance standards being evaluated in such studies. Given the inherent methodological differences, it is virtually impossible to ensure that a bottom-up study is using the same adequacy standard as a top-down study.

Differences in scale and need

Another other major source of cost variation across studies is the variation in school and district characteristics. Schools that are too small to take advantage of economies of scale have higher costs than other schools. Schools with a higher proportion of needy kids also are expected to have higher costs. Studies that incorporate adjustments for scale and need tend to have lower minimum costs than do studies from which those costs cannot be factored out. Similarly, studies based on states with advantaged populations will tend to have lower costs than studies based on other states. Five states—Arkansas, Florida, Louisiana, Mississippi and West Virginia—do not have a single district with less than 15 percent of the students eligible for free or reduced lunches, so minimum costs in those states would reflect a baseline with at least 15 percent needy students rather than a baseline with 0 percent needy students.

The impact of such adjustments can be substantial. Consider, for example, the variations across states regarding the impact of school size on the cost of an adequate education. Most Successful Schools and Evidence-Based analyses make no attempt to estimate the increased per-pupil costs facing very small schools. On the other hand, Professional Judgment and Cost Function analyses generally provide estimates of the effects of school district size.

Professional judgment studies generally indicate significant economics of scale, but tend to be very inconsistent about the district size at which those economies are realized. Various studies have indicated that a lack of economies of scale push costs upward for districts with fewer than 12,500 students (Nebraska), 11,300 students (Kansas), 8,000 students (Tennessee), 5,200 students (Colorado), 4,380 students

(Missouri), 1,740 students (Montana) and 750 students (North Dakota). In Nebraska, a district with 400 pupils had costs 40 percent above the minimum, but in Missouri, a district with 364 pupils, had costs only nine percent above the minimum.[10]

Cost Function studies tend to be more consistent, typically indicating that costs are minimized for districts with 2,000 to 5,000 pupils and sweep sharply upward for districts with fewer than 300 pupils. Most also show higher costs for very large districts. Cost Function studies from both sides of the recent legal battle over adequacy in Texas indicate that a district with 400 pupils has costs between 35 and 39 percent above the minimum, while a district with 50,000 pupils has costs that are at most 0.1 percent above the minimum.

Table 2 compares the implicit adjustments for student poverty across the 13 studies for which we had access to district-by-district cost estimates. The implicit poverty adjustments were calculated by regressing the predicted cost of an adequate education (in logs) on the share of students in poverty, controlling for school district size and regional cost differences. The adjustments indicate the percentage increase in predicted cost associated with a one percentage point increase in the poverty rate of the local school district. For example, a poverty adjustment of 0.225 for Arkansas indicates that each percentage point increase in the school district's poverty rate increases the estimated cost of an adequate education by 0.225 percent. At the extreme, the implicit poverty adjustment embedded in the Arkansas Evidence-Based study indicates that a school where all of the students were in poverty would have a cost of an adequate education that was 22.5 percent higher than the cost of an adequate education in a school

[10] Intriguingly, both the Nebraska and the Missouri studies were conducted by the same research team.

where none of the students were in poverty, holding constant the size of the school and the prevailing wage for college graduates.

Table 2: The Implicit Adjustments for Student Poverty

State	Study Type	Implicit Poverty Adjustment	Baseline Cost Estimate
Arkansas	Evidence Based	0.225	$6,115
Kansas	Cost Function	0.965	3,982
Kansas	Professional Judgment	0.681	6,172
Minnesota	Cost Function	1.679	4,932
Missouri	Cost Function	0.992	4,013
Missouri	Cost Function	0.802	4,900
New York	Cost Function	1.346	5,511
New York	Professional Judgment	0.915	7,196
Pennsylvania	Professional Judgment	0.616	6,436
Rhode Island	Cost Function	0.672	5,725
Texas	Cost Function	0.395	4,030
Texas	Cost Function	1.273	3,147
Washington	Professional Judgment	0.581	6,841

Note: The implicit poverty adjustments are coefficient estimates from a regression of the district-level cost of an adequate education (in logs) on the log of enrollment, the log of enrollment squared, the share of students in poverty and the NCES Comparable Wage Index. In all cases, the coefficient estimates are significantly different from zero at the 1-percent level. Complete regression tables available upon request.

As the table illustrates, adjustments for student need have a significant impact on the estimated cost of an adequate education. The lowest estimated adjustment (from an Arkansas Evidence-Based study) indicates that student poverty can increase the cost of education by nearly 23 percent. The highest estimated adjustment (from a Minnesota Cost Function Study) indicates that student poverty can increase the cost of an adequate education by nearly 170 percent.[11]

Although the sample is too small to be definitive, the data suggest that studies with higher adjustments for student poverty tend to have lower baseline estimates. In the four cases where we have access to two studies from the same state (Kansas, Missouri,

[11] The large poverty adjustment in Minnesota is largely attributable to the substantial cost differential provided for the Minneapolis school district.

New York and Texas), the study with the higher implicit poverty adjustment has the lower baseline estimate.

Differences in policy environments

Finally, even if two studies used comparable reporting standards, evaluated comparable performance levels and made similar adjustments for scale and need, the estimated costs of education need not be the same across states. Schools operate in policy environments that can change dramatically as one crosses state lines, and those different policy contexts can drive substantial differences in cost.

Structural rules may make it more costly to increase student performance in one state than in another. For example, some states set maximum class sizes or regulate the length of school year. Other states may require districts to hire nurses or career councilors.

Differences in teacher labor markets can drive differences in costs. Teacher compensation rules regarding certificate requirements, wage ranges, merit and bonus systems and step advancement programs can all lead to higher costs in some states. Those higher costs are not captured by regional cost adjustments because, by design, the adjustment strategy relies on differences in amenities and costs of living, not on differences in the educational policy sector.

General differences in state fiscal policy and school system structure can also drive differences in cost. Tight budgets or limits on local taxing authority may lead school districts to operate more efficiently, or to postpone needed maintenance. States where it is more difficult for voters to monitor school districts may have less efficient school systems (Grosskopf et al. 2001). Competition from charter schools could spur

greater efficiency and thereby lead to lower baseline costs in some states but not in others.

4. Comparing the Methodologies

There are many analytic approaches to answering the critical question, "What are the implications of common standards for the cost of education?" and the choice of methodology can have considerable influence on the subsequent estimate of cost. Both bottom-up and top-down strategies indicate that increasing student performance to a common standard would require either an increase in resources, a reallocation of resources away from existing outcomes or an increase in school district efficiency. However, the degree to which resources must rise or efficiency must improve differs greatly from one study to the next, and can be influenced by the estimation methodology. Therefore, it may be useful to consider the analytical strengths and weaknesses of the various approaches.

Bottom-up Strengths

The primary strength of bottom-up methods, like Professional Judgment or Evidence-Based analyses, is that the methods are relatively simple and transparent and produce easily understood results. That is, bottom-up models appear not to involve more complex statistical modeling. Of course, well-designed bottom-up models require researchers to use statistical modeling to determine market prices for educational inputs,[9] and professionals frequently rely on statistical analysis to form their opinions.

Because achieving consensus regarding desired educational outcomes can be difficult and precise measurement of those outcomes even more complicated, one

advantage of bottom-up analyses is that they avoid these complexities altogether. Professional Judgment approaches can also incorporate outcomes that are difficult to measure, while top-down analyses can only estimate the costs associated with measurable outcomes.

Bottom-up Weaknesses

In an era of increasing emphasis on educational standards and accountability, it can be difficult to justify a cost figure for an "adequate education," where that cost figure is, at best, indirectly linked to student outcomes.

Furthermore, analyses that rest on the judgment of a panel of professionals are vulnerable to the blind spots and biases of individual panel members. If the panel is poorly drawn or unaware of cost effective educational practices, their cost estimates will be biased.

While proponents of Evidence-Based analysis infer a strong connection between specific comprehensive school reforms and improved outcomes, research evidence regarding the effectiveness and more specifically the cost effectiveness of these reforms is mixed at best and may not apply in all contexts (Bifulco et al. 2002; Borman and Hewes 2002; Levin 2002; Borman et al. 2003). Furthermore, there may be little connection between the outcomes such reform models are "proven" to accomplish and the outcomes policymakers hope to achieve.

For practical reasons, bottom-up analyses rely on a limited set of prototypical districts, which can lead to problems when actual school districts differ from the prototypes. For example, it can be difficult to estimate the costs of operating a district

with 600 pupils, when prototypes have been estimated with 200 pupils and 1000 pupils. Similar issues exist in the accommodation of student needs, where only a limited range of possibilities may be feasibly represented in the prototypes. The greater the difference between the prototypes and the actual schools, the greater is the margin for error. It can be particularly problematic to estimate costs when the actual schools differ from the prototypes in more than one dimension, as would occur when schools both were smaller and served more disadvantaged students than the most similar prototype. Even apparently subtle differences in applying the prototypes to the real world (such as choosing to interpolate between prototypes linearly instead of nonlinearly) can lead to significantly different cost estimates.

Bottom-up analyses frequently prescribe sharp increases in resource utilization, but tend to presume that implementing such changes will have no effect on resource prices. If the increase in demand resulting from the new intensity requirement drives up the price of inputs, then the total cost predictions from the analysis will be greatly understated.

Top-Down Strengths

The primary strength of top-down models is that they establish a direct link between education costs and desired outcomes. Understanding the link between costs and outcomes and designing aid formulas based on this understanding is arguably a critical objective in an era of increased emphasis on standards and accountability. Furthermore, cost estimates are based on actual data about student performance and school district expenditures in a given state, so there is no question that the analysis is applicable.

Cost Function analysis has the added strength that it is specifically designed to measure the district-by-district differences in costs associated with the geographic price variations, economies of scale, and variations in student need. As such, it provides an empirical basis not only for the basic level of spending, but also for various cost adjustments that must be applied to that base.

Top-Down Weaknesses

Policy-makers must designate a measurable performance standard. Achieving such consensus can strain the political system. Many outcomes that policy-makers consider important may be too difficult to measure, and that which is measured well may be a biased representation of that which we hope to achieve.

Top-down approaches can be data intensive, requiring high quality measures of school district performance and expenditures. Many states lack the necessary data to conduct such analyses. For example, Maryland does not collect detailed data on school expenditures. Thus, although the state of Maryland was able to identify 104 schools that it considered to be successful, researchers conducted a Successful Schools analysis on a narrower sample of less than 60 schools on the grounds that it would be difficult to obtain fiscal data from the full 104 within the time available. Cost Function analyses on the basis of such a small sample would be problematic.

By design, statistical models describe relationships within the experience of the data. It is problematic to extrapolate beyond that experience to predict the costs associated with a level of performance that is not regularly achieved, or is not achieved by districts with a particular set of geographic and demographic characteristics.

A difficulty with more complex statistical methods like educational Cost Functions is that both the underlying methodologies and eventual outcomes of those methodologies can be difficult to understand and difficult to communicate to constituents. In addition, the underlying methodologies rest on theoretical and analytical assumptions with which informed parties may disagree.

Cost function analyses are complex and explicitly involve errors of estimation and modeling. There are also strong differences of opinion among researchers regarding the appropriate model for cost function analysis.[12] While other methodologies are also vulnerable to error and bias, there can be political resistance to methodologies that are difficult to explain and reveal the inherent imprecision of social science. Top-down methods like Cost Function analyses estimate a statistical relationship between spending and outcomes, but they do not provide specific insights into how districts should internally organize their resources to effectively and efficiently produce the desired outcomes.

5. Conclusions

Clearly, no one approach to estimating educational adequacy dominates the others from either a theoretical or a practical perspective. All have been used—and will continue to be used—by policy-makers, litigants, and interest groups to influence state education policy and anticipate the consequences of policy change. Any effort to quantify the cost of a move to common standards must rely either on a top-down strategy, a bottom-up strategy or some combination of the two.

[12] For example, see Hanushek (2007) or Costrell, Hanushek and Loeb (2008). For a response, see Duncombe (2006), or Gronberg, Jansen and Taylor (2008)

The lack of consensus regarding the appropriate research methodology would be largely moot if all of the methods yielded similar predictions about the cost of an adequate education. Unfortunately, that is not the case. The choice of research method has considerable influence on the nature of the predictions. Adjusted for inflation and regional price variations—but using different methodologies—the estimated per-pupil cost of an adequate education for a single state can range from $5,511 to $9,241 (in 1999 dollars). Furthermore, even when two research methods yield roughly similar estimates of the cost of an adequate education in the baseline school district in a given state, different methods can yield strikingly different estimates of the variations in costs associated with district characteristics, like size and student demographics. Given the sensitivity of the estimates to differences in methodology, it is clear that multiple estimates using alternative methods would be more reliable than a single estimate.

Differences across studies with respect to the evaluated performance level make it very difficult to generalize from existing adequacy studies to the cost of meeting common standards. With the exception of Cost Function analyses, the existing adequacy studies do not yield cost estimates for alternative performance standards. Therefore, while one could use the existing literature to estimate the cost of complying with existing standards, one would need to start from scratch to estimate the cost of complying with common standards across all 50 states.

Furthermore, estimating the increase in cost associated with complying with common standards would require baseline estimates of the cost of complying with existing standards in each state. The literature contains adequacy estimates for 30 states, but one could argue that some of those estimates are only loosely tied to existing state

standards and would need to be redone. Estimates for the remaining 20 states would require analyses of the existing standards in those states, although conceivably some of them have standards, demographics and policy environments that are sufficiently similar to those in states with adequacy estimates that one could generalize from the existing literature.

All of the estimation methods rest on the presumption that any increase in student performance would require an increase in resources, a reallocation of resources away from existing outcomes or an increase in school district efficiency. If the goal is to establish common academic standards that are at least as rigorous as those measured by NAEP, then academic standards will need to rise in virtually every state. Complying with tough academic standards would require substantial changes in the resource allocation of schools. Estimating the cost of complying with those standards would be a challenge in its own right.

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Figure 1: Bottom-Up Adequacy Studies, 1997-2007

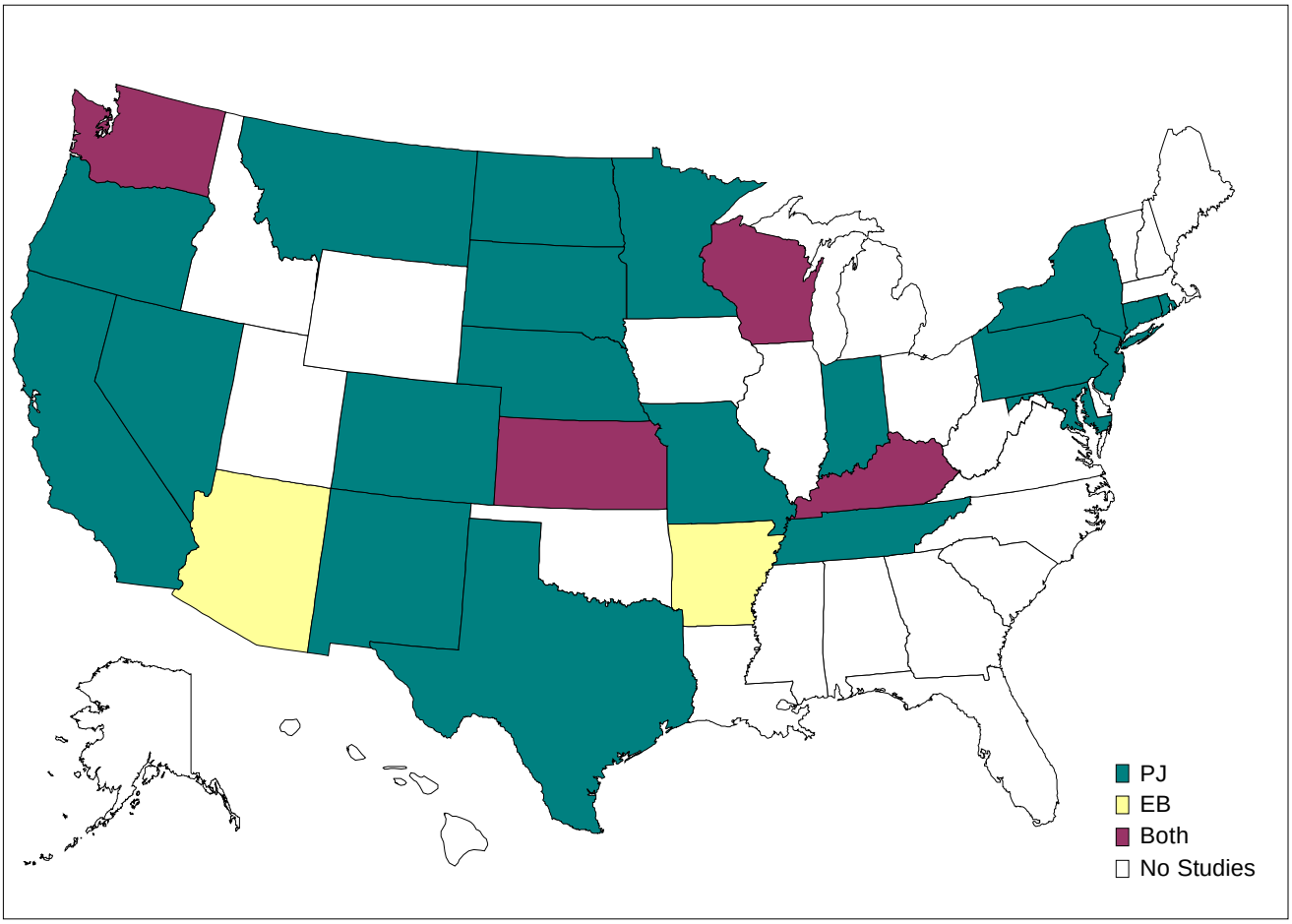

Figure 2: Top-Down Adequacy Studies, 1997-2007

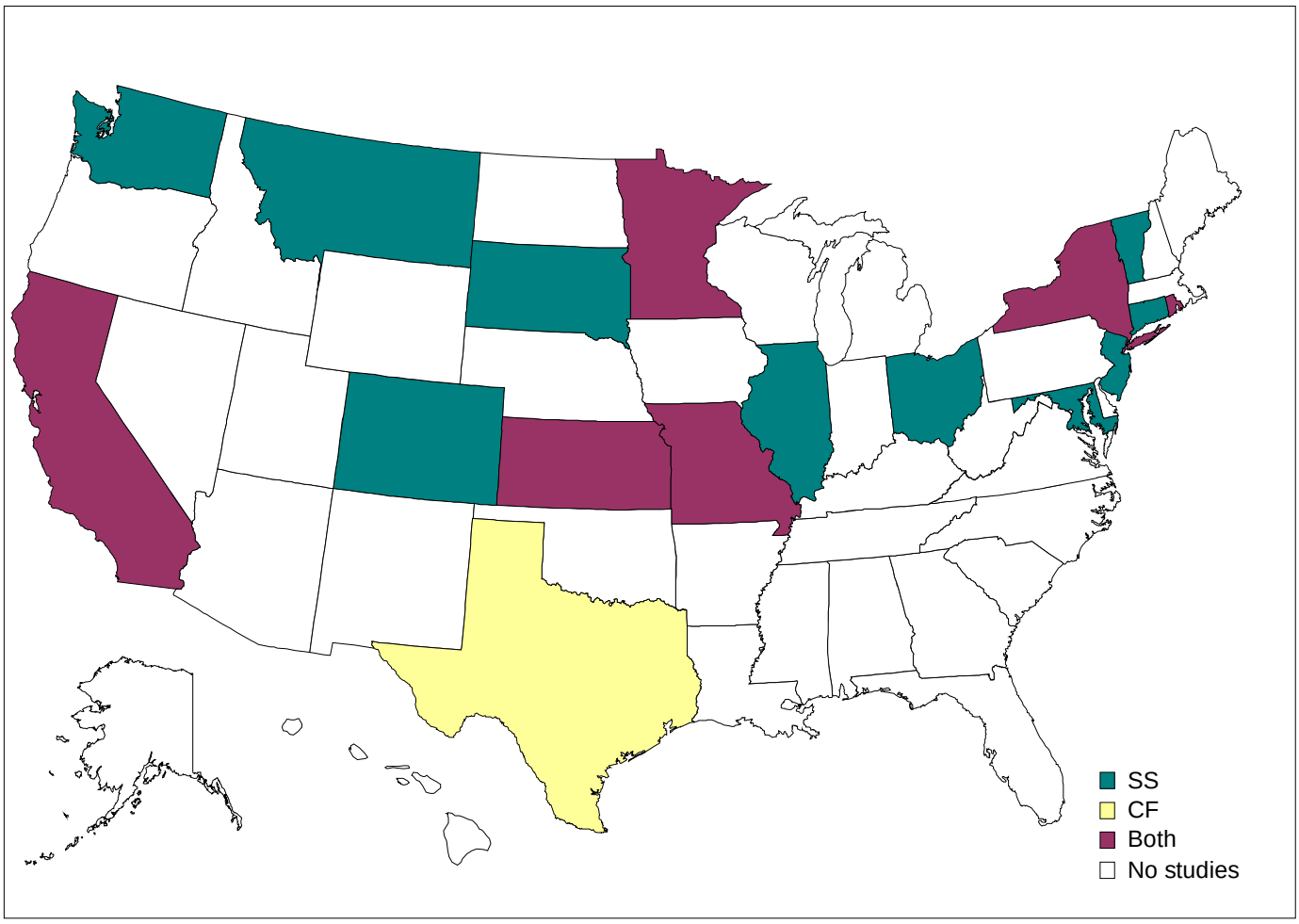

Figure 3: The Baseline Reported Cost of Adequacy