ENSURING ADEQUATE EDUCATION FUNDING FOR ALL

A New Federal Foundation Aid Formula

BRUCE D. BAKER
MATTHEW DI CARLO
MARK WEBER

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Bruce D. Baker
Matthew Di Carlo
Mark Weber

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ABOUT THE AUTHORS

Bruce D. Baker is a professor and chair of the Department of Teaching and Learning at the University of Miami and author of *Educational Inequality and School Finance: Why Money Matters for America's Students*.

Matthew Di Carlo is a senior fellow at the Albert Shanker Institute in Washington, D.C. He has a Ph.D. in sociology from Cornell University.

Mark Weber is the Special Analyst for Education Policy at the New Jersey Policy Perspective and a lecturer in education policy at Rutgers University, where he earned his Ph.D. He is also a music teacher in Warren Township, N.J.

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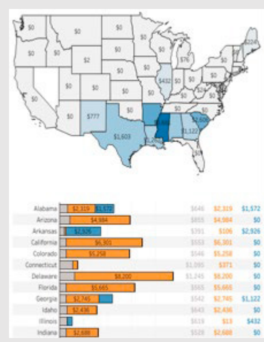
EXECUTIVE SUMMARY

In this report, we propose and simulate a framework for a new foundation formula approach to distributing federal K-12 education aid. This proposal, with full funding and compliance, would provide every school district with the estimated revenues necessary to reach the goal of average national outcomes in mathematics and reading. The framework is designed to target assistance where it is most needed by allocating federal funds based not only on student need (as is currently the case), but also on states' and school districts' ability (and willingness) to contribute themselves, given their capacity to raise revenue—in other words, based on their "effort."

Some form of this "foundation funding" system is how state and local K-12 funds are distributed in almost all states, at least in theory (though often not in practice). States determine how much each district requires to meet the needs of its students—i.e., a "foundation" funding amount. Districts are then expected to contribute a reasonable amount of local revenue toward these costs, given their capacity to raise those funds (e.g., a wealthy suburban district will raise far more revenue than a low-income city district at the same tax rate). Finally, state aid makes up the difference between this local "fair share" contribution and the minimum "foundation" total funding level.

Unfortunately, insufficient state revenue, the use of empirically invalid methods for calculating "foundation" funding levels, and other factors are responsible for the failure of this approach to provide adequate and equitable funding in most states. But the general idea of distributing funds based on needs/costs *and* effort/capacity is a sound a pproach, particularly in the United States, where nested jurisdictions with varying costs and resources share responsibility for public school funding.

In contrast, the vast majority of federal education aid is allocated based solely on student need/costs—or, more accurately, proxies for need, such as Census poverty rates in the case of Title I aid. So long as states maintain a certain percentage of their total funding levels between years, they get the same amount of federal aid regardless of effort.



This report is accompanied by an **online data visualization tool**, with which you can "cost out" different federal aid proposals using our framework and view state-by-state results.

Try the tool: shankerinstitute.org/fedviz

As relates solely to student need, this is a fair approach to incorporating federal aid into the multilayered system of K-12 school finance in the United States. It is, however, also "effort neutral"— it fails to target crucial aid at states with smaller economies and high costs, which, despite their strong effort levels, cannot possibly meet their students' needs. Conversely, it effectively rewards states that fail to provide adequate funding for all students, despite having the capacity to do so. A federal aid system based on a foundation formula would account for both factors: student need and the capacity of states and districts to raise revenues.

THE PROPOSAL AND SIMULATION

We propose a framework for a new federal aid program that functions similarly to how state finance systems work (or, at least, how they are supposed to work)—that is, by distributing federal aid based on both costs/need as well as states' and districts' ability and willingness to pay their "fair shares" of the costs of bringing all districts up to a minimum adequate level. In this sense, our proposal integrates the federal government as the "top layer" in a national foundation formula, in which each level of government fills the gaps that the lower levels—state and local governments—cannot reasonably fill themselves, given their costs and capacities.

The simulation, which serves as a "proof of concept" for the framework, essentially builds out this national funding formula; the full details are laid out in the body of the report, but the process is summarized here. We begin by calculating adequate per-pupil funding levels for the vast majority of public school districts in the United States. This is accomplished using a national cost model that estimates the funding levels required to achieve the goal of national average math and reading scores, which we identify as a modest but reasonable common "benchmark" goal. Each district's initial "adequate funding gap" is the difference between its current funding levels and these required adequate levels.

Filling all districts' negative (inadequate) gaps—achieving universal adequate funding—is the primary end goal of our framework. Over half of all U.S. districts are funded below our estimated adequacy targets, and they are found throughout the nation. In many states, most students attend districts with below-adequate funding. But even in those (relatively few) states where most districts' resources are above our adequacy targets, there are still many that fall through the cracks, and these school districts tend to be those with the highest costs and least capacity to pay those costs via local revenue.

Our simulation calculates the cost of bringing all of these inadequately funded districts up to their target levels. However, *eligibility* for these additional "gap-closing" federal funds are contingent upon states and districts contributing a reasonable "fair share" if they don't already do so. We define this fair share contribution in terms of fiscal "effort"—i.e., total state and local K-12 revenue must constitute a minimum percentage of capacity (e.g., gross state product [GSP] or aggregate personal income [API]). This ensures that neither the federal government nor states with smaller economies (and/or very high costs) are required to bear a disproportionately large burden in meeting the needs of their student populations, particularly when localities aren't contributing enough themselves.

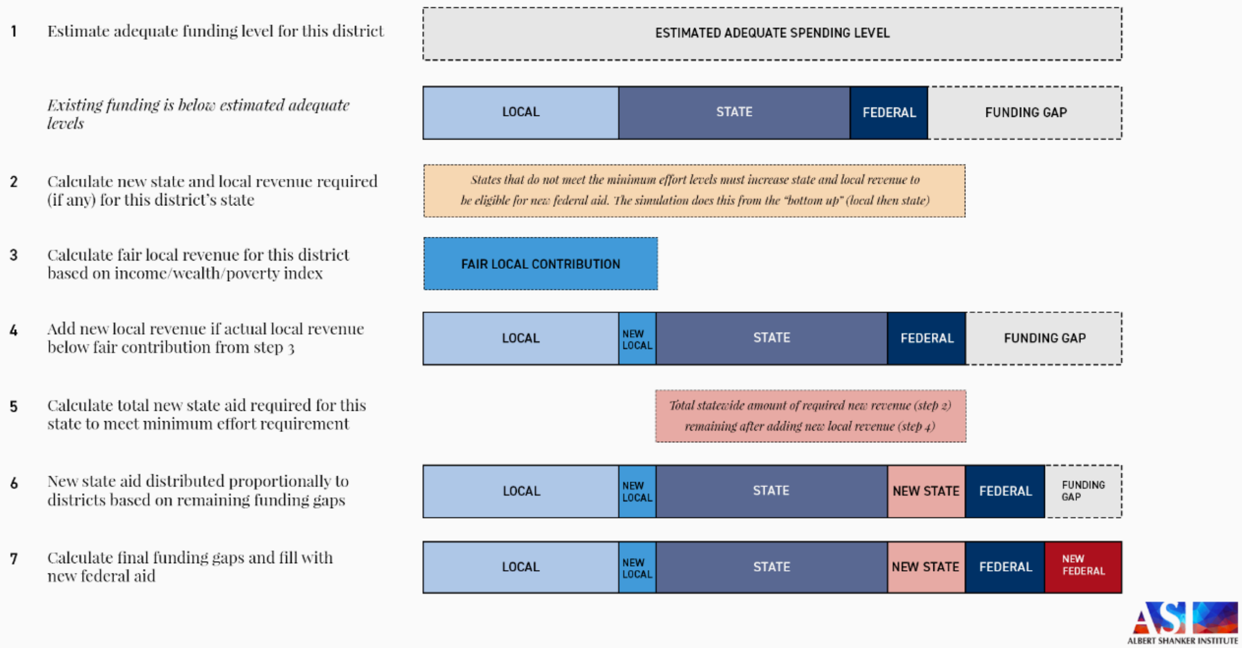
In our proposal and simulation, we set this minimum effort level at roughly the U.S. average. Districts in states that meet this requirement are eligible for additional federal aid. And, indeed, about 20 states are "pre-eligible." States, in contrast, that are below required effort levels must increase investment—at least gradually, demonstrating sufficient progress. For some states, this would require a moderate increase in revenue; for others, it would be larger.

We suggest that these latter states should have the flexibility to satisfy the overall requirement via some combination of increased state aid and/or increases in local revenue. In our simulation, however, this state/local split is determined from the "bottom up." That is, we calculate reasonable minimum local revenue levels for all U.S. school districts, and any districts in which actual local revenue is below these minimums must increase local revenue to meet the targets (many districts already meet the minimum, while others do not). The minimum revenue amounts are based on a national local capacity index that we construct using measures of property value, income, and income-to-poverty ratios.

The final step is to simulate the allocation of new local, state, and federal aid. This procedure entails several sub-steps, models, and tests, but put simply, a combination of new state aid and new local revenue brings states up to the minimum required "fair share" effort levels (if they are not at those levels already), distributing the new funding to districts proportionally to their negative adequate funding gaps. Any district in which this new revenue is insufficient to raise total funding up to adequate levels receives new federal aid to make up the difference. See Figure Exec1 for a simplified illustration of the procedure for a hypothetical district.

FIGURE EXEC1

Model of federal foundation aid formula



RESULTS OF THE SIMULATION

Our proposed supplemental federal aid program is essentially voluntary for states. Those below minimum effort levels must boost investment, at least gradually, in order to be eligible. That said, in this summary we report national results of our simulation under a scenario of full compliance (state-by-state results are presented in the report). These national results, whether in this summary or below, represent maximum possible estimates of costs—as well as benefits—in the districts we are able to include in our models and simulation (which serve approximately 95 percent of all public school students).

Key national findings of the simulation include:

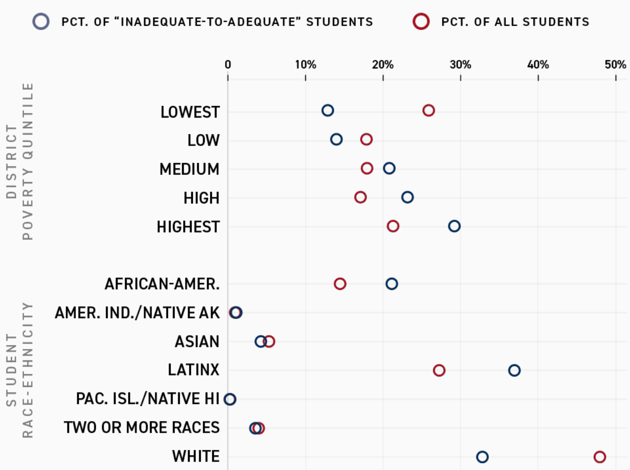
Universal adequacy would require roughly $52 billion in additional federal funding annually. Existing (pre-pandemic) federal aid, which constitutes around 10 percent of all K-12 revenue, would roughly double in our full compliance simulation. Yet this increase in federal funds would be accompanied by additional "fair share" state and local investment of approximately $80 billion, which is an aggregate increase of about 13 percent in total state and local revenue for fiscal year 2019. These increases vary widely by state, depending on current effort levels.

The additional federal funds would be targeted at districts in 34 states. These states (and districts) are those that cannot achieve adequate funding despite meeting minimum state and local effort levels. 18 states are "pre-eligible"—i.e., they would not have to increase state and local revenue to be eligible for new federal funds.

Full participation in this program would cause a decrease in the percentage of students in inadequately funded districts from about 55 percent to 0 percent. In other words, if all states increased state and local investment up to our target "fair share" levels, and roughly $52 billion in new federal aid filled the remaining adequacy gaps, around 26 million schoolchildren would no longer attend schools in inadequately funded districts. These "beneficiaries" and the districts in which they attend schools are a diverse group, as inadequate funding is a widespread problem. But a disproportionate share of our proposal's beneficiaries attend schools in higher-poverty districts, and almost 60 percent are African American and Latinx students, who make up just over 40 percent of all students in our simulation (see Figure Exec2).

FIGURE EXEC2

Percent of students in simulated "below-adequate to adequate" districts by district Census poverty quintile and student race and ethnicity



See Figure 10 for notes and sources.

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Full participation would also reduce the overall unequal opportunity gap—the average difference in adequate funding gaps between the highest- and lowest-poverty districts in each state—by over 60 percent. On average, the 20 percent of districts in each state with the lowest Census poverty rates are funded approximately $3,400 per pupil above estimated adequate levels. In contrast, the highest-poverty districts are funded roughly at an equal amount *below* adequate levels, for a total "unequal opportunity gap" of just over $6,700 per pupil. Our proposed framework, with all states meeting minimum effort levels and additional federal funds filling adequate funding holes, would reduce that gap to $2,638 per pupil, a decrease of about 61 percent. In addition, the program would reduce the national opportunity gap between African American and white students by 59 percent, while the Latinx/white gap would decline by 49 percent. In several states, such long-standing poverty- and race-/ethnicity-based funding gaps would be largely eliminated.

These improvements in opportunity gaps, like the distribution of "beneficiaries" by district poverty and student race and ethnicity, would stem from the targeting of new aid, especially federal and state aid, at districts funded below estimated adequate levels, which also tend to be those with higher poverty rates and larger shares of students of color. But, again, the benefits would be shared by a diverse group of districts and students, because inadequate funding is a widespread problem.

We emphasize that several of the important features of our proposal and simulation, such as minimum required "fair share" effort levels and the selection of the student outcome "benchmark" for adequate funding targets, are flexible. We have chosen parameters that we believe are reasonable and attainable, and we have made an effort to test and present separate results for different possibilities (e.g., different definitions of capacity in our effort measure). The actual design and implementation of our framework might require changes, and we believe it is flexible enough to meet these challenges. In addition, users can see results for different scenarios, including different minimum state and local effort levels, using the online data visualization tool accompanying this report.

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The framework we lay out in this report is, most basically, a proposal for a new federal aid program, though this approach could also be used to allocate existing federal aid. Its most important benefits, of course, would be the improvement in student outcomes from more adequate and equitable funding in participating states. By bringing effort and capacity into the federal aid equation, as is the case in virtually all states' systems, our framework ensures that the new federal funding goes where it is needed most.

Yet the framework is also designed with the longer-term goal of improving and "harmonizing" K-12 school finance at the state and local levels. While a handful of states' finance systems do a reasonably good job of providing adequate funding for all students, most do not. Insofar as roughly 90 percent of all K-12 revenue comes from state and local sources, any serious effort to improve this situation will require substantial additional investment from states and districts. The federal government cannot compel such investment directly, but it can play a crucial role in helping the students most in need, while also incentivizing new state and local investment by rewarding states that contribute a reasonable fair share of their resources to public schools.

INTRODUCTION

The goal of any public school finance system should be to distribute resources such that all students have equal opportunity to achieve common (and hopefully desirable) outcome goals. In a situation where all funding comes from a single source (e.g., a single level of government), implementation of this principle is conceptually straightforward—funding should be allocated according to the costs of achieving the common outcome goal(s), with jurisdictions serving larger shares of higher-need students receiving more.

In the United States, however, multiple nested levels of government—federal, state, and local—share in the responsibility for funding public schools, with each raising revenue from its own sources and distributing those funds to more disaggregate levels, from federal to state to district and, eventually, to schools and classrooms. Insofar as resources are finite, the fairest and most efficient approach in this multilayered system is for each disaggregate level to contribute a reasonable amount of revenue to achieving the common goal(s), based on its capacity to raise such revenue, with any gaps filled by the higher levels.

This is roughly how state and local education finance works—or, more accurately, how it is supposed to work. Yet the systems that largely determine how state and local revenue are raised and distributed vary widely between states, as do costs and revenue-raising capacity within and between those states.

The federal role is layered onto this rather tangled web by engaging the cost side of the equation and ignoring the capacity side. Most federal aid is distributed according to proxies for student needs (e.g., poverty rates) regardless of how much states and districts contribute themselves. On the one hand, this makes sense. It is perhaps the fairest—and certainly the least politically complicated—approach. It is not, on the other hand, necessarily the most equitable or efficient approach, and that's precisely because of the heterogeneity between states in their needs and capacities.

In this report, we describe and simulate a framework for a new approach to federal K-12 aid that rectifies this disconnect by integrating federal into state and local school finance with a national model of school funding. The guiding principle of this framework is to direct additional revenue where it is needed most, and the end goal is to raise funding in every U.S. public school district to levels adequate to achieve common student outcome goals. Our proposal, put simply, is for federal aid to be allocated based not only on student need (as is currently the case), but also on how much states and districts are able (and willing) to contribute themselves, given their capacity to raise revenue. In order to understand the conceptual basis for this proposal, it is useful to begin with a brief discussion of, first, how school finance systems should work and, second, how they actually do work.

HOW SCHOOL FINANCE SYSTEMS SHOULD WORK

On average, about 90 percent of school funding comes from a combination of local and state revenues. Local revenues, mostly from property taxes, are collected and distributed at the school district level, with states exerting substantial control over local revenue by defining the bounded geographic spaces of local districts, determining how taxable properties are valued and taxed, and deciding how those taxes are incorporated into the broader school finance system. State revenues, usually derived mostly from sales and income taxes, are "pooled" and distributed to districts via a statewide funding formula. The details of these formulas vary substantially from state to state, but they are designed, in theory, to accomplish two goals:

1. **Account for differences in the costs of achieving equal educational opportunity across schools, districts, and the children they serve.** *Cost* refers to the amount of money a school district needs to meet a certain educational goal, such as a particular average score on a standardized test. Costs vary because student populations vary (e.g., some districts serve larger shares of disadvantaged students than others)

and because the economic and social characteristics of school districts vary (e.g., some districts are located in labor markets with higher costs of living than others). School funding formulas attempt to account for these differences by driving additional funding to districts with higher costs.

2. **Account for differences in fiscal capacity, or the ability of local public school districts to pay for the cost of educating their students.** In many states, school districts rely heavily on local property taxes to raise revenues. This advantages wealthier communities: because their property values are higher, they can tax themselves at lower rates. School funding formulas attempt to account for this difference by driving more funding to districts with less capacity to raise local revenues and meet their students' needs.

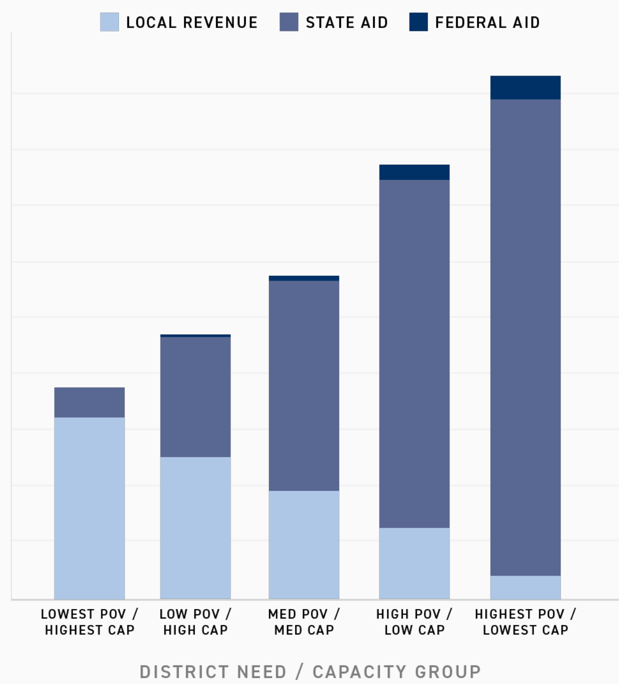
These two factors—local costs and local capacity—are strongly (but not perfectly) associated with each other. For instance, districts having less local taxable wealth are also far more likely to serve higher concentrations of students in poverty, and child poverty is a major factor determining the cost of providing children with equal opportunity to achieve common outcome goals (Duncombe and Yinger 2007). This creates a compounded issue of sorts, in which districts with the highest costs also tend to be those with the least capacity to raise revenue to pay those costs. In states that fail to account for these discrepancies with state aid, there are often massive gaps between resources and needs in high-poverty districts.

Such failures carry serious consequences for U.S. schoolchildren. Over the past decade or so, there has emerged a political consensus regarding schools, money, and state school finance systems. This consensus—that money does, indeed, matter—is supported by a growing body of high-quality empirical research regarding the importance of equitable and adequate financing for providing high-quality schooling to all children (Baker 2017, 2018; Candelaria and Shores 2019; Jackson 2020; Jackson, Johnson, and Persico 2016; Jackson, Wigger, and Xiong 2021; Lafortune, Rothstein, and Schanzenbach 2018).

In part for these reasons, many state courts have reaffirmed that their constitutions mandate statewide school funding systems that take these factors into account. That is, they require states to make up the gaps between districts' needs/costs and their ability to pay those costs with local revenue. An ideal state school finance system, therefore, would look something like the one depicted in Figure 1. In this graph, districts are sorted into five groups (the horizontal axis), with the highest-poverty, lowest-capacity districts represented by the rightmost bar and the most affluent, highest-capacity districts all the way to the left. In this particular graph, the total length of the bars for each district group represents the costs of achieving a common student outcome, such as a given average test score.

FIGURE 1

Hypothetical adequate and equitable state school finance system



There are two key takeaways from Figure 1. The first is that total costs (the length of the bars) are higher for the higher-poverty districts than for the lower-poverty districts. This, once again, is due to the former serving larger shares of high-need students, which, all else being equal, drives up the cost of achieving common student outcome goals (Duncombe and Yinger 1998, 2000, 2005; Imazeki and Reschovsky 2004; Reschovsky and Imazeki 2000). For instance, high-poverty districts often have to offer higher salaries to recruit and retain teachers (Hanushek, Kain, and Rivkin 2004; Lankford, Loeb, and Wyckoff 2002), while smaller classes have been shown to narrow outcome gaps between students from different backgrounds (Dynarski, Hyman, and Schanzenbach 2013; Konstantopoulos and Chung 2009).

Second, in this (hypothetical) state, as in virtually all states, the highest-poverty districts are able to raise much less local revenue per pupil (the light blue portions of the bars) than their more affluent counterparts. However, as is the case in the ideal system in Figure 1, but not in most states, the difference between this local revenue and total costs is made up by state revenue (the grayish blue portions of the bars). In short, while the total length of the bars and the amount of blue vs. orange area in each bar will vary between states, the key idea is that state aid ideally fills the gap between local capacity and costs, such that all districts have what they need given the students they serve.

A well-designed state school finance system, therefore, begins by setting a need-/cost-adjusted target level of funding for each local public school district to achieve the desired outcome. This is the minimum level of funding each district should have, and it is often referred to as a "foundation level."

In states' school funding formulas, the foundation level might, for example, be calculated through a series of steps, a simple example of which might be as follows:

1. Setting a basic per-pupil funding level, which is the *minimum* cost of achieving the desired outcomes for a single student—i.e., a student with no exceptional educational needs (e.g., no economic disadvantage, native English speaker, not a special education student, etc.);
2. Applying empirically based weights and other adjustments to address the different costs associated with achieving a common set of outcome goals across different settings and with different children (e.g., a student who is an English language learner might have their basic funding level increased by a given percentage); and
3. Summing the total of all weighted amounts, based on a district's student enrollment, to produce total district foundation funding.

The base amount, the weights, and other cost adjustments should be reasonably calculated toward the goal of providing equal educational opportunity for all students in all school districts. The ideal school funding system, in other words, sets its foundation levels so that all school districts have the resources they need to provide an adequate education.

Next, the state formula must determine the sources of revenue for each district. In the United States, school funding formulas rely on three primary revenue sources:

1. Local property taxes;
2. State aid, derived primarily from a mix of income and sales tax revenues; and
3. Federal aid derived from federal tax sources (such as income taxes).

One downside of this layered system is that finding the "right" way to combine these revenue sources to achieve equitable funding is complicated. Property tax revenues across local communities, for example, are vastly inequitable, with the lowest-poverty, lowest-need districts typically able to raise the most revenue. However, property taxes are also much less likely to be affected by economic swings and, therefore, are a less volatile revenue source than other taxes, such as state sales and income taxes. Property taxes can actually help to balance the public school revenue portfolio, providing stability in economic downturns (Chapman 2008; McNichol 2013; Tannenwald 2002).

In any case, in an ideal state school finance system, the goal is to determine the "local fair share" or "required local effort" to be paid by local communities toward the cost target. This contribution is usually determined with respect to the taxable property wealth of the communities and the income of taxpaying residents. For districts that do not meet their per-pupil cost targets with local revenue alone, state aid is allocated to make up the difference (most districts fall in this category, albeit by degrees that vary widely).

HOW SCHOOL FINANCE SYSTEMS ACTUALLY WORK

In reality, most state school finance systems fall far short of even a realistic approximation of the ideal system. Funding gaps (discrepancies between resources and costs/needs) persist throughout the system. Such gaps are most egregious between local public school districts within the same state—but they are also found between states and even between schools within the same district and taxing jurisdiction (Baker and Weber 2016; Baker and Welner 2010).

Illustrating this failure does not require a thorough state-by-state review of formulas; it is evident in their aggregate funding outcomes. Figure 2, for example, presents the situation in three states: California, Mississippi, and New Jersey. The left panel of the graphs for each state presents per-pupil revenue (by source) in 2018-19 (henceforth simply 2019), by district Census poverty quintile (the 20 percent lowest-poverty districts in each state, the districts in the 20th-40th percentile of poverty, and so on). These revenue data are from the National Center for Education Statistics (National Center for Education Statistics 2021a). The right panel of the graphs is current spending, again by district poverty, with a red marker indicating spending levels that would be required (i.e., adequate) to achieve national average test scores. These adequate spending estimates, which are from our School Finance Indicators Database (SFID) (Baker, Di Carlo, Weber, et al. 2021), are discussed in more detail below. Note that the reason we present two separate graphs for each state is that we cannot split up current spending by source, and total revenue includes funds that go toward "non-current" expenditures such as capital outlay and debt interest that are not "instructional" per se (we do adjust for this in our simulation below, however).

In all three states, local revenue per pupil is lower in the highest-poverty compared with the lowest-poverty district group. In California and New Jersey, as in most other states, there is at least some drop-off in local revenue (the light blue portion of the bars) as district poverty increases, particularly as we move from the medium- to the high- and highest-poverty quintiles. In other words, local revenue is generally "regressive"—higher-poverty districts receive less than lower-poverty districts—and this is a direct result of the former's lower capacity to raise local revenue (e.g., lower property values).[1] Conversely, state revenue (the bluish gray bars) is generally "progressive" (higher-poverty districts receive more), though this relationship is far more pronounced in New Jersey and California than in Mississippi. In all cases, however, even with the progressive but modest contribution of federal aid (the dark blue bars), total revenue and thus current spending is generally flat (non-progressive) in all three states, as is the case nationally, even when revenue is adjusted for cost-influencing factors such as poverty and regional wage variation (Baker, Di Carlo, Reist, et al. 2021). Although state aid does make up at least some proportion of the gap in local revenue between districts with different local capacities, it does not do so in a manner that accounts for the often vast differences in educational costs between these districts.

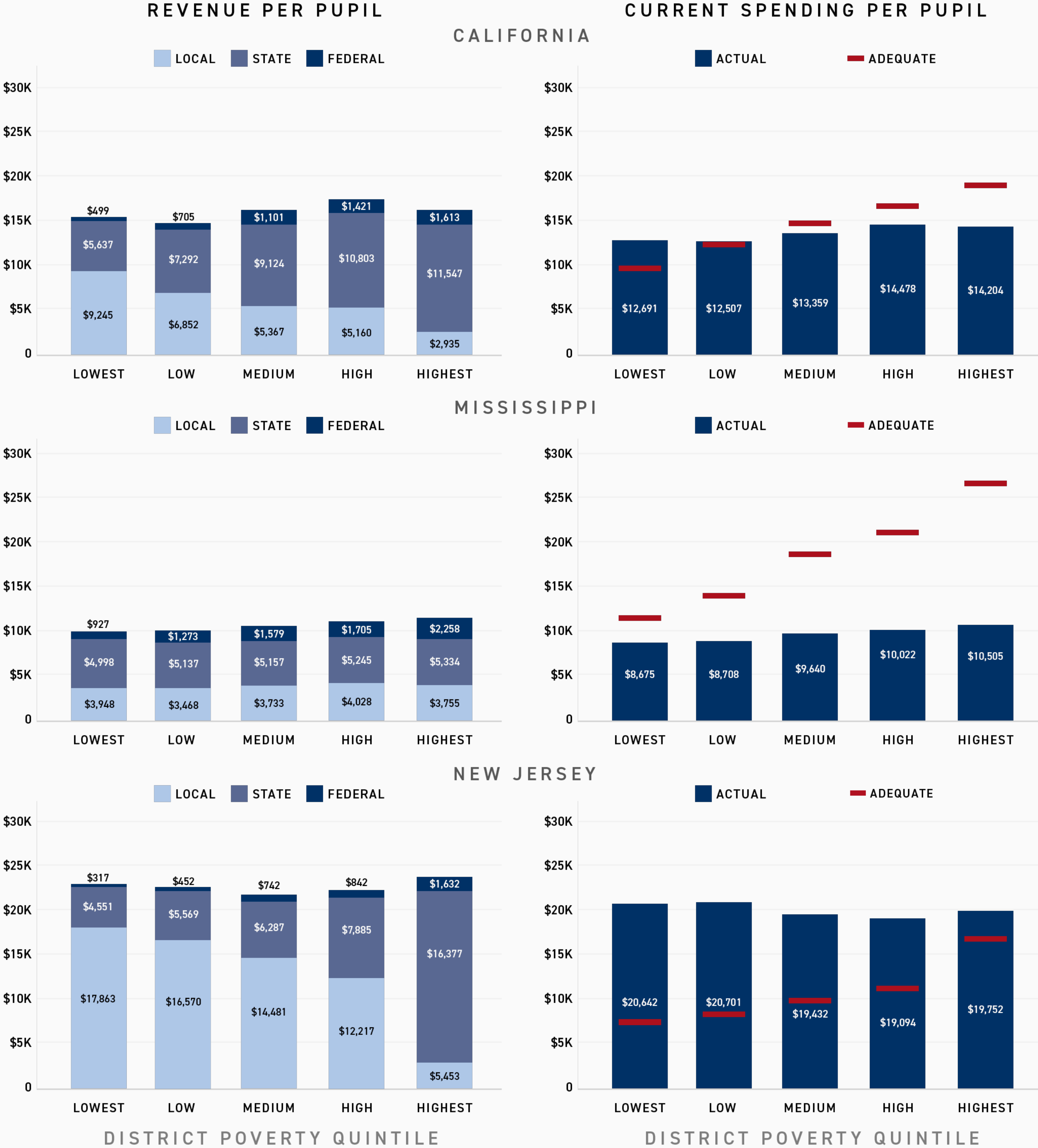
The consequences of this flat funding are evident in the right panels for each state. In Mississippi, for example, spending is below our estimated adequate levels across all district poverty quintiles, and for the higher-poverty groups, spending is half or less of the targets. In California, which is more similar than Mississippi and New Jersey to most other states, spending is far below adequate in the high- and highest-poverty quintiles, moderately inadequate in the medium-poverty districts, and adequate in the lower-poverty groups. Even in New Jersey, which is one of very few states in which funding, on average, exceeds our modest adequacy targets in all five quintiles, it is far less adequate in the higher-poverty compared with the lower-poverty groups (this is unequal opportunity).

Note that Mississippi, unlike California and especially New Jersey, comes nowhere near raising enough to meet its substantial costs (it is a very high-poverty state). This issue is discussed below, but for now the point is: In all three states, revenue and spending are clearly not calibrated to the cost of providing equal opportunity, as they are in the hypothetical ideal system depicted in Figure 1.

1 In the SFID, revenue progressivity (or lack thereof) is measured by comparing state and local revenue between the highest- and lowest-poverty quintiles in each state after adjusting revenue for regional wage variation, population density, and district size (Baker, Di Carlo, Weber, et al. 2021). Such adjustments are important because factors such as labor costs and economies of scale affect the purchasing power of the education dollar. In this report, we discuss revenue progressivity/regressivity using unadjusted revenue estimates, but we would recommend adjusted estimates when evaluating the performance of state school finance systems.

FIGURE 2

Revenue by source, current spending, and estimated adequate spending per pupil by district Census poverty quintile, selected states, 2019



Existing federal revenue amounts (left panel) are prepandemic aid. Adequate spending figures (right panels) are estimated levels required to achieve national average test scores.

SOURCE: NATIONAL CENTER FOR EDUCATION STATISTICS; SCHOOL FINANCE INDICATORS DATABASE

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In Figure 3, we present the comparison of actual and adequate spending by district poverty for all states. In order to make the figure more readable, we'll limit the comparisons to the lowest-poverty, medium-poverty, and highest-poverty districts. And we express the comparison of actual and required/adequate funding as a percentage.

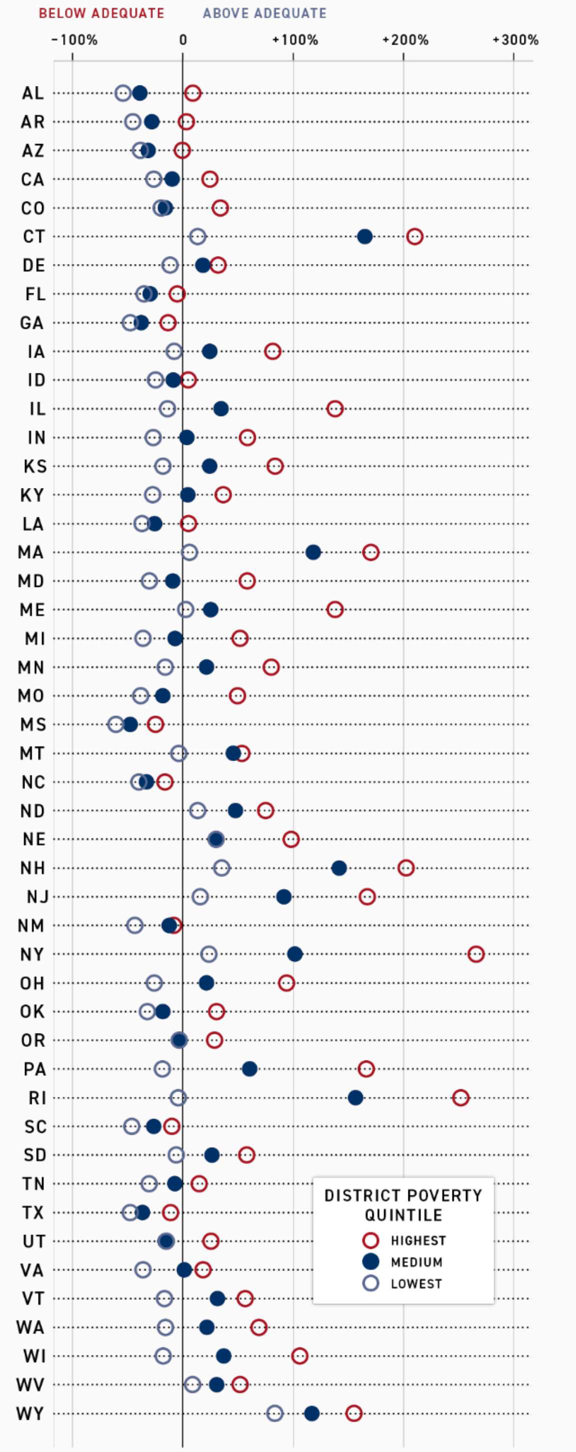
Figure 3 shows that, as mentioned above, New Jersey is the exception: It is among only 11 states in which average spending is above adequate levels in the highest-poverty district quintile. In the typical state, spending is below estimated adequacy targets in its highest-poverty districts, approximately adequate in its medium-poverty districts, and above adequate in the most affluent quintile.

Still, there is quite a bit of variation between states in Figure 3. Some states, such as Connecticut, New Jersey, and Wyoming, provide rather robust funding overall, however, it is still poorly calibrated with costs, resulting in massive opportunity gaps between higher- and lower-poverty districts. Yet, in the vast majority of states, districts serving the students most in need are funded well below estimated adequate levels, even by the rather modest standard of national average test scores (and, even where aggregate funding is above our adequacy targets, there are districts that slip through the cracks). The outcomes of the typical state school finance system in the United States bear little resemblance to those of the ideal system.

There are two primary reasons for this failure. The first and often the most basic problem is that most states do not set their district funding targets—their "foundation" funding amounts—based on any empirically defensible system. Sometimes, the adequacy targets are products of poorly designed costing studies, and more often base spending levels and cost adjustments for student needs and costs aren't derived from any cost analyses at all. Other states rely on consultants who use "evidence-based" methods in which the "evidence" is better described as personal opinion, and which are subject to political pressures to understate additional costs associated with student needs. In any case, the failure to set proper foundation levels can essentially serve to justify inequitable funding and relieve pressure to increase revenue or reform how it is distributed.

FIGURE 3

Funding adequacy by district Census poverty quintile and state, 2019



NOTE: Figures are percent differences between actual spending and spending levels required to achieve national average test scores. Plot does not include states (AK, DC, HI, NV) excluded from the analysis reported below.

SOURCE: SCHOOL FINANCE INDICATORS DATABASE

Moreover, such failures persist despite decades of high-quality empirical research on education costs (Baker 2006; Duncombe and Yinger 2007; Golebiewski 2011). Researchers and/or policy analysts tend to use either of two general approaches to identifying spending levels that should generally be sufficient for achieving desired outcomes and identifying how education costs vary across districts within a state. The first approach involves gathering focus groups of informed constituents to specify the inputs to schooling they believe are needed to *get the job done.* These "professional judgment" panels are essentially proposing an hypothesis of the programs and services needed under varied conditions and for varied student populations to achieve desired outcomes.

The alternative is to construct statistical models that estimate the relationship between current district spending levels and current student outcomes, with consideration of both the various factors that affect the cost of achieving desired outcomes (student characteristics, district characteristics, labor market pressures) and factors that influence whether districts are more or less likely to spend inefficiently. This approach, called "education cost function modeling," has been used extensively in peer-reviewed studies of education costs and cost variation (Downes 2004; Duncombe and Yinger 1997, 1998, 1999, 2000, 2005, 2007; Imazeki and Reschovsky 2004). For years, it was limited by the quality and accessibility of finance data, even within states. Since that time, however, data quality and access have improved significantly.

The second primary reason why state finance systems work less well in practice than in theory is, put simply, the failure of some states to raise enough to support their schools. Sometimes this failure is due to limited capacity; in other cases, it is essentially a policy choice. At any given level of taxation and governance, the amount spent on public goods and services is typically a function of: a) the income or ability to spend on those goods and services; b) the additional increases in taxes needed to raise the revenue desired for supporting those goods and services (the "tax price" of an additional $1 of revenue); c) voters'/taxpayers' "tastes" for the services or goods in question; and d) whether and how much of the cost of providing those goods or services will be paid for by intergovernmental (IG) transfers from some higher level of government (through some aid formula or grants) (Corcoran and Evans 2010; Holcombe 1980). That is:

$$spending = f(income, tax\ price, tastes, IG\ transfers)$$

To the extent that states leave it to local communities to raise what they will for local public schools, differences in income, tax price, and tastes across local districts will lead to differences in spending, quality, and outcomes. And to the extent the federal government provides a limited share (roughly 10 percent) of all K-12 aid to states and schools, differences in income, tax prices, and tastes between states will continue to drive interstate inequality.

EFFORT AND CAPACITY

The failure of many states (and districts) to raise enough revenue to fund their schools adequately is often, but not always, a policy choice. States vary quite drastically in how much of their economic capacity—put simply, the size of their economies—goes toward public schools (in the form of state and local revenue). We refer to this type of measure, which gauges K-12 funding as a proportion of capacity, as "fiscal effort" or simply "effort."

Effort (and capacity) is an important piece of the school funding puzzle because some states' economies are so small relative to their students' needs that they are essentially unable to raise enough revenue to fund their schools adequately, whereas other states simply refuse to provide sufficient resources despite having the option to do so. Effort allows us to differentiate the former states from the latter. This is useful for evaluating states' systems, of course, but, as discussed below, effort is also a key component of our proposal for federal aid.

As we define it, effort is calculated by dividing an aggregate measure of state and local funding, typically revenue or spending, by a capacity indicator. The measure of "capacity"—the denominator—should be exogenous and not subject to political influence. It is common to hear state policymakers describe education spending as a large share of the state budget—likely the largest share of any state's budget when compared to all other public services. But the budget itself is a reflection of the choice to levy sufficient taxes or not to support public services. A large share of an inadequate overall budget will be inadequate. The appropriate denominator for measuring effort is one that reflects the wealth and income that could be taxed, not merely that which *was* taxed.

Two measures are typically used as the denominator of effort measures for making interstate comparisons[2]:

- **Gross state product:** GSP measures the monetary value of final goods and services—that is, those that are bought by the final user—produced in a state in a given period of time (say a quarter or a year).
- **Aggregate personal income:** API is the sum of personal income for a state's resident population.

In this report, data for both capacity measures are from the Bureau of Economic Analysis (Bureau of Economic Analysis 2022). Not surprisingly, states with higher API also tend to have higher GSP. But there are some deviations caused by differences in the balance of states' economies. Delaware and New York, for example, have a strong presence in the financial services industries, which causes GSP to be higher in these states than one would expect judging by their APIs. Similarly, North Dakota has elevated economic output from natural resources (natural gas and oil), which is not reflected in its residents' incomes. Either capacity measure is a defensible choice, but given these possible discrepancies, we will present results using both versions, though our discussion of the results will focus mostly on the GSP-based effort indicator.

The numerator of the effort measure in this report is combined state and local revenues for elementary and secondary education (National Center for Education Statistics 2021c).[3] The size of a given state school finance system is the sum of the state *and* local components of that system, because nearly every aspect of the local tax system and the revenues generated by that system are defined by and controlled under state laws. States define the local taxing jurisdictions, taxable properties within them, methods for assessing the taxable values of those properties, and procedures for levying and collecting taxes on them. States also define how those local revenues are combined with state aid to generate the majority of public school revenue, in some cases mandating specific minimum contributions or even required local property tax rates for schools—essentially a statewide property tax, which in some cases is reported as such (as state revenue) and other cases not. In general, then, the combination of state and local revenues is the best reflection of "effort" levied by states toward financing their public school systems.

As such:

$$Effort = \frac{Total\ state\ and\ local\ revenue\ to\ schools}{State\ fiscal\ capacity\ (total\ GSP\ or\ API)}$$

In Figure 4, we present a scatterplot of GSP-based effort by GSP per capita; we express the latter in per capita terms so that it is more comparable between states. The plot shows, first, that there is no relationship between effort and capacity—i.e., the state markers in the plot exhibit no consistent pattern (the correlation coefficient is -0.06).

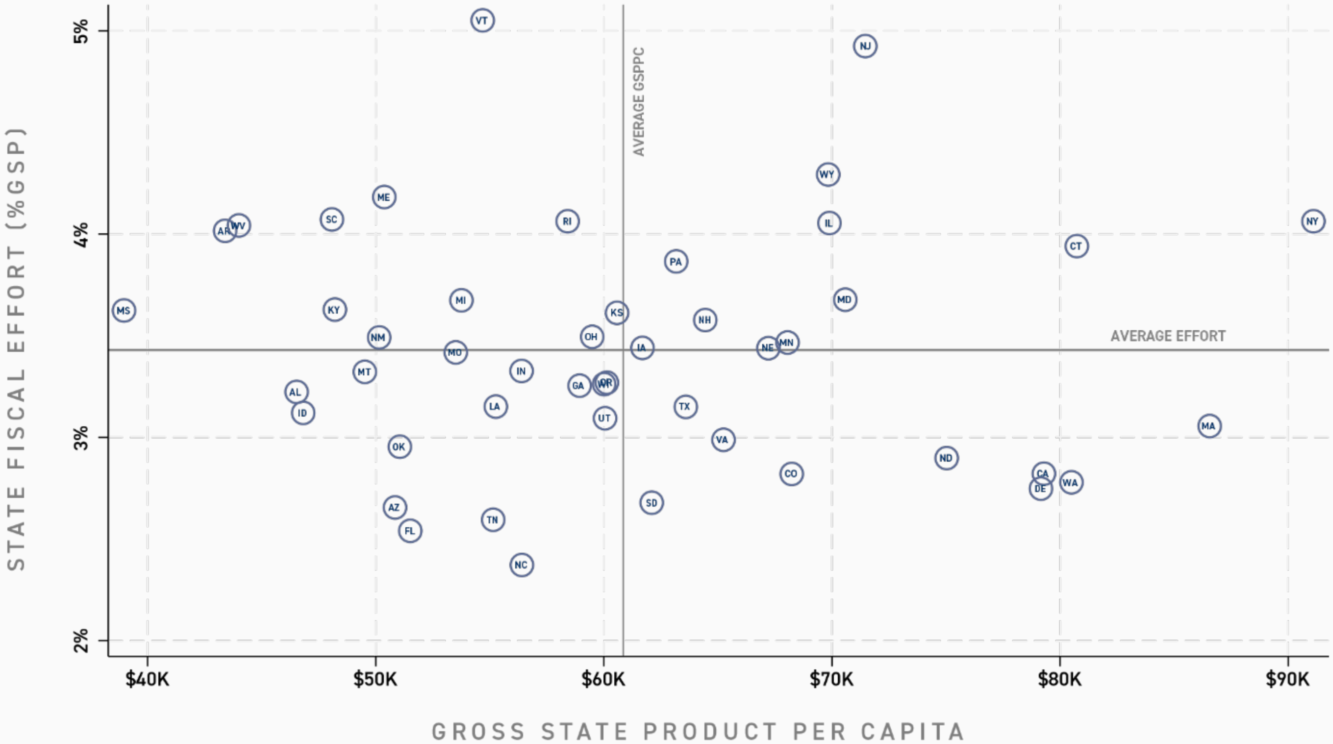
New York and New Jersey, for instance, are high-capacity states that also put forth above-average effort (the upper-right area of Figure 4), generating copious K-12 resources statewide. But there are also a number of states, such as Delaware, Massachusetts, and California, that are high capacity and put forth relatively low effort (the lower-right area of the plot). In contrast, several states, such as Arkansas, Kentucky, Maine, Mississippi, South Carolina, and West Virginia, exhibit rather strong (or at least above average) effort, but their relatively limited capacity means that students in those states will be under-resourced vis-à-vis states that put forth similar effort but have greater capacity.

2 These types of measures also play a prominent role in cost-sharing formulas—i.e., for determining fair share contributions from jurisdictions with vast differences in capacity. For example, to determine each nation's fair share contribution, NATO uses a cost-sharing formula based on gross national income (North Atlantic Treaty Organization 2022).

3 In the SFID, our effort indicator numerator is from the Census Bureau's Annual Survey of School System Finances (U.S. Census Bureau 2019a), and it is "total state and local expenditures, direct to K-12 education." This numerator is almost perfectly correlated with what we use here, but the two vary modestly in either direction (the mean absolute deviation is about 6 percent). We choose this version because the direct state and local revenue measure is more appropriate for our simulation, which is based on revenue.

FIGURE 4

Fiscal effort by gross state product per capita, 2019



NOTE: Average effort and GSP per capita are weighted. Plot does not include states (AK, DC, HI, NV) excluded from the analysis reported below.

SOURCE: BUREAU OF ECONOMIC ANALYSIS; SCHOOL FINANCE INDICATORS DATABASE; U.S. CENSUS BUREAU

But the effort/capacity relationship also helps to explain some of the adequacy results presented in Figures 2 and 3. For instance, we saw in Figure 2 that Mississippi's funding is well below estimated adequate levels across all poverty quintiles. This, to reiterate, is partially because it is a very high-poverty state, which increases costs. But another critical factor is that Mississippi, despite devoting a comparatively large (or at least above average) percentage of its capacity to K-12 education, has such a small economy that even its strong effort level yields far less revenue than it would in a state with a large or even medium-sized economy. In contrast, California's profile from Figure 2 also shows inadequate funding across most districts (all but the lower-poverty district groups), but, unlike Mississippi, California has a very large economy. The state fails to provide adequate funding for most districts due not to limited capacity, but rather to a failure to devote enough of that capacity to schools—i.e., low effort. Finally, New Jersey's abundant (albeit non-progressively-distributed) funding comes from a combination of high effort and high capacity.

3 In the SFID, our effort indicator numerator is from the Census Bureau's Annual Survey of School System Finances (U.S. Census Bureau 2019a), and it is "total state and local expenditures, direct to K-12 education." This numerator is almost perfectly correlated with what we use here, but the two vary modestly in either direction (the mean absolute deviation is about 6 percent). We choose this version because the direct state and local revenue measure is more appropriate for our simulation, which is based on revenue.

It also bears noting that effort has declined in most states over the past 10–15 years, particularly since the 2007–09 recession. Average effort decreased sharply between 2009 and 2013, with at least a nominal net decrease during this time in virtually every state. This is a massive drop in U.S. average effort over a relatively short period of time, costing schools billions of dollars in education resources (Baker, Di Carlo, Reist, et al. 2021).

Of course, economic downturns tend to create decreases, and the severity of the 2007–09 recession meant that this pattern was also going to be unusually pronounced. What's truly disturbing—and unusual—is the fact that effort never recovered. Between 2013 and 2019, effort in the typical state remained mostly flat. As a result, the U.S. average effort level was lower in 2018 and 2019 than at any point in recent history.

In general, then, states with large economies have larger "pies" from which education might be funded (via taxation). These states can therefore put forth less effort than their counterparts with smaller economies and still spend the same amount on their schools. On the other hand, states that serve higher-poverty student populations will have to spend more overall to achieve the same outcomes, which means, for example, that two states with equal capacities might have to put forth different effort levels if one has higher costs. In other words, while higher effort levels are generally preferable, and higher effort is associated with more adequate funding, one should evaluate state effort with an eye on capacity *and* costs.

Effort is often used to evaluate states' finance systems, but we suggest that it has a potentially useful *direct* role to play in K-12 finance policy, particularly federal aid programs.

RETHINKING THE FEDERAL ROLE IN K-12 EDUCATION FINANCE

Even though the vast majority of K-12 revenue comes from state and local sources, federal aid plays an important and productive role in supplementing that funding, progressively providing more revenue to districts with greater need (e.g., Title I is distributed based on poverty).

Yet state fiscal effort (state and local funding as a proportion of capacity), which we have been discussing, plays no direct role in federal finance policy, in part because federal aid is "effort neutral" (eligibility is only contingent upon states maintaining funding levels between years, a provision that is called "maintenance of effort" but defines effort differently than we do). That is, so long as they maintain their funding levels year to year, states and districts receive the same amount of federal aid regardless of what they contribute themselves and, on a related note, no matter how adequately or inadequately their current funding levels might be (and even the "maintenance of effort" requirement has not been enforced consistently).

Were state and local school funding in the United States widely adequate and equitable, this would be a reasonably efficient approach to any new (or existing) federal aid program. Insofar as most states' systems fail even to roughly approximate the ideal, however, we suggest that the current approach to federal aid requires reexamination.

Federal aid essentially operates independently of states' "foundation style" systems, and it thus maintains a somewhat delicate position in the K-12 finance incentive structure, one that must be considered in any attempts to rethink and expand the federal role in public education. Presumably, if federal aid were simply increased and provided to states and school districts in underfunded states without strings attached, many states and local districts would in turn reduce their own effort further. This is why states, in their aid formulas, impose minimum local effort requirements (though some of these are "soft" rather than "hard" requirements—used only for calculating state aid but not actually mandated). States enforce these requirements because they do not want to reward school districts that choose not to raise sufficient revenues for their schools if they have the capacity to do so.

In the same way, the federal government should not reward states for putting forth low effort. And, conversely, when effort is insufficient, federal aid policy might potentially incentivize higher effort. It stands to reason, therefore, that any attempt to design a new approach to federal aid allocation—one focused on sustained, meaningful improvement in funding adequacy and equity—should include minimum state and local effort requirements as a condition of receiving aid.

Fortunately, we already have a model for such an approach: state finance systems. Recall that, in the ideal funding system described above and depicted in Figure 1, state aid compensates for the difference between adequate funding levels (costs) and local revenue, with the latter set at a minimum reasonable contribution defined as a share of capacity (e.g., total taxable wealth). This is essentially the required "local effort," and it is a crucial component of most states' systems, as it determines how much state aid is required (enough to fill all gaps) and where it goes. In other words, state aid is targeted directly at districts in which local capacity is insufficient to meet students' needs, in an amount sufficient to meet said needs. We propose that this same approach should guide federal aid allocation. We now turn to laying out such a framework.

PROPOSAL AND SIMULATION PARAMETERS

In much the same way as state finance formulas (in theory) are designed to ensure that every district's funding meets or exceeds its "foundation" level, the end goal of the federal program we propose—and the framework upon which it is based—is to bring all K-12 districts' funding up to adequate levels (i.e., universal adequacy). Our proposal is for a supplemental aid program, but the framework could also be used to distribute existing federal aid. In our proposal, we achieve universal adequacy *without any reduction in revenue in any district*, or any shifting of current funding between districts.

Participation in this supplemental aid program is voluntary, and eligibility for new federal aid is determined state by state—i.e., all districts in states that meet requirements are eligible for new aid, whereas in non-participating states no districts are eligible. As we'll see, however, many states are already eligible at their current investment levels (at points, we'll refer to these states as "pre-eligible" states). Note that statewide eligibility does not imply district-level eligibility; the actual amounts of new federal aid are determined separately.

In the simplest terms, our framework can be summarized as follows:

1. States must put up a "fair share" of their capacities toward K-12 schools in order to be eligible (i.e., they must meet minimum state and local effort requirements); and
2. New federal aid then fills all the gaps between state and local "fair share" funding levels and adequate funding levels in all districts.

We define fair share contributions, and thus statewide eligibility, in terms of combined state *and* local effort because, as mentioned above, the two are inextricably linked under state school finance policies. States, in effect, create and govern local taxes.

Eligibility requires that states meet a fixed minimum required state and local fiscal effort level (or demonstrate sufficient progress toward meeting it). As discussed above, effort in a given state is simply total state and local revenue divided by capacity, with the latter defined as either GSP or API. These two versions of our effort indicator are highly correlated (the correlation coefficient is typically around 0.85 in any given year), but they do affect the results in some states. We therefore simulate our federal aid program separately using both versions. And, as mentioned above, we measure funding—the numerator—as total state and local revenue in each state; these estimates are from the NCES (National Center for Education Statistics 2021c).

Our simulation defines the state and local "fair share" contribution at roughly (slightly above) the U.S. averages of the GSP- and API-based effort levels: 3.5 percent and 4.0 percent, respectively. That is, total state and local revenue must meet or exceed 3.5 percent of GSP (or, in the API-based version, 4.0 percent of API). Actual implementation of our proposal could hypothetically raise or lower this bar, which would shift the "gap-filling" burden of state/local versus federal. We choose these minimum required effort levels for use in our proposal and simulation because they are reasonable and attainable goals (the online data visualization accompanying this report allows users to choose different minimum effort levels).

We are, however, agnostic on how states that do not meet these minimum requirements go about raising that additional revenue—i.e., whether it comes in the form of additional state revenue, local revenue, or some combination of both. We do, however, explicitly simulate a local and state share of the increase based on states' current local contributions and other factors, which plays a direct role in our calculation of new federal aid.

We now turn to laying out our proposed federal aid program, as well as our simulation of that program, step by step. A quick summary of these four steps, albeit one that omits numerous sub-steps laid out in detail below, is as follows (all steps entail mostly district-level calculations):

1. **Calculate adequate funding levels:** These cost targets, which are presented above aggregated to the state level, will be the final factor determining how much new state and federal aid each district receives.
2. **Calculate "fair" local revenue amounts:** These fair local contributions, which are based on a new local capacity index that we construct, also help determine how much districts receive in new state and federal aid, as the latter two revenue sources are essentially added on top of this local contribution.
3. **Calculate required additional state and local investment:** In states where state and local effort is below our minimum "fair share" levels (3.5 percent of GSP and 4.0 percent of API), this is the amount they'll have to raise in order to be eligible for new federal aid.
4. **Construct a district funding formula and simulate the program:** This is the largest step, and it entails a number of sub-steps by which additional (simulated) local, state, and federal revenue is allocated to each district.

We now will describe each step and its constituent calculations in detail.

STEP 1: CALCULATE STUDENT OUTCOME-BASED ADEQUATE FUNDING TARGETS (DISTRICT LEVEL)

Again, the goal of the program we propose is to provide all students with the opportunity to achieve common outcome goals—i.e., the goal is universal adequacy. Accordingly, our first step is to calculate target (or adequate) funding levels for every district in accordance with those outcome goals. Until recently, such a model was not feasible at a national scale, due to a lack of data on both labor costs and student outcomes that were comparable between states. Fortunately, advances in collection and analysis now provide the data necessary for our model.

In estimating adequate spending levels, we must consider that while all school districts may strive toward the same outcomes, each one serves a unique student population and does so under a unique set of conditions—from large urban centers to remote rural spaces, or from schools serving large shares of low-income and minority students to schools in affluent, sprawling suburbs. These varying conditions and student populations create vastly different costs for districts, even those working to achieve common outcome goals.

To estimate these widely varying costs for each school district, we use 2019 estimates from the National Education Cost Model (NECM). These data are from the District Cost Database published annually as part of the School Finance Indicators Database (Baker et al. 2022). We describe the NECM in general terms below; for more details, see Baker, Weber, and Srikanth (2021).[4]

In our context here, the term *cost* is the amount of funding necessary for a school district to meet a stated educational outcome. The NECM estimates this cost using a national database of school district finance data in combination with data on student and district characteristics. These data are matched with outcome data: specifically, test scores in reading and math for students in grades 3 to 8 that have been statistically transformed to make them comparable across all states (Reardon et al. 2021). The model determines how student population characteristics (percentage in poverty, percentage of English language learners, percentage of students with disabilities, etc.) and district character-

4 In addition to the SFID's district-level dataset of finance, student characteristics, and other variables, the NECM relies heavily on three additional data sources. The first is the Comparable Wage Index for Teachers (Cornman et al. 2019), an index of regional wage and salary variation developed by Dr. Lori Taylor of Texas A&M in collaboration with researchers at the National Center for Education Statistics (Taylor 2014; Taylor, Fowler, and Schneider 2006). The second is the EDGE School Neighborhood Poverty Estimates, also published by the NCES, which is specifically designed to measure poverty surrounding schools and districts (Geverdt 2018). The third and perhaps most important NECM data source is the Stanford Education Data Archive, a groundbreaking database of nationally normed test scores going back to 2009 (Reardon et al. 2021). The SEDA allows for a better comparison of individual district's test results across all states, a crucial tool for producing cost model estimates that are comparable across the United States.

istics (relative wage costs, enrollment size, grade-level enrollments, etc.) affect student outcomes, and how much funding is needed to reach a specified goal given these variations.

The common student outcome goal we have chosen is relatively modest: national average outcomes in reading and math. Because this goal is based on an average, many students, by definition, will not achieve it. This outcome standard could, of course, be raised or lowered; however, changes in the outcome would necessarily change the amount of spending necessary to achieve that outcome. We choose here to stick with the national average as it is a goal that is meaningful and reasonably attainable for all or most districts.

A problem with cost modeling in education finance is that outcomes and spending have a circular, or *endogenous,* relationship. Greater spending leads to better educational outcomes; however, better outcomes can lead to greater spending, as higher test scores can manifest in higher property values, increasing a community's tax capacity and, therefore, its ability to spend on its schools (Figlio and Lucas 2004; Nguyen-Hoang and Yinger 2011). The NECM draws on previous work in education cost modeling to address this problem through econometric methods. The result is a model that plausibly describes a *causal* relationship between spending and outcomes, which is the goal of our simulation.

The NECM spending targets we use, of course, are estimates; there is no guarantee that a district spending at its target will reach the stated goal (national average test scores in math and reading for grades 3 through 8). Districts certainly will have characteristics that are not captured by our model that affect spending, requiring them to spend more or less than the target to meet the outcome goals. Some districts may also choose to spend revenues on beneficial educational programs that will not affect test scores (sports, the arts, counseling services, etc.), whereas others may, in fact, engage in practices that make them more fiscally efficient or inefficient than others.

Despite these caveats, the spending targets we use herein are reasonable estimates, based on actual data, of the cost of achieving a basic level of equal educational opportunity across all school districts. As such, they are useful—indeed essential—for our current goal: defining an increased federal role to level up those states and local communities that lack the capacity to fully close their own funding gaps.

STEP 2: DETERMINE "FAIR SHARE" LOCAL REVENUE AMOUNTS (DISTRICT LEVEL)

Our next step is to begin calculating state and local "fair share" contributions toward meeting those targets. Recall that we propose that states, in order to be eligible for our new federal aid program, must put forth sufficient effort (i.e., enough state and local funding as a share of their capacities). As we'll see, many of them already do so, whereas others would have to increase their effort levels to receive the new funds. Determining how much additional funding would be raised in the latter states is obviously necessary for our simulation, as the gap between funding after this new revenue is raised and our adequate cost targets will determine the amount and distribution of new federal aid.

It bears mentioning that we could, in theory, simply proceed to calculating the amount of additional funding that we would see in states that boosted their effort to our "fair share" minimum levels (3.5 percent of GSP or 4.0 percent API). Since we are technically agnostic on how states achieve this goal—i.e., what combination of state versus local funding—we could simply assume that they all did so, without paying any attention to the state/local composition of those increases.

We instead go about the complex process of estimating local "fair share" contributions for two main reasons. The first and most important reason is practical: These contributions play a role, discussed below, in the simulation, even in pre-eligible states. Districts are the most disaggregate major level in the finance structure, and so fair local contributions are in many respects the foundation upon which any state—or national—finance formula are built. Their impact often "trickles up." For example, where local contributions are widely insufficient relative to capacity, this places a greater burden on states to fill gaps, which in turn can (at least in our proposal) also strain federal contributions. Any proposal for the type of program we are suggesting, as well as any realistic simulation of that program, should address the issue of the state/local split.

Second, the calibration or balance of state and local revenue is important and may provide policy-relevant results. For one thing, revenue from different sources have different properties that often lead to conflicting conclusions—e.g., local property tax revenue, unlike state revenue, is regressive, but local revenue is also more stable and can serve as a vital shield during economic downturns (Chapman 2008; McNichol 2013; Tannenwald 2002). More immediately, though, states vary in the degree to which they rely on state versus local revenue, and any state plan to increase total state and local effort could potentially benefit from some guidance as to how the state might balance its "revenue portfolios." If, for example, a given state tends to draw less local revenue than would be expected given its local capacity, this might be a factor in how it approaches boosting investment. Accordingly, as part of our simulation, we calculate reasonable "fair share" local contributions for all U.S. districts in our sample, and use those contributions to present, for each state, how much of their additional effort funding might come from local versus state sources.

Calculating fair local contributions, of course, entails operationalizing what constitutes a fair local contribution. States vary quite a bit in terms of the policies that determine local revenue collection. Many state school finance systems, such as those of Kansas and Texas, simply impose fixed property tax rates to calculate required local contributions. We do not have a single consistent source of local taxable property wealth across all school districts; as such, applying a simple fixed property tax rate is not feasible. This approach also fails to account for differences in income that might affect the ability of communities to impose common tax rates.

We therefore rely on an approach used in states such as New York (NYSED 2014), Tennessee (TACIR 2005), and Pennsylvania (PADOE 2018), which use combined indices of income and property wealth for local communities to determine their ability to raise property tax revenues for schools. This approach requires that we accomplish two goals: 1) construct a measure of local capacity to raise revenue that is comparable across all states; and 2) estimate a model that determines "fair share" local effort (i.e., expected local revenue given districts' capacity). While not all states presently account for variations in both property values and income, a uniformly fair national system should include an index built on common measures of local capacity across states.

STEP 2A: CONSTRUCT AN INCOME/WEALTH/POVERTY (IWP) INDEX (DISTRICT LEVEL)

We construct a combined local capacity index that incorporates the following district measures from the NCES/Census Education Demographic, Geographic, and Economic Statistics (EDGE) Program pooled across 2016-19 (National Center for Education Statistics 2021b):

1. Income;
2. Housing values; and
3. Income-to-poverty ratios.

We center each of these variables at their means within each state and year, weighted for population. We then calculate the average of the three mean-centered measures for every district. Finally, we recenter each combined index value on the state mean (without population weighting). We refer to our final index as the Income-Wealth-Poverty index, or IWP index:

$$IWP = \frac{\begin{gathered}\textit{weighted average of}\\ \left(\left(\frac{income_i}{income_j}\right)\left(\frac{housevalue_i}{housevalue_j}\right)\left(\frac{IPratio_i}{IPratio_j}\right)\right)\end{gathered}}{\textit{average of } (income_j\ housevalue_j\ IPratio_j)}$$

where *i* refers to districts and *j* to states. We attempted various combinations of these measures—e.g., centered and not centered, enrollment-weighted and unweighted—and arrived at this version because it most completely predicted existing variations in local revenue raised per pupil across all districts nationally. The IWP index is in many respects analogous to GSP or API in the state effort calculation.

STEP 2B: ESTIMATE EQUITABLE LOCAL REVENUE TO BE RAISED AT SPECIFIC IWP INDEX VALUES (DISTRICT LEVEL)

Next, we fit a regression model to estimate the relationship between IWP and local revenue within each state. Specifically, we predict existing local revenue per pupil raised by every district in the country (the dependent variable) as a function of their IWP, using 2017–19 data from the U.S. Census Bureau Fiscal Survey of Local Governments (F-33) (National Center for Education Statistics 2021a). This model can be expressed as follows:

$$\begin{aligned} total\ local\ revenue\ per\ pupil_{ij} &= b_0 + b_1 IWP_{ij} + b_2 state_j \\ &+ b_3 IWP_{ij} \times state_j + b_4 year + e \end{aligned}$$

The model is weighted for district enrollment. It predicts 72 percent of the variation in local revenue raised by districts. We allow within-state slopes to vary (the interaction of IWP and state) because the actual amount of local revenue raised depends on a variety of state policy influences, including current distributions of state aid. This means, put simply, that the calculation of "fair share" local contributions based on IWP is not uniform across states. Rather, it accounts, to some degree, for differences between states in contextual state-level factors that mediate the relationship between local capacity (in our case, IWP) and local revenue; such differences may include, for instance, discrepancies in how taxable property values are measured.

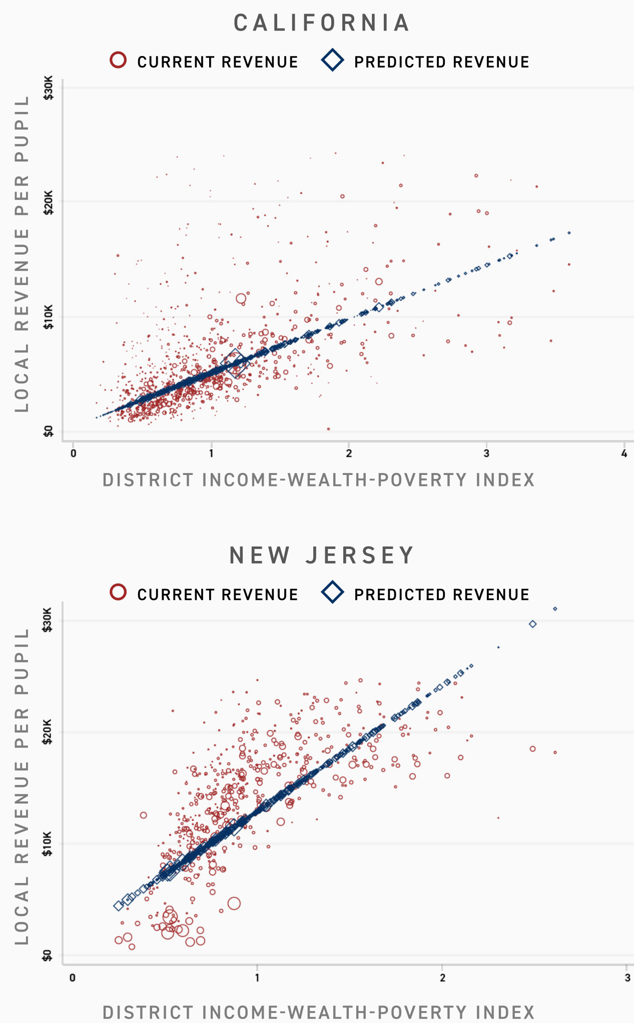
STEP 2C: DETERMINE EACH DISTRICT'S "FAIR SHARE" LOCAL CONTRIBUTION (REQUIRED LOCAL EFFORT)

Finally, we use the estimates from the model in Step 2b to generate predicted values of what each local public school district "should" be raising. These values are best thought of as a fair contribution of local revenues for each school district, given their capacity to raise taxes and state policy environment. We refer to these contributions as "required local effort," or RLE (note, however, that "effort" in this case, while conceptually similar, is distinct from our main state and local effort indicator, and is also expressed in dollar amounts rather than as a percentage).

It might be useful to provide a couple of quick state-level visualizations of the relationship between actual and RLE/fair local revenue, particularly how it varies by IWP. Since the latter is centered around its state mean, IWP values of 1 represent state average lev-

FIGURE 5

Current and predicted local revenue by district income-wealth-poverty (IWP) index, California and New Jersey



NOTE: IWP index values of 1 represent state averages. See text for details on the calculation of predicted local revenue and the IWP index. District markers weighted by student enrollment but marker sizes not comparable between plots. Plots exclude a small number of districts with local revenue above $25,000 per pupil.

SOURCE: NATIONAL CENTER FOR EDUCATION STATISTICS; U.S. CENSUS BUREAU els (i.e., districts with average values on our combined index of property values, income, and income-to-poverty ratios). Districts with values above 1 are more "affluent" by a given percentage (IWP minus 1), whereas districts with values below 1 are less affluent by a given percentage (1 minus IWP).

The scatterplots in Figure 5 present local revenue per pupil (the vertical y-axis) by IWP (the horizontal x-axis) for California and New Jersey. In each plot, there are two markers for every district, both weighted by student enrollment (larger markers are districts with larger enrollments, though the sizes are not comparable between states). The blue diamonds in the plots below are predicted local revenue amounts (RLE)—that is, the amount we would expect each district to produce given its capacity (IWP), based on how much similar districts raise. Since RLE is predicted as a function of IWP, the relationship is linear and the markers are arrayed in a straight line. The red circles are actual local revenue amounts, which are either higher than expected (above the line of blue diamonds), lower than RLE (below the line), or approximately equal (very close to the line). The difference between local revenue and RLE is, in a sense, a local effort indicator.

For example, Figure 5 shows that, in California, approximately half of the state's over 900 districts generate more revenue than expected (above the line), whereas half come in below RLE, and this is generally the case regardless of local capacity (i.e., across the range of IWP values on the horizontal x-axis).

In New Jersey, in contrast, there are more districts in which local revenue exceeds RLE than there are districts in which revenue is below expectations, but there is an interesting pattern of the red circles across IWP levels. Namely, a group of large districts with low IWP come in below RLE, most of the mid-range IWP districts are above the line, and the highest-IWP districts are mostly clustered below expected values, creating a kind of slanted bell-shaped curve pattern of the markers.

The low-IWP districts in the lower left corner are mostly high-poverty districts affected by the state court's "Abbott decisions" in 1997-98, which placed full responsibility upon the state to provide plaintiff districts ("Abbott districts") with what they needed to offer the specific programs and services mandated by the court. This resulted in a sharp increase in the progressivity of state aid and a decrease in local revenue in Abbott districts between 1998 and 2008. This effect began to fade after the 2007-09 recession, but there is a clear remaining impact visible in the figure, which shows a select group of high-poverty districts with unusually low local revenue versus their capacities. Many of the districts toward the middle of the IWP range, conversely, saw declines in state aid directed at the Abbott districts, and had to increase local effort to compensate, pushing them over expected values (Lauver, Ritter, and Goertz 2001).

The New Jersey example illustrates how state policies (including those affected by court decisions) can influence local effort, sometimes in rather dramatic ways. Nationally, however, there is no consistent relationship at all between IWP and the gap between local and RLE revenue levels. In other words, as is the case at the state and local level (see Figure 4), local effort varies widely by local capacity.

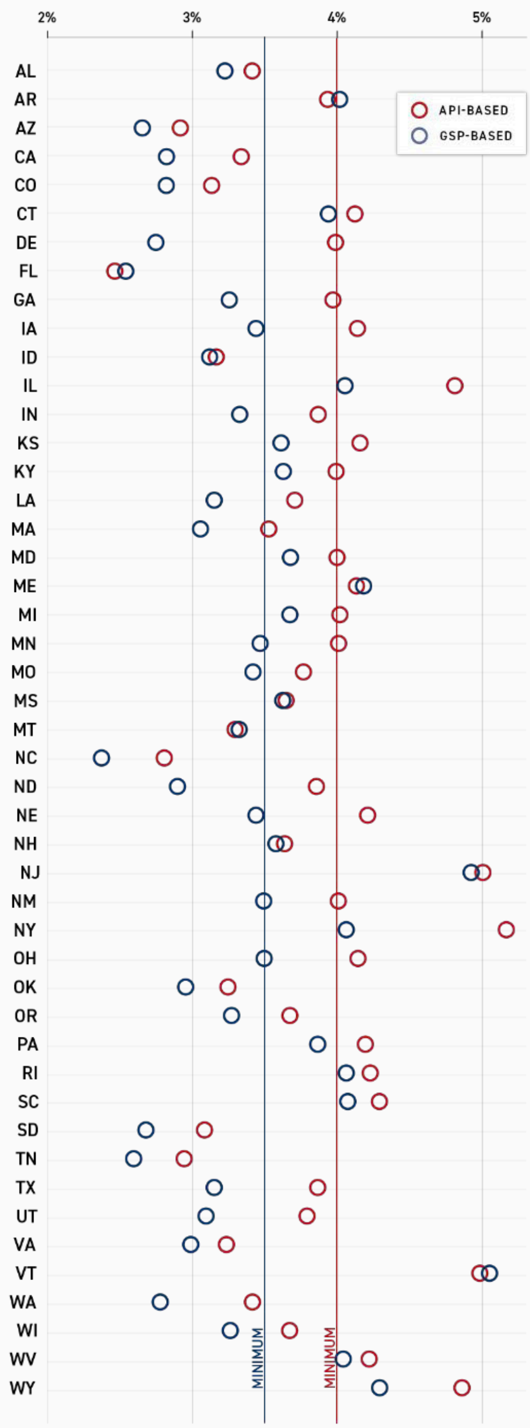
STEP 3: DETERMINE TOTAL REQUIRED ADDITIONAL STATE AND LOCAL INVESTMENT (STATE LEVEL)

We now turn our attention to the final step before we actually start simulating new revenues: estimating the combined state and local revenue that should be raised in each state at fixed minimum levels of the two versions of our effort indicator (3.5 percent of GSP or 4.0 percent of API). These, again, are the thresholds for state and local revenue above which states are eligible for additional federal aid under our proposed framework. For states below this threshold, the difference between total actual revenue (state plus local) and total required revenue represents additional revenue required for eligibility.

In order to provide a sense of where states stand currently (in 2019), Figure 6 presents effort (both versions) by state. The vertical lines in the middle of the graph

FIGURE 6

Fiscal effort (GSP- and API-based) by state, 2019



NOTE: Vertical lines in the plot represent required minimum levels for GSP-based (blue) and API-based (red) effort in the simulation. Graph does not include states (AK, DC, HI, NV) excluded from the analysis reported below.

SOURCE: NATIONAL CENTER FOR EDUCATION STATISTICS; BUREAU OF ECONOMIC RESEARCH

area represent our two minimum required levels (one for GSP-based and the other for API-based effort).

A total of 18 states already meet our minimum requirements for both effort indicator versions, though the group of states varies a bit by version, with five states eligible under one version and not the other. These states are "pre-eligible" for federal aid in the program we are proposing (though, again, some will only be eligible in the GSP- and not the API-based simulation, or vice versa). The rest would have to increase their effort levels. Some of the gaps between effort and thresholds are small, but many are substantial. In either case, bear in mind that the denominators here are essentially entire state economies, which means that even seemingly minor effort increases often represent large amounts.

STEP 3A: ESTIMATE THE RELATIONSHIP BETWEEN EFFORT AND REVENUE (STATE LEVEL)

As far as calculating required additional state and local investment for states below our minimum effort thresholds, the simple option would be to calculate 3.5 percent of each state's GSP (or 4.0 percent of its API) and then compare those amounts to total state and local revenue in each state (essentially subtracting the latter from the former to produce a total state and local required new investment level).

However, we again test a regression-based approach in order to account for the potential influence of some additional factors. Most notably, it may be reasonable for one state to devote a smaller share of its capacity to schools than does another state if it so happens that that former state has a smaller share of its population in the age range for K-12 schooling compared with the latter state. Put differently, two states might raise the same amount of revenue but revenue *per pupil* might be higher in one state if it is home to fewer school-aged children. We therefore estimate a regression model in which we predict state and local revenue per pupil (the dependent variable) as a function of effort, capacity per capita (specifically per capita under 18 years old), and the proportion of each state's population under 18 years old. This model can be expressed as:

$$state\ and\ local\ revenue\ per\ pupil_j = b_0 + b_1 effort_j + b_2 \%under18_j + b_3 capacityPC_j + b_4 year + e$$

The model uses state-level data from 2015 to 2019. Population shares are determined using Census data (U.S. Census Bureau 2019b). We fit two models, one for each version of our effort indicator (GSP- and API-based). Table 1 presents the results of these models.

TABLE 1

Regression of state and local revenue per pupil on fiscal effort, capacity per capita, and percent of population under 18, by effort version

	EFFORT MEASURE			
	GSP-BASED		API-BASED	
INDEPENDENT VARIABLE	COEFF.	S.E.	COEFF.	S.E.
Effort	301624***	11220	287118***	11642
Percent of population under 18	10200***	3888	11670***	4527
Capacity per capita (under 18)	56630***	1468	62551***	2252
Year	-65	59	-68	65
Intercept	116540	119707	122802	128655
Observations	192		192	
r2	0.94		0.93	

* p < 0.10 ** p < 0.05 *** p < 0.01

NOTE: OLS regression using state-level data pooled across 2015-19. Capacity per capita is GSP or API divided by the population under 18 years old.

SOURCE: BUREAU OF ECONOMIC ANALYSIS; NATIONAL CENTER FOR EDUCATION STATISTICS; SCHOOL FINANCE INDICATORS DATABASE; U.S. CENSUS BUREAU

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As would be expected, effort and capacity, along with population distribution, predict nearly all of the variation in state and local revenue per pupil (note that dividing GSP/API by the total population rather than the under 18 population does not appreciably affect our results). This, of course, is because effort is simply revenue divided by capacity. But Table 1 also suggests that the share of the population under 18 has some statistically discernible association with revenue per pupil.

STEP 3B: CALCULATE REQUIRED INCREASES IN TOTAL STATE AND LOCAL REVENUE FOR THOSE STATES BELOW MINIMUM EFFORT LEVELS USING BOTH DIRECT AND REGRESSION-BASED APPROACHES (STATE LEVEL)

We now use the models presented in Table 1 to predict the state and local revenue per pupil that would be raised at our required effort levels (that is, 3.5 percent of GSP and 4.0 percent of API). In states where effort is already above required minimum levels (pre-eligible states), predicted revenue will be lower than actual revenue, and these estimates play no role in the simulation going forward. However, in states where required effort exceeds actual effort, whether GSP- or API-based, the difference between predicted revenue and actual revenue represents the total required increase in state and local funding that would be required for program eligibility.

As it turns out, our regression-based estimates of required state and local revenue are virtually identical to those we get via the simple approach of calculating these amounts by multiplying required effort by capacity in each state. As such, either the direct calculation method or the regression-based predictions of state and local revenue increases could be used in our final model. We therefore use the direct calculation approach.

We now have estimates of how much additional funding each state would have to raise to meet our minimum effort requirements (in the 18 states where effort already meets those thresholds in each version of our effort indicator, this is zero). We can therefore turn to the actual simulation.

STEP 4: CONSTRUCT A NATIONAL FUNDING FORMULA AND SIMULATE THE FEDERAL AID PROGRAM

This is the final step, and it is also the first point at which we begin actually simulating outcomes. Note that we are simulating what would happen *under a full compliance scenario*—i.e., a scenario in which all states comply with our required state and local "fair share" contributions, as outlined below (about one in three states already do so). But we will be presenting state-level results, which allow us to evaluate the impact of compliance on a state-by-state basis. Simulating full compliance nationally enables calculation of maximum program costs and benefits.

We can now proceed to calculating simulated state and local funding and new federal aid allocated by our proposed framework. Doing so requires that we create a model of sorts for allocating the additional state and local funding from the increase in effort (in those states where that increase was required). Recall that the end goal of our framework is universal adequate funding—i.e., all districts' funding, at a minimum, is enough to meet our NECM estimates of funding required to achieve the common goal of national average math and reading scores. These gaps will drive the allocation of new state and federal funding.

The simulation process, which is performed separately but identically for our GSP- and API-based effort indicators, proceeds according to the following steps.

STEP 4A. CALCULATE SIMULATED LOCAL REVENUE USING RLE (DISTRICT LEVEL)

We begin with local revenue, as it is the foundation of our multilayered simulation. In districts where local revenue per pupil is lower than our estimated "fair" RLE contributions (calculated in Step 2b above), we increase simulated local revenue to RLE amounts, with the increased local revenue amount not to exceed each district's estimated adequate funding level (this essentially caps RLE-based increases in simulated local revenue for a relatively small group of affluent districts in which RLE is unusually high and/or estimated adequate spending targets unusually low). In contrast, in districts where local revenue already exceeds RLE, no change is made. In other words:

$$\begin{aligned}&\mathit{simulated\ local\ revenue}\\&= \mathit{the\ greater\ of\ actual\ local\ revenue\ or\ RLE}\end{aligned}$$

$$\mathit{where\ RLE} < \mathit{estimated\ adequate\ funding\ level}$$

In districts where RLE exceeds both actual local revenue and the adequate funding target, simulated revenue is capped at the latter:

$$\begin{aligned}&\mathit{simulated\ local\ revenue}\\&= \mathit{the\ greater\ of\ actual\ local\ revenue\ or\ } (\mathit{RLE} - (\mathit{RLE}\\&- \mathit{estimated\ adequate\ funding\ level}))\end{aligned}$$

$$\mathit{where\ RLE} \geq \mathit{estimated\ adequate\ funding\ level}$$

This step, unlike the step determining new state aid (below), is carried out for states *whether or not they meet minimum state and local effort requirements*. In other words, even in pre-eligible states, federal aid amounts are allocated based on the assumption that all districts meet RLE requirements, even though RLE-based increases are not required in pre-eligible states.

We chose to apply (but not require) RLE in districts in pre-eligible states because the alternative was to rely solely on new federal aid to fill their gaps, essentially giving a pass to—indeed rewarding—districts that fail to contribute their fair share to the "foundation" funding amount. Imposing RLE mitigates this federal burden without imposing the local revenue increase as a requirement, which we contend is a fair compromise.

STEP 4B. CALCULATE THE STATE/LOCAL SPLIT OF NEW REQUIRED REVENUE (STATE LEVEL)

The local share is calculated only for states in which state and local effort is below our fixed required levels, and it is:

$$\mathit{local\ share} = \frac{\begin{array}{c}\mathit{sum\ of\ district\ simulated} - \mathit{actual\ local\ revenue}\\ (\mathit{where\ RLE} > \mathit{actual})\end{array}}{\begin{array}{c}\mathit{total\ required\ additional\ state}\\ \mathit{and\ local\ investment}\end{array}}$$

This is essentially the total amount of additional local RLE revenue divided by the total amount of additional effort-based state and local revenue that the state would have to raise to be eligible for new federal aid (from Step 3b). The state share is simply:

$$1 - \mathit{local\ share}$$

In states where state and local effort already exceeds required minimums, the state/local split is not calculated, as no increase in state and local investment is required. We present the state/local splits below.

STEP 4C. CALCULATE ADEQUATE FUNDING GAPS REMAINING AFTER RLE, CURRENT STATE AID, AND EXISTING (PRE-PANDEMIC) FEDERAL AID (DISTRICT LEVEL)

This is the first step at which we begin using our adequacy estimates (from Step 1), which are "converted" from per-pupil to total amounts (i.e., total required, or adequate, per-pupil funding multiplied by enrollment) in each district so as to maintain comparability with existing federal aid, the per-pupil calculation of which is complicated.[5] We then construct remaining (preliminary) funding gaps for all districts:

$$\begin{aligned} remaining\ funding\ gap &= (RLE + existing\ state\ aid \\ &+ existing\ federal\ aid) \\ &- (predicted\ cost\ target\ per\ pupil \\ &\times enrollment) \end{aligned}$$

Note that we use RLE here rather than simulated local revenue. This means that remaining funding gaps may actually be negative (i.e., below adequate) even if total revenue exceeds the (adjusted) cost target. In other words, if a given district's actual local revenue (and therefore its simulated local revenue) is higher than its estimated RLE amount, the remaining funding gap for this district may be negative even if actual/simulated local revenue is sufficient to cover it. We use RLE instead of simulated local revenue because RLE represents a fair local contribution, and districts that exceed RLE are paying more than that fair share. This is, of course, a good thing, and constraining these districts' eligibility for new federal aid based on their relatively high local revenue generation would be unfair and, perhaps, a perverse incentive to decrease local effort.

That said, obviously, in some districts this remaining gap calculation produces a negative gap (indicating funding below estimated adequate levels), whereas in others the gaps are positive. These gaps are calculated for all districts, regardless of whether or not they are located in states pre-eligible for new federal aid, and also whether or not their funding already exceeds estimated adequate levels. However, positive gaps do not play any meaningful "role" in the simulation going forward (i.e., they are not used in the calculation of new state or federal aid).

STEP 4D. CALCULATE TOTAL NEW STATE AID (STATE LEVEL)

The amount of new state aid, assuming full compliance, is:

$$\begin{aligned} &new\ state\ aid \\ &= total\ required\ additional\ state\ and\ local \\ &\ investment \times state\ share \end{aligned}$$

$$\begin{aligned} &where\ total\ required\ additional\ state\ and \\ &\ local\ investment > 0 \end{aligned}$$

with total required investment from Step 3b, and the state share calculated as in Step 4b. This is essentially how much additional state aid will be distributed to districts before we calculate new federal aid. As indicated, once again, in pre-eligible states, new state aid is not calculated. Note also that, in several states where effort is in fact below the minimum, the additional local revenue from the RLE simulation is sufficient for eligibility (i.e., the RLE increase pushes the state above our required minimum effort level); in these cases, new state aid is zero and the local share is simply 100 percent.

5 The main reason here is that all levels of revenue in the federal finance data are poorly aligned with the enrollments served, due to choice programs and other passthroughs of revenues to districts that serve students outside of those (non-government-run) districts. As a result, dividing total federal aid by enrollments adds error to our calculations, error which is non-uniform across states and districts (due, for example, to variation in the size of charter school sectors). We therefore generally avoid using or even expressing federal aid on a per-pupil basis, but when we do so we carry out a procedure to "back correct" the per-pupil amounts to match enrollments.

STEP 4E. SIMULATE THE ALLOCATION OF NEW STATE AID (DISTRICT LEVEL)

The simulated allocation of this new state aid is based solely on the remaining funding gaps calculated in Step 4c. Each district's share of new state aid is:

$$\textit{district share of new state aid} = \frac{\textit{remaining funding gap (district)}}{\textit{total statewide remaining funding gap}}$$

$$\textit{where total required additional state and local investment} > 0$$

with districts' remaining funding gaps calculated as shown in Step 4c. The actual amount of new state aid for each district is then:

$$\textit{new state aid} = \textit{district share of new state aid} \times \textit{new state aid}$$

$$\textit{where total required additional state and local investment} > 0$$

with new state aid from Step 4d. This means that simulated state revenue is:

$$\textit{simulated state revenue} = \textit{existing state aid} + \textit{new state aid}$$

Note, again, that this additional state aid is only simulated in states where current effort is below our requirements. In states where effort meets requirements, new state aid is zero. Note also that there are many districts in which the allocation of new state aid is applied above and beyond adequate cost targets. This occurs when the total increase in state and local revenue from the effort boost exceeds the amount required to close all negative funding gaps. In these cases, new state aid is still distributed as above—going only to districts with remaining funding gaps, distributed proportionally based on those gaps—but the actual amounts of new funding exceed the remaining gaps. In our "alternative" simulation results, discussed and presented below, we isolate and back out this "excess" state aid.

STEP 4F. CALCULATE FINAL FUNDING GAPS (DISTRICT LEVEL)

Final funding gaps will determine the amount of new federal aid in our proposed framework. They must also be "corrected" to reflect the fact that a portion of K-12 revenue is "non-current" revenue—i.e., it is spent, for example, on capital outlay and interest payments, rather than on instruction and other areas with a more direct impact on student outcomes (this is why our adequacy estimates are usually expressed in terms of current spending). Our simulation, in contrast, relies on revenue rather than spending, and we cannot separate current from non-current spending, requiring a different approach. Final gaps are calculated for each district as:

$$\textit{final funding gap} = \textit{remaining funding gap} + \textit{new state aid} + \textit{noncurrent state and local revenue}$$

$$\textit{where current spending per pupil} < \textit{predicted cost target per pupil}$$

with remaining funding gaps from Step 4c and district state aid amounts from Step 4e. Non-current state and local revenue is calculated using the same Census data source from which we draw our other district-level finance data. Adding non-current revenue in this step essentially reduces all final negative gaps by the approximate amount of state and local revenue reflected in remaining funding gaps that does not represent current expenditures.

As noted, however, the non-current adjustment is not applied in districts where pre-simulation funding (measured as current spending) already exceeds estimated adequate levels. This decision was made due to exorbitant non-current spending amounts in many districts where funding is already adequate, causing implausible increases in funding gaps in districts that should play no role in the allocation of new federal aid. In these "pre-adequate" districts, therefore:

$$final\ funding\ gap$$
$$where\ current\ spending\ per\ pupil \geq predicted\ cost\ target\ per\ pupil$$

Where new state aid is insufficient to close remaining funding gaps from Step 4c, final funding gaps will be negative (i.e., simulated funding below predicted adequate funding targets). These are the gaps in districts where a negative (below-adequate) gap still remains after adding new state aid (Step 4e) to the remaining gap from Step 4c (or, in the case of states where effort already exceeds required minimums, where the remaining gap from Step 4c is negative). In all other districts (i.e., those with positive gaps), the final funding gap is zero.

STEP 4G. SIMULATE THE ALLOCATION OF NEW FEDERAL AID (DISTRICT LEVEL)

In this final step, we simulate the allocation of new federal funds from our proposed supplemental aid program. For each district:

$$new\ federal\ aid = final\ funding\ gap \times -1$$
$$where\ final\ funding\ gap < 0$$

These new federal funds are targeted exclusively at districts with remaining negative funding gaps as determined in Step 4f, and the total amount of the new federal aid in any given district, in any given state, or nationally is the inverse of the sum of these negative gaps from Step 4f. Put differently, the new federal aid fills all the final gaps to achieve universal adequacy (at least in a situation of full compliance on the part of all states, which is what we are simulating).

We presented a simplified summary of the full simulation in Figure Exec1 above.

ILLUSTRATION OF THE PROCESS AND STATE/LOCAL SPLIT

To demonstrate how the simulation works in practice, we illustrate this process at the aggregate state level using Texas as an example. The simulation results for Texas are presented in Table 2. For the purposes of this illustration, Table 2 focuses exclusively on the simulation using the GSP-based version of our effort indicator.

Current GSP-based effort in Texas is approximately 3.2 percent, below our required "fair share" level of 3.5 percent. The difference between actual state and local revenue in Texas and the revenue that would be raised with a 3.5 percent effort level is approximately $6.3 billion. This is how much the state would need to increase its K-12 investment in order to be eligible for federal aid (though, again, any actual implementation of our proposal could, and indeed should, allow states to make sufficient progress toward this goal over a period of time and still remain eligible).

TABLE 2

Illustrative state-level simulation walkthrough for Texas

SIMULATION CALCULATION	VALUE
Gross state product (in millions of dollars)	$1,795,635
Current state and local effort	3.2%
Required state and local effort for program eligibility	3.5%
Additional state and local revenue for program eligibility	$6,271,751,816
Total increase in local revenue from RLE compliance	$4,199,946,270
Local share of required state and local revenue increase	67.0%
Total adequate funding gap after local increase	$40,405,522,682
Total adequate funding gap after RLE plus current state, federal aid	$22,777,224,881
Total increase in state aid to meet 3.5% effort requirement	$2,071,805,546
State share of required state and local revenue increase	33.0%
Remaining total adequate funding gap **(new federal aid)**	$20,705,419,472

NOTE: Simulation results using GSP-based effort indicator.
SOURCE: VARIOUS SIMULATION DATA SOURCES (SEE TEXT)

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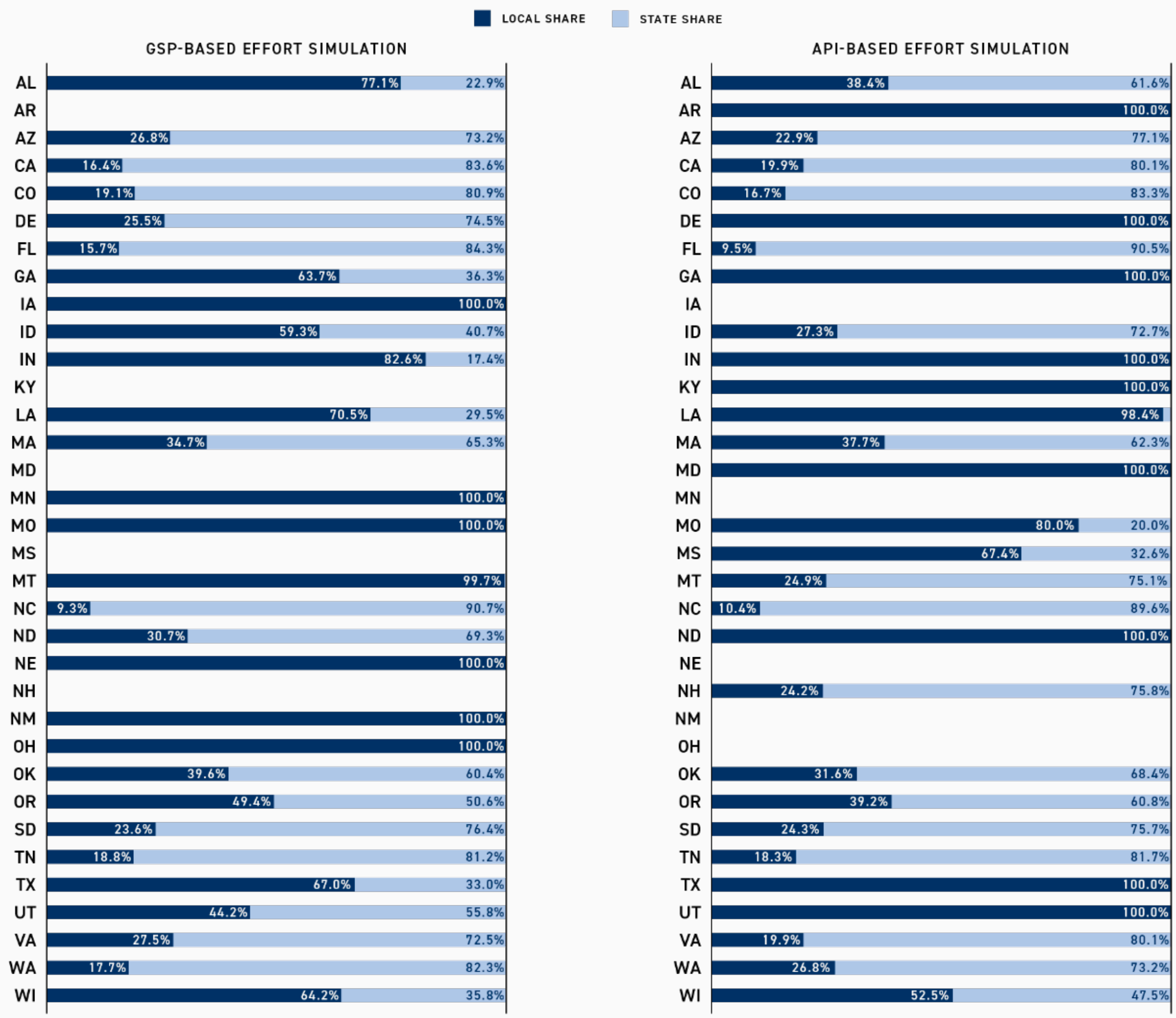
Based on our calculation of RLE, a total of $4.2 billion in additional local revenue would be raised by increasing all districts' local contributions to RLE levels (with no change to districts in which local revenue exceeds RLE amounts). That amount is equivalent to almost precisely two-thirds of the total increase in state and local revenue ($6.3 billion) needed for program eligibility. It also represents our "recommended" local share of the increase, with the rest (around $2 billion, or 33 percent) coming from state sources (i.e., new state aid in our simulation).

Next, we calculate the remaining funding gap for bringing all Texas districts up to adequate funding levels (using the NECM adequacy estimates). In each district, we calculate the remaining gap—i.e., the sum of all negative funding gaps, ignoring all positive gaps—after the simulated allocation of additional RLE-based local funding, on top of current state and federal aid (with the gaps adjusted for non-current spending as described above). This comes to a final statewide gap of $22.8 billion. After we allocate the new state aid ($2 billion) according to districts' proportional gaps, we have

FIGURE 7

Estimated state/local split of new (simulated) state and local revenue by effort version and state



NOTE: New revenue from RLE-based local increases and additional state aid (if any) required to satisfy minimum effort requirement, as a percentage of total new state and local aid. Figure limited to states in which state and local effort is below minimum required levels using at least one version of effort indicator. See text for details on calculation.

SOURCE: VARIOUS SIMULATION DATA SOURCES (SEE TEXT)

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a final gap of $20.7 billion, all of which will be filled with new federal aid from our program. Every district in Texas in which there is still a negative funding gap will receive enough funding to fill that gap completely, achieving universal adequate funding (without "taking" any funds from districts in which funding is already adequate).

This basic process is repeated for all states, though not all steps are functionally necessary in all states. For instance, in states where current effort already exceeds our minimum levels (pre-eligible states), we "skip" the steps calculating required additional funding and the state/local split. We will present the full set of national and state-by-state new federal aid results in the next section. First, though, Figure 7 presents the state/local split of required additional revenue by state, which was calculated in Step 4b (the figure, of course, excludes states in which effort exceeds minimum requirements).

The GSP- and API-based results are somewhat similar (the correlation is roughly 0.47), but there are some noteworthy differences. Most obviously, in some states, API-based effort is above the minimum and GSP-based effort is not (or vice versa), which means the state/local split is not calculated for only one of these versions of our effort indicator. In all but one of these cases, the non-missing split (GSP- or API-based) is 100 percent local; this is due to the fact that these states tend to be those in which state and local effort levels are close to the minimum requirements, with one version falling above and the other below. As a result, the amount of additional required state and local investment is generally modest, and local revenue from RLE is enough to make up the difference.

But the shares in some cases vary meaningfully even when both versions are below the threshold. For example, in the simulation based on GSP-based effort (see Table 2), Texas' state/local split is 67/33, whereas it is 100 percent local in the API-based simulation (that is, the simulated increase in local revenue from RLE is sufficient to make up the state's entire required additional investment amount). This discrepancy, as well as those in other states, occurs despite the fact that both versions of the effort indicator have the same numerator, and the two versions of the denominator are almost perfectly correlated. The variation is due mechanically to one effort measure being further from the required minimum level than the other. In Texas, for instance, GSP-based effort (about 3.2 percent) is further from the mean (3.5) than is API-based effort (3.9 from 4.0). As a result, the required increase in investment is lower under the API-based version, and so the total RLE-based local revenue increase covers more (in this case, all) of the gap.

SIMULATION RESULTS

In this section, we present the results of the simulation in two parts. First, we present total costs and aid (effort-based increases in state and local revenue as well as new federal aid), both nationally and by state. Second, we examine the distributional impact of this program, including how it affects K-12 funding adequacy and equal opportunity, once again nationally and by state.

Before moving on to these results, a few points bear quick mention. First, when interpreting our national results (those summed or averaged across all states), keep in mind that our simulation is one in which all states (and districts) comply with the minimum state and local effort requirements to receive the new federal aid. This requirement is effectively waived in pre-eligible states (though RLE-based local revenue increases do affect federal funding amounts even in these states), but in many other states eligibility would require a substantial revenue boost. This implies that the national benefits of this program for adequacy and equal opportunity must be weighed against not only the total *federal* cost as simulated here, but also the cost of a substantial additional investment from states and districts. We present estimates of both, and also present some aggregate results for alternative simulations.

Second, we would emphasize that many of the important details and parameters of both our proposal and our simulation—such as required "fair share" effort levels, the selection of the student outcome "benchmark" for adequate funding targets, and the specification of the model used to estimate those targets—are flexible. We have chosen parameters and made important assumptions that we believe are both reasonable and feasible, and we have made an effort to test and present separate results for different possibilities (e.g., different definitions of capacity in our effort measure). But we acknowledge that the actual design and implementation of our proposal would inevitably require changes to address political, methodological, and implementation issues and realities. We believe that our framework is flexible enough to meet these challenges; however, any such changes, whether to our proposal or our simulation, would change the results reported below, and would entail tradeoffs. For example, setting a higher minimum state and local effort level would alter the balance of new funding sources, with a larger proportion coming from states and districts, and a smaller share from new federal aid. The online data visualization tool that accompanies this report allows users to test how different parameters—e.g., different minimum effort levels—affect simulated program costs.

Finally, note that the calculations above, and thus the simulation results presented below, do not include Alaska, the District of Columbia, Hawaii, and Nevada, as well as a relatively small number of districts in various other states.[6] The districts that are included in our models and results, however, serve roughly 95 percent of all U.S. public school students.

6 The District of Columbia is excluded from the simulation due to its unique state/local revenue structure, which would require a separate process. Hawaii is excluded because it consists of a single government-run school district that is isolated from other labor markets (and, as a result, NECM estimates are not available in the state). Nevada and Alaska are excluded due to issues with the finance data in these states. Finally, SFID users may note that NECM and effort estimates are not reported for Vermont between 2017 and 2019 (Baker, Di Carlo, Reist, et al. 2021), but they are included in the simulation results reported here. We decided to include Vermont in this analysis, despite these issues, because doing so has virtually no impact on our aggregate (national) results. We would, however, recommend serious caution in interpreting the Vermont results (data are missing for a few dozen districts in the state, and those districts for which data are available are also problematic). We also have concerns about the spending data from New York state (including New York City), and about the student outcome data in western and upstate New York (Baker, Di Carlo, and Weber 2021).

PROGRAM COSTS AND AID ALLOCATION

In Table 3, we summarize the results for total program cost. The table presents, by state and separately for both effort indicators (GSP- and API-based), just two estimates. The first is the total amount of additional state and local investment required for that state to meet our thresholds (3.5 percent of GSP and 4.0 percent of API). In states that already meet this requirement, this value appears as "n/a." This is the case for 18 "pre-eligible" states in each simulation (GSP- and API-based), but a total of 23 states are missing values throughout the entire table since the group of states varies between the GSP- and API-based effort simulations (usually because they are close to the minimum in one version and just above in the other). Note that every one of these states would receive new federal aid under our proposal, with the amounts representing

TABLE 3

Additional required state and local revenue and new (simulated) federal aid by effort version and state

	EFFORT MEASURE			
	GSP-BASED		API-BASED	
	REQUIRED STATE AND LOCAL INCREASE	NEW FEDERAL AID	REQUIRED STATE AND LOCAL INCREASE	NEW FEDERAL AID
AL	$610,091,776	$2,691,187,738	$1,224,125,440	$2,077,154,074
AR	n/a	1,438,607,051	85,702,688	1,438,607,051
AZ	2,963,226,112	33,061,136	3,457,137,152	—
CA	20,173,242,368	—	16,625,473,536	—
CO	2,531,294,208	—	2,903,275,264	—
CT	n/a	485,139	n/a	485,139
DE	557,538,624	—	5,128,102	2,314,782
FL	10,075,548,672	—	16,623,193,088	—
GA	1,474,458,624	6,156,790,390	146,659,472	6,692,471,150
IA	114,226,136	93,639,688	n/a	93,639,688
ID	300,557,792	11,242,488	652,083,968	—
IL	n/a	889,593,467	n/a	889,593,467
IN	639,531,456	915,492,979	418,133,536	1,026,855,174
KS	n/a	173,820,097	n/a	173,820,097
KY	n/a	398,320,725	14,162,481	398,320,725
LA	883,310,272	2,591,940,130	632,395,392	2,842,855,010
MA	2,536,990,208	—	2,337,836,544	—
MD	n/a	983,421,872	4,950,478	983,421,872
ME	n/a	29,637,172	n/a	29,637,172
MI	n/a	1,973,270,039	n/a	1,973,270,039
MN	122,275,824	431,257,604	n/a	431,257,604
MO	261,396,864	1,525,174,955	668,579,136	1,391,533,293
MS	n/a	3,033,737,239	396,785,312	2,904,465,282
MT	89,844,768	70,416,451	360,310,080	—
NC	6,398,077,440	—	5,728,940,544	—
ND	338,958,848	—	60,596,728	10,719,120
NE	75,847,936	25,799,652	n/a	25,799,652
NH	n/a	3,064,297	302,151,360	—
NJ	n/a	85,966,908	n/a	85,966,908
NM	7,488,970	745,251,243	n/a	745,251,243
NY	n/a	9,193,296	n/a	9,193,296
OH	34,036,216	2,482,321,409	n/a	2,482,321,409
OK	1,085,704,576	653,155,166	1,360,195,200	378,664,542
OR	557,181,952	—	702,564,928	—
PA	n/a	1,500,540,335	n/a	1,500,540,335
RI	n/a	96,218	n/a	96,218
SC	n/a	1,889,953,480	n/a	1,889,953,480
SD	437,154,336	—	423,745,216	—
TN	3,283,055,872	—	3,374,844,928	—
TX	6,271,751,680	20,705,419,472	1,983,014,144	22,777,224,881
UT	736,849,664	—	309,678,656	313,957,574
VA	2,731,363,328	—	3,769,071,872	—
VT	n/a	379,621	n/a	379,621
WA	4,152,973,568	—	2,735,593,216	—
WI	801,932,288	246,079,286	980,654,400	67,357,174
WV	n/a	6,485,986	n/a	6,485,986
WY	n/a	175,125	n/a	175,125
US TOTAL	**$70,245,910,378**	**$51,794,977,855**	**$68,286,982,860**	**$53,643,788,186**

NOTE: States with "n/a" for required additional state and local investment are those in which effort meets minimum required levels and additional revenue is not required for eligibility. See text for details on calculation.

SOURCE: VARIOUS SIMULATION DATA SOURCES (SEE TEXT)

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total adequate funding gaps remaining after the application of new local RLE-based local revenue, which is not required for eligibility but does factor into the calculation of new federal aid (see Step 4a). Since these states already contribute a reasonable share of their capacity to their schools, the federal aid program we propose would fill the remaining gaps in all districts where such gaps are negative (i.e., below estimated adequate levels).

The second estimate, by effort indicator version, is the amount of new federal aid each state would receive, contingent upon their meeting state and local effort requirements. It represents the amount that would be needed to bring every single district up to our adequate funding targets (i.e., universal adequacy), after the simulation of additional state and local funding. All pre-eligible states, to reiterate, receive new federal aid in both versions of the simulation, although the amounts are quite small in states such as Wyoming and Rhode Island.[7] This is because, even after the application of non-required RLE-based local revenue increases, inadequately funded districts are found even in states where overall funding is quite high, in no small part because those funds are usually not distributed progressively.

In the remaining states (i.e., those in which current state and local effort is below our required levels), the amount of new federal aid represents remaining gaps after the total state and local contribution is increased to meet our requirements. Many of these states—13 of 29 in the GSP simulation and 14 of 29 in the API simulation—would not receive new federal aid under the parameters of our simulation. Although we would reiterate that our simulation makes several assumptions and choices that might alter these final results, the fact that so many states have no remaining adequate funding gaps once their state and local investments are boosted to meet U.S. average effort requirements is quite telling. It suggests that many states are not meeting their students' needs despite having the capacity to do so, even by the modest standard of adequate funding to achieve national average math and reading scores.

In contrast, the remaining non-pre-eligible states—16 of 29 in the GSP simulation, and 15 of 29 in the API simulation—would in fact receive new federal aid in the simulations. In a number of cases, the return on the additional state and local investment would be substantial. Most notably, Texas would need to increase state and local funding by around $6.3 billion under the GSP-based simulation or $2.0 billion in the API-based simulation, but would, as a result, be eligible for nearly $20.6 billion or $22.8 billion, respectively, in new federal funding. In fact, Texas alone would receive around 40 percent of all new federal funding, despite serving only about 11 percent of the students in our simulation sample. Similarly, Georgia would receive over $6 billion in additional federal funds "in exchange" for a comparatively minor increase in state and local investment.

The total required federal cost of our program under this full compliance scenario (bottom row of the table) is approximately $51.8 billion using GSP-based effort and $53.6 billion using API-based effort. This is roughly equivalent to the amount of current (pre-pandemic) federal aid allocated to these states. The simulation also, however, requires an additional $70 billion in state and local investment (the total is similar in the GSP- and API-based simulations). This is equivalent to a roughly 13 percent increase in total 2019 state and local revenue (though, again, this increase would be much higher in states where effort is below our requirements, and essentially zero where effort already exceeds our requirements).

It certainly bears noting that this total amount of required new state and local investment is roughly equivalent to our estimates of how much total state and local funding would increase if all states returned to their average effort levels before the 2007-09 recession (Baker, Di Carlo, Reist, et al. 2021). The failure of most states to reinvest in their schools as their economies recovered from that recession has had disastrous consequences for the funding of schools and other public services, and a large portion of the required state and local investment increases in our simulation are making up that ground that was lost and never regained.

7 Wyoming receives a very small amount of new federal aid despite the fact it is the only state in which not one district has a negative funding gap. This new federal aid goes to one district (Converse County #1), in which actual local revenue far exceeds RLE, but RLE plus existing state and federal aid come in just below the cost target. This final gap is closed by new federal aid. This occurs in many districts in other states, but it happens to be "visible" in Wyoming because of its lack of negative funding gaps.

In Table 4, we present per-pupil simulated funding, by source, for each state and nationally (for both the GSP- and API-based simulations). The final columns in the table present the percent increase in these amounts over existing (2019) revenue per pupil. Note that simulated local revenue is the same for both the GSP- and API-based simulations, as local revenue increases do not depend directly on state and local effort.

Full compliance with our program results in an increase of just over 13 percent in state and local revenue (bottom row of the table), and an increase of approximately 20 percent in total revenue (the difference between the two coming in the form of new federal aid). In this sense, new federal aid is shouldering a disproportionately large share of the new funding burden relative to its current share of total K-12 funding (around 10 percent, on average).

TABLE 4

Simulated per-pupil revenue by source and percent increase over existing revenue, by effort version and state

	SIMULATED REVENUE PER PUPIL (EXISTING + NEW)							PERCENT INCREASE OVER EXISTING REVENUE					
		GSP-BASED			API-BASED			GSP-BASED			API-BASED		
	LOCAL	STATE	FEDERAL	TOTAL	STATE	FEDERAL	TOTAL	STATE + LOCAL	FEDERAL	TOTAL	STATE + LOCAL	FEDERAL	TOTAL
AL	$4,503	$6,564	$4,875	$15,942	$7,408	$4,031	$15,942	8.5	314.8	40.1	16.7	243.0	40.1
AR	2,039	8,680	4,242	14,961	8,680	4,242	14,961	3.8	250.6	29.7	3.8	250.6	29.7
AZ	5,891	7,376	1,366	14,633	7,908	1,331	15,130	31.9	2.7	28.5	37.2	–	32.8
CA	6,565	11,897	1,102	19,564	11,304	1,102	18,971	23.2	–	21.6	19.2	–	17.9
CO	7,815	8,174	781	16,770	8,594	781	17,190	24.0	–	22.6	27.2	–	25.7
CT	15,413	8,225	979	24,617	8,225	979	24,617	6.2	0.1	6.0	6.2	0.1	6.0
DE	6,915	15,456	1,223	23,594	11,811	1,243	19,969	28.0	–	26.1	7.1	1.7	6.8
FL	6,251	7,337	1,235	14,823	9,678	1,235	17,164	36.5	–	32.4	60.0	–	53.4
GA	6,642	6,068	4,626	17,336	5,759	4,936	17,337	7.7	332.8	34.7	5.1	361.8	34.7
IA	6,709	7,289	964	14,962	7,289	964	14,962	4.8	23.6	5.8	4.8	23.6	5.8
ID	3,042	6,482	942	10,466	7,749	901	11,692	12.8	4.5	12.0	27.8	–	25.1
IL	10,844	7,389	1,514	19,747	7,389	1,514	19,747	6.0	41.7	8.0	6.0	41.7	8.0
IN	4,669	8,092	1,843	14,604	7,980	1,954	14,603	5.6	98.6	12.2	4.7	110.6	12.2
KS	4,647	8,973	1,437	15,057	8,973	1,437	15,057	5.2	32.7	7.3	5.2	32.7	7.3
KY	4,988	7,113	1,979	14,080	7,113	1,979	14,080	5.8	41.8	9.7	5.8	41.8	9.7
LA	6,954	5,793	5,585	18,332	5,406	5,972	18,332	12.0	251.0	41.3	8.6	275.3	41.3
MA	12,331	9,108	883	22,322	8,882	883	22,096	18.7	–	17.8	17.4	–	16.6
MD	9,639	7,517	2,134	19,290	7,517	2,134	19,290	3.2	108.4	9.3	3.2	108.4	9.3
ME	10,632	6,224	1,189	18,045	6,224	1,189	18,045	7.8	23.2	8.7	7.8	23.2	8.7
MI	5,605	7,980	2,212	15,797	7,980	2,212	15,797	5.8	228.8	16.9	5.8	228.8	16.9
MN	5,269	10,097	1,287	16,653	10,097	1,287	16,653	3.6	70.6	6.8	3.6	70.6	6.8
MO	7,294	5,362	2,697	15,353	5,513	2,547	15,354	6.8	175.2	19.7	8.1	159.9	19.7
MS	4,336	5,073	7,888	17,297	5,351	7,611	17,298	6.5	472.0	69.3	9.6	451.9	69.3
MT	6,805	5,678	2,156	14,639	7,545	1,670	16,020	6.7	29.1	9.5	22.6	–	19.8
NC	3,326	10,477	1,086	14,889	10,018	1,086	14,430	46.6	–	41.8	41.8	–	37.5
ND	6,795	10,782	1,550	19,127	8,576	1,651	17,022	23.1	–	20.8	7.6	6.5	7.5
NE	9,706	4,549	1,070	15,325	4,549	1,070	15,325	11.5	8.3	11.2	11.5	8.3	11.2
NH	13,378	5,650	951	19,979	6,953	934	21,265	6.0	1.8	5.8	13.2	–	12.6
NJ	13,721	9,483	997	24,201	9,483	997	24,201	7.9	6.9	7.8	7.9	6.9	7.8
NM	3,113	8,293	3,939	15,345	8,293	3,939	15,345	6.2	145.7	24.3	6.2	145.7	24.3
NY	16,713	11,422	1,424	29,559	11,422	1,424	29,559	2.6	0.2	2.5	2.6	0.2	2.5
OH	8,763	5,559	2,553	16,875	5,559	2,553	16,875	6.8	157.1	17.2	6.8	157.1	17.2
OK	5,097	6,081	2,052	13,230	6,492	1,641	13,230	17.5	91.0	25.0	21.8	52.7	25.0
OR	6,514	7,763	944	15,221	8,015	944	15,473	7.8	–	7.2	9.7	–	9.0
PA	11,377	6,566	1,888	19,831	6,566	1,888	19,831	5.1	102.5	10.1	5.1	102.5	10.1
RI	10,704	7,257	1,353	19,314	7,257	1,353	19,314	6.7	0.1	6.2	6.7	0.1	6.2
SC	6,877	6,476	3,731	17,084	6,476	3,731	17,084	5.3	231.6	23.7	5.3	231.6	23.7
SD	7,354	6,636	1,546	15,536	6,535	1,546	15,435	33.8	–	29.5	32.9	–	28.6
TN	5,438	8,083	1,075	14,596	8,192	1,075	14,705	41.4	–	37.2	42.5	–	38.2
TX	8,212	4,553	5,361	18,126	4,145	5,770	18,127	11.2	318.1	42.0	7.6	349.9	42.0
UT	4,590	5,796	716	11,102	5,051	1,284	10,925	14.7	–	13.7	6.5	79.5	11.9
VA	7,965	6,967	909	15,841	7,773	909	16,647	17.0	–	15.9	23.3	–	21.8
VT	1,164	11,542	490	13,196	11,542	490	13,196	1.9	1.3	1.9	1.9	1.3	1.9
WA	5,072	14,892	899	20,863	13,599	899	19,570	24.0	–	22.7	15.9	–	15.1
WI	6,711	8,017	1,247	15,975	8,227	1,037	15,975	8.6	30.2	10.0	10.2	8.2	10.0
WV	5,170	7,275	1,453	13,898	7,275	1,453	13,898	6.8	1.7	6.2	6.8	1.7	6.2
WY	9,607	10,186	1,406	21,199	10,186	1,406	21,199	12.2	0.1	11.3	12.2	0.1	11.3
US	7,828	8,098	2,198	18,123	8,119	2,237	18,184	13.3	100.3	19.6	13.4	103.9	20.0

NOTE: Simulated revenue includes existing plus new revenue. Percent increases are simulated per-pupil revenue amounts compared with existing 2019 revenue. See text for details on calculation.

SOURCE: VARIOUS SIMULATION DATA SOURCES (SEE TEXT)

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Clearly, the national averages mask dramatic variation between states. For example, just looking at the GSP-based version, the state and local increase is over 30 percent in five states, including nearly 50 percent in North Carolina, while the increase in federal revenue varies from zero to nearly 500 percent in Mississippi. It is worth reiterating once again what these federal increases mean. Most obviously, they reflect (upper bound) costs of the program that we are simulating. But they also suggest that roughly a dozen states—those that are not pre-eligible for federal aid but receive little or no increase in simulated federal aid (and thus little or no increase in new federal aid)—have sufficient capacity to achieve universal adequacy by raising effort up to our reasonable "fair share" minimum levels. Several of these states, such as California, Colorado, Florida, and North Carolina, currently exhibit severe and widespread negative funding gaps, and they are effectively tolerating this situation despite having the means to rectify it.

Conversely, states such as Alabama, Georgia, Mississippi, and Texas vary in their existing effort levels, but they all exhibit large remaining funding gaps even when effort is boosted to "fair share" contributions. This is a function of low capacity, high costs, or both (i.e., it is a matter of capacity relative to costs), factors that are outside states' control but constrain their ability to meet their students' needs with the kind of federal assistance that we are proposing.

ALTERNATIVE SIMULATIONS

The simulation results discussed above are, to reiterate, a "full compliance" scenario—i.e., one in which: 1) all districts' simulated revenue is increased to RLE levels regardless of whether or not they already exceed adequate funding levels (i.e., "excess local revenue"); and 2) all states' simulated state and local revenue is sufficient to meet minimum effort requirements, even if that results in simulated state aid being allocated to districts above and beyond their cost targets (i.e., "excess state aid"). Moreover, new federal aid is distributed on top of existing (pre-pandemic) federal aid, without any changes to the latter.

Regarding the second issue ("excess" new state revenue), this occurs in states where the amount of additional state revenue required to achieve universal adequacy is lower than the total amount of additional state and local revenue needed to bring the state up to minimum effort requirements (i.e., needed for that state to be eligible for new federal aid). In our "preferred" simulation, we allocate this excess new state aid anyway, distributing it proportionally to districts' gaps even after those gaps are closed (see Step 4e). We do this because the "excess" in any given district is actually funding above and beyond adequate spending targets that are based on a modest goal (national average test scores), and at the state level the extra funds are those above and beyond additional revenue needed to meet a minimum state and local effort level that is also rather modest (roughly the national average). If meeting the latter goal means overshooting the former goal in states that are underinvesting in their schools, then it is a more than reasonable requirement to impose in exchange for new federal aid. It is also a fairer standard, as it is uniform across states.

TABLE 5

National cost estimates for alternative simulations, by effort version and revenue source

SIMULATION		EFFORT VERSION	TOTAL INCREASE IN REVENUE (MILLIONS OF DOLLARS) LOCAL	STATE	FEDERAL	TOTAL
SIM1	Full compliance	GSP-based	30,747	51,220	51,795	133,762
		API-based	30,747	52,090	53,644	136,481
SIM1a	Full compliance, existing federal through national formula	GSP-based	30,747	51,220	29,241	111,209
		API-based	30,747	52,090	31,321	114,158
SIM2	Back out excess new state revenue if all funding gaps filled	GSP-based	30,747	29,200	51,795	111,742
		API-based	30,747	27,351	53,644	111,742
SIM2a	Back out excess state revenue, existing federal through national formula	GSP-based	30,747	29,200	29,241	89,188
		API-based	30,747	27,351	31,321	89,419

NOTE: SIM1a and SIM1b are simulations in which existing federal aid is also "passed through" the national funding formula—i.e., targeted exclusively at districts with final funding gaps (i.e., gaps after RLE and new state aid are applied), up to the required amount to close all gaps. SIM2 is an alternative scenario in which "excess" new state aid—the amount above and beyond that required to fill all final funding gaps in each state—is not allocated. See text for details on calculations of the full compliance simulation (SIM1).

SOURCE: VARIOUS SIMULATION DATA SOURCES (SEE TEXT)

That said, in Table 5, we report national costs for an alternative simulation in which this excess state aid is not allocated; this simulation is called Sim2, whereas our main simulation (full compliance) is Sim1.

For both Sim1 and Sim2, we also report one other alternative version (Sim1a and Sim2a) of the simulation in which existing (pre-pandemic) federal aid is also allocated through our formula—i.e., it does not "move" between states, but it is distributed exclusively to districts with final funding gaps (see Step 4f). In other words, we allocate existing federal aid the same way we do new federal aid.[8] Table 5 presents total costs, by source and effort indicator version (GSP- and API-based), for these four simulations (for Sim1, the total new federal aid is the same as in the bottom row of Table 3). The amounts in Table 5 are presented in millions of dollars.

Looking first at the comparison of Sim1 and Sim1a (the interpretation of which is identical to that when comparing Sim2 with Sim2a), note first that the total local and state increases are identical. This is because Sim1a makes no change to state and local investment. Sim1a does, however, reduce the total federal cost by approximately $22 billion in both the GSP and API versions. The reason for this is simple: in Sim1, a large portion of existing federal aid goes to districts in which simulated (and, in many cases, existing) funding is already above adequate levels, whereas in Sim1a those funds are "prioritized" for allocation to districts with negative final gaps (though, again, no *state's* existing federal funding is reduced). As a result, in Sim1a, existing federal aid "pays off" around $22 billion in final funding gaps, as it is distributed directly to districts with those gaps. In fact, existing federal aid is sufficient to achieve universal adequacy in our "full compliance" simulation in about 20 of the 34 states (or 19 of 33 states in the API-based simulation) that receive at least some new federal aid (see Table 3). And almost $23 billion of the remaining new federal aid in the GSP-based version of Sim1a would go to just four states: Texas ($14.2 billion), Georgia ($4.3 billion), Mississippi ($2.3 billion), and Alabama ($1.8 billion).

It bears reiterating that we are not recommending a change to the allocation of existing federal aid, and so Sim1a and Sim2a are merely illustrative of the fact that a large share of existing federal aid goes to districts in which funding is already above our estimated adequate levels or would be if states contributed a minimum reasonable share of their capacities to their schools.

Moving on, in comparing Sim1 and Sim2, notice first how the total cost of Sim2 is the same in the GSP- and API-based versions. This is because eliminating excess state aid—aid that is above and beyond cost targets—equalizes the total funding gap in both versions after the RLE-based increase, and the only difference between them is in how much of that total gap is filled by new state versus new federal aid. That said, we see that excess state aid amounts to roughly $22 billion overall (Sim1 new state aid minus Sim2 new state aid), which is over 40 percent of the total increase in state aid in Sim1.

This is a rather striking figure, not only because this $22 billion represents a potential reduction of the total cost of full state and local compliance by roughly 25 percent, but also because the idea of eliminating excess state aid from states' minimum effort requirements—remember that new state aid is not simulated/required in pre-eligible states—is not implausible. There is no one "correct" state and local effort level. Effort, rather, should be commensurate with costs. For instance, states with particularly low-poverty student populations (and/or more capacity) may be able to provide adequate funding for all students despite a relatively moderate effort level.

We retain excess state aid in our "preferred" simulation (Sim1) in large part because, again, our estimated adequate funding levels and our minimum effort requirements are both based on modest goals (national average outcomes in both cases). Eliminating excess state revenue would, for instance, effectively enable a possible waiver on the state and local effort requirement, one based on an implied interpretation of any funding above these targets as unnecessary "overfunding," when that is most certainly not the case. More-

8 Sim1a and Sim2a, unlike Sim1 and Sim2, are not district-level simulations. We simply subtract total state-level existing federal aid from new federal aid. In states where existing aid is sufficient to "cover" all final negative funding gaps (i.e., it is greater than states' total final funding gaps), the allocation of "excess" existing federal aid is not actually simulated.

over, as is evident in the comparison of Sim1 and Sim2, excess state aid does not affect the calculation of new federal aid, which is the primary focus of our simulation. State-by-state results for Sim2 are available in the online data visualization accompanying this report.

It bears mentioning, finally, how simulated local revenue is the same in all simulations—i.e., we do not report results for an alternative simulation that eliminates excess local revenue. This is because backing excess local revenue out of the simulation would entail mechanical complications requiring changes that would render the alternative simulation incomparable with the others. We can, however, report that approximately $13 billion out of the nearly $31 billion in simulated additional local revenue (around 40 percent) is allocated to districts in which existing funding is already above our cost targets. This estimate does not include excess local revenue to districts in which the RLE increase pushes negative gaps into positive territory (i.e., from below to above adequate), and it is therefore an underestimate of excess local revenue. Even so, it certainly suggests, as would be expected, that a sizeable portion of new local revenue does not contribute to closing negative funding gaps. As with excess state aid, however, we retain excess local revenue based on the modesty of our cost targets, the aforementioned importance of local effort as a "foundation" for funding at higher levels, and the fact that by definition excess local revenue does not affect our estimates of new federal aid.

IMPACT BY DISTRICT POVERTY AND STUDENT RACE AND ETHNICITY

Just as the national averages at the bottom of Table 4 mask a great deal of underlying state-by-state variation, the statewide estimates conceal important variation in outcomes between districts (and the students they serve). Put simply, our simulation allocates both new federal revenue as well as new state aid solely to districts with negative (i.e., below-adequate) funding gaps, and underfunded districts in the United States are far more likely to be higher-poverty and to serve larger shares of students of color compared to districts in which funding exceeds estimated cost targets.

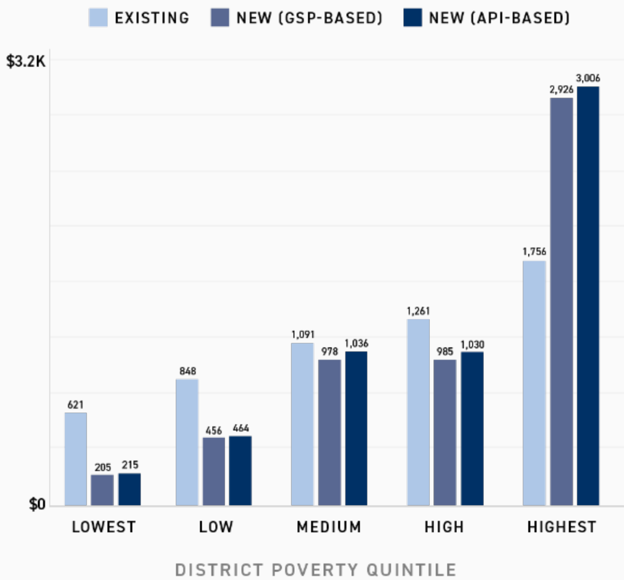
This is no accident. Recall that the guiding principle of our framework is to target new funding where it is needed most, with need in this context defined in terms of districts where funding is below estimated costs (i.e., negative funding gaps) and/or capacity is insufficient to meet costs even at reasonable "fair share" contribution (i.e., effort) levels. These two definitional components correspond directly with the two major mechanical features of our framework and simulation: allocation of most new aid based on funding gaps and minimum effort requirements. A framework with either one of these features, but without the other, would fundamentally alter our proposal and its potential impact. Most obviously, "gap-targeted" allocation without minimum effort requirements would essentially shoulder the federal government with the responsibility of closing funding gaps, an untenable proposition given, among other things, the limited federal role (about 10 percent) in K-12 funding. Conversely, minimum effort requirements without "gap-targeted" allocation of the new revenue would likely close negative funding gaps in many districts but could easily widen positive gaps in others, perpetuating or even exacerbating inequity.

In short, then, the within-state distribution of new aid is a crucial part of our framework's design, and examining these outcomes—how new revenue, both state/local and federal, is distributed to districts serving different student populations—is therefore a necessary part of evaluating its impact.

We begin with a focus on new federal aid, particularly a comparison of existing versus new (simulated) federal funding. In Figure 8 we present both U.S. average existing (pre-pandemic) federal aid per pupil and new federal aid per pupil, by district poverty quintile (note that district poverty groups are defined state by state). The estimates of new federal aid (one from the GSP-based and the other from the API-based simulation) in the figure are, to be clear, *additional* federal aid amounts. This means, for instance, that the total simulated federal aid amounts presented statewide (i.e., not by district poverty) in Table 4 represent these new amounts plus existing federal aid amounts (the light blue bars in Figure 8), and total simulated federal aid per pupil can be calculated for each poverty quintile by adding the existing to the additional amount (the latter separately for the GSP- and API-based versions).

FIGURE 8

Existing and simulated new federal revenue per pupil by effort version and district Census poverty quintile



Simulated federal aid amounts include both new and existing (prepandemic) federal aid. Adequate funding targets are adjusted to reflect non-current revenue. See text for details on calculations.

SOURCE: NATIONAL CENTER FOR EDUCATION STATISTICS; SIMULATION DATA SOURCES (SEE TEXT)

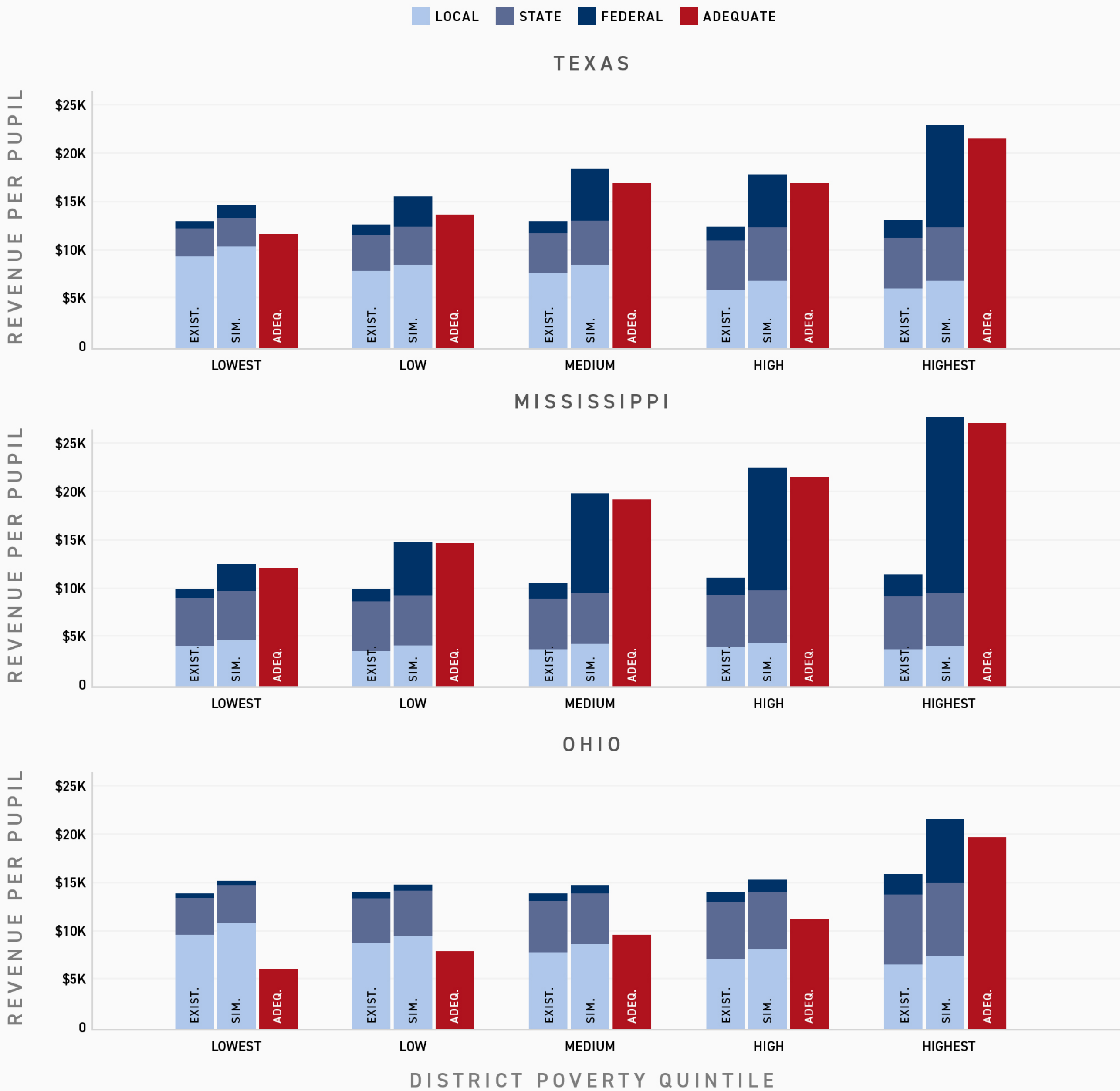
As is clear in the upward slope of the light blue bars, existing federal aid is allocated progressively, with the lowest-poverty districts in each state receiving around $600 per pupil, on average, and the highest-poverty districts receiving over $1,700 per pupil. Simulated federal aid under our proposal is also progressive, but far more so, increasing from approximately $200 per pupil in the lowest-poverty group to around $3,000 in the highest-poverty quintile, with a particularly steep increase between the fourth and fifth quintiles. Such progressivity, again, is no surprise. It is a direct result of the fact that the highest-poverty districts in each state tend to be those in which current funding is furthest below estimated adequate levels, as well as those in which the capacity to pay those costs—even at reasonable minimum effort level levels—is lowest.

The discrepancy between existing and new federal aid in Figure 8—i.e., the steeper slope of the latter versus the former—is indicative of the fact that the vast majority of existing federal funds are targeted exclusively based on proxies for need (e.g., Census poverty rates), with no consideration of effort or adequacy. This causes a laudable upward slope of existing federal aid, but one which is attenuated by the fact that, for instance, approximately 36 percent of existing federal funds go to districts in which existing funding already meets our estimated adequate levels. Although we would emphasize that this federal aid is an important part of total funding that benefits millions of students, including those in districts where existing funding already meets our (modest) cost targets, the fact remains it could be targeted instead at thousands of districts that remain underfunded, often badly so, in states where even relatively strong effort levels are insufficient to close these gaps.

It might also be useful to visualize existing and new (simulated) funding from all sources. Since the results vary between states, Figure 9 presents this comparison in just three states—Texas, Mississippi, and Ohio (simulated revenue estimates for all states, along with percent increases from which existing funding can be derived, are presented in Table 4). Specifically, the figure presents estimates of existing and simulated revenue per pupil, by source, for each district poverty quintile, as well adequate spending targets (also by poverty). Unlike Figure 8, the new federal funding levels in this graph (the dark blue portion of the middle bar for each poverty quintile) include both existing (pre-pandemic) federal aid and new (simulated) federal aid; since existing federal aid remains constant under the simulation, the dark blue portions of the existing revenue bars represent that part of the dark blue portions of the simulated revenue bars that are existing federal revenue. The adequate funding level amounts (the red bars) are adjusted to reflect non-current spending (see Step 4f above). Note, finally, that for this figure we will present the results only for the GSP-based version of the simulation. The results for every state using both versions are available using the online visualization tool that accompanies this report.

FIGURE 9

Existing, simulated, and estimated adequate revenue per pupil by source and district Census poverty quintile, selected states



NOTE: Simulated federal aid amounts include both new and existing (prepandemic) federal aid. Adequate funding targets are adjusted to reflect non-current revenue. See text for details on calculations.

SOURCE: NATIONAL CENTER FOR EDUCATION STATISTICS; SIMULATION DATA SOURCES (SEE TEXT)

Texas, for example, has enormous existing funding gaps, with almost 90 percent of its students attending schools in districts where funding is below our estimated adequate levels. As mentioned above, a disproportionately large share of all new federal aid in our simulation goes to this one state. As in most states, existing local revenue per pupil in Texas declines with district poverty (the light blue portions of the bars get shorter), and state revenue (the grayish blue portions), while progressive, serves only to equalize revenue across district poverty levels, leaving higher-poverty districts well short of the cost targets (the red bars). In some states, total state and local revenue is actually regressive: the highest-poverty districts receive substantially less revenue than the lowest-poverty districts. The state's required increase in state and local investment (from 3.2 to 3.5 percent of GSP) yields significant increases in simulated state and local revenue per pupil (see Table 2), but a combination of high costs and capacity that is not commensurate with those costs leaves large remaining gaps in the medium-, high-, and especially highest-poverty quintiles (compare the total length of the light blue and grayish blue portions of the simulated bars with the red adequate target bars); these gaps are filled with new federal aid.

Mississippi in many respects exemplifies the potential benefits of incorporating effort and capacity into federal aid allocation. In Mississippi's simulation results, we see that the state, which already exceeds our minimum GSP-based effort level of 3.5 percent (3.6 percent), sees only a very modest simulated increase in local revenue (from the "voluntary" RLE boost in Step 4a), and no increase in state aid (as such an increase is neither required nor calculated in pre-eligible states such as Mississippi). Despite this relatively high (or at least above average) effort level, Mississippi's extremely high poverty (i.e., high costs) means that the state is left with aggregate funding gaps that are at least substantial in all five district poverty quintiles, but truly enormous in the medium-, high-, and highest-poverty groups. These final gaps are covered by total simulated federal aid, the vast majority being new federal aid from our proposed framework. In other words, even at its relatively high effort level, and with all districts meeting RLE, Mississippi would still be unable to cover the costs of even our rather modest adequate spending levels. In this and similar states, federal aid is a crucial bridge to adequacy.

Finally, Ohio is another example of a state that roughly meets our GSP-based state and local effort requirements, though the state's actual effort level of 3.495 percent is just slightly below the threshold of 3.5 percent. The increase in simulated local revenue from bringing all districts up to RLE easily covers this required increase, and the increase in local revenue from meeting RLE generates fairly substantial average increases in per-pupil local revenue in most of Ohio's district poverty quintiles. Yet both existing and simulated state and local revenue in Ohio exceeds estimated adequate levels in all but the highest-poverty quintile (you can see this situation in Figure 3, where existing funding is well above adequate levels in the middle-poverty quintile). As a result, the state's remaining gaps after the simulation of new state and local revenue (entirely the latter in this case) are concentrated almost entirely in this highest-poverty group, which includes the large "Big 8" Ohio districts, such as Akron, Cincinnati, Cleveland, Columbus, Dayton, and Toledo. In other words, Ohio does a reasonably good job of funding most of its districts overall (though there are inadequately funded districts even where aggregate funding is above our targets), and its capacity is sufficient to do so; however, its highest-poverty districts are rather markedly underfunded and need a substantial amount of new federal aid to achieve adequacy.

What the simulations for all three states have in common is that, as in the vast majority of states, simulated total revenue is progressive, whereas existing revenue is generally flat, with some of the "credit" for this change going to the increase in state and local investment, but most going to new federal aid. In part because our simulation is deliberately set up such that no district's funding is decreased or redirected to a different district, new federal aid assumes most of the burden of making revenue progressive, which in turns brings total simulated funding up to adequate levels even in higher-poverty districts.

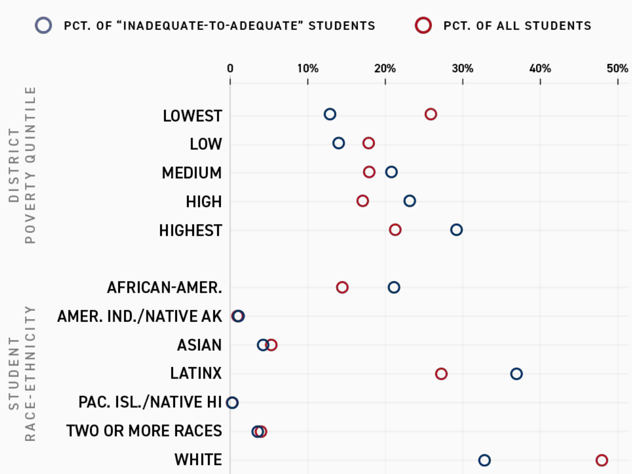
IMPACT ON ADEQUACY AND EQUAL OPPORTUNITY

Insofar as our proposed framework's end goal is universal adequacy for all U.S. public school districts, and since we are simulating full compliance with this program, the end result of the simulation is that every district's funding is at least equivalent to—and in many cases above—its estimated adequacy target. Yet it's important to keep in mind that the districts (and their students) that are currently underfunded but would "move" to adequate funding under a full compliance scenario of our proposal are more likely to share certain characteristics than others. For simplicity's sake, we'll refer to these students—those in districts that are currently underfunded but attain adequate funding levels in our simulation—as receiving “adequacy enhancements,” or simply “enhancements.”

In Figure 10, we present a dot plot in which the blue circles represent the percentage of all “enhanced” students who fall into certain groups, specifically the Census poverty quintiles of their district and their races or ethnicities. For a frame of reference, each row in the figure also includes a red circle, which represents the percent of *all* students who fall into this category, regardless of funding adequacy. For example, in the top row we see that roughly 13 percent of all enhanced students attend schools in their states’ lowest-poverty quintile, compared with about one-quarter of all students, suggesting that a disproportionately low share of “enhanced” students attend school in their states’ most affluent districts.

FIGURE 10

Percent of students in simulated "below-adequate to adequate" districts by district Census poverty quintile and student race and ethnicity



NOTE: Estimates represent the district poverty and student race/ethnicity distribution of students who in 2019 were in districts with funding below estimated adequate levels but would achieve adequate funding (or greater) due to full compliance with the simulated federal aid program. The distributions of all students are also presented for comparison. Note that the simulation does not include Alaska, the District of Columbia, Hawaii, or Nevada, which is of particular relevance when interpreting the results for the categories that include Native Hawaiians and Native Alaskans.

SOURCE: SCHOOL FINANCE INDICATORS DATABASE

The pattern of dots by district poverty shows very clearly that the enhanced students are disproportionately those who attend their states’ higher-poverty districts. For instance, 52 percent of enhanced students are in either the high- or highest-poverty quintile, which together serve only about 38 percent of all students.

And the same basic finding applies to students of color. Since Figure 10 presents national estimates, we do include all racial/ethnic groups, although a couple of them (e.g., American Indian/Native Alaskan, Pacific Islander/Native Hawaiian) are extremely sparse (note that we do not have estimates for Alaska and Hawaii, which of course are home to a large share of the nation’s Native Alaskan and Native Hawaiian students, respectively). That said, the enhanced students—i.e., those who are currently attending schools in underfunded districts but would achieve adequate funding in our simulation—are disproportionately African American (21 percent, compared with 14 percent of all students) and Latinx (37 percent, compared with 27 percent of all students). In contrast, the share of white enhanced students, while substantial (almost 33 percent), falls well short of white students’ share of the K-12 population (48 percent).

To be clear, the results presented in Figure 10 are essentially just characteristics of students/districts by funding adequacy, rather than direct results of our simulation *per se*. In other words, students in underfunded districts are more likely to be students of color and to live in higher-poverty areas, and so our simulation, which achieves universal adequacy, disproportionately benefits students of color and those in higher-poverty districts (though remember that most school districts see at least some increase in state and local and/or federal investment).

That said, the fact that enhanced students are disproportionately students of color and those attending schools in their states’ higher-poverty districts is, once again, a feature of our framework rather than a random unintended benefit. Our proposal deliberately directs a large share of new funding at districts with below-adequate funding, and “favors” states in which capacity is insufficient to meet costs even at “fair share” effort levels. Students in underfunded districts, as well as those living in states with low capacity, are generally more likely to be poor and/or students of color than their peers in adequately funded districts located in richer states; these students, therefore, benefit most from our framework.

Yet it is also important to emphasize that the beneficiaries in our simulation are a broad, inclusive group. For example, the fact that about one in four of these students attends school in one of their state's 40 percent most affluent districts (the lowest- and low-poverty quintiles), and the fact that 33 percent of "enhanced" students are white, suggest that the benefits of this proposal are widespread. This is because inadequate funding is widespread, affecting students of all races, ethnicities, and poverty levels. The enhancement tent is, therefore, a large one.

That our simulation would disproportionately benefit students of color and higher-poverty districts was baked into the approach of a framework geared toward universal adequacy. Less certain is how our proposal affects *equal opportunity*. Insofar as the end goal of both state school finance systems and federal K-12 aid programs should be to provide equal opportunity for all students to achieve common goals, any evaluation of these systems, or changes to these systems, should focus not only on adequacy, but on equal opportunity as well.

Adequacy and equal opportunity, as we define them, are related but distinct concepts. A state with universally adequate funding is one in which all districts' funding is equal to or above the adequacy bar (regardless of how that bar is set); our simulation, via full compliance, achieves this goal. Equal opportunity, however, requires that no districts' resources are any further above (or below) funding targets than other districts' resources. For example, even in a state with universal adequacy, there may be some districts with funding way above estimated adequate levels (benchmarked to a common student outcome goal) and other districts just barely above. This represents unequal opportunity, since the former students have a much better shot at achieving the goal than do the latter.

The multilayered system of local, state, and federal aid would ideally provide both adequate funding and equal opportunity—i.e., funding in all districts is above adequate levels by roughly the same proportional amount. Our simulation achieves the latter but its impact on the former is no less important, and it is entirely possible to achieve universal adequacy without improving equal opportunity. We saw in Figure 3 that there are district poverty-based "opportunity gaps" in pretty much every single state (i.e., funding is either below adequate in the highest-poverty districts and above adequate in the lowest-poverty districts, or it is substantially more adequate in the latter districts compared with the former). Any proposal that exacerbates these discrepancies, or those between students of different races and ethnicities, is extremely problematic, and any that does not improve them should cause serious concern.

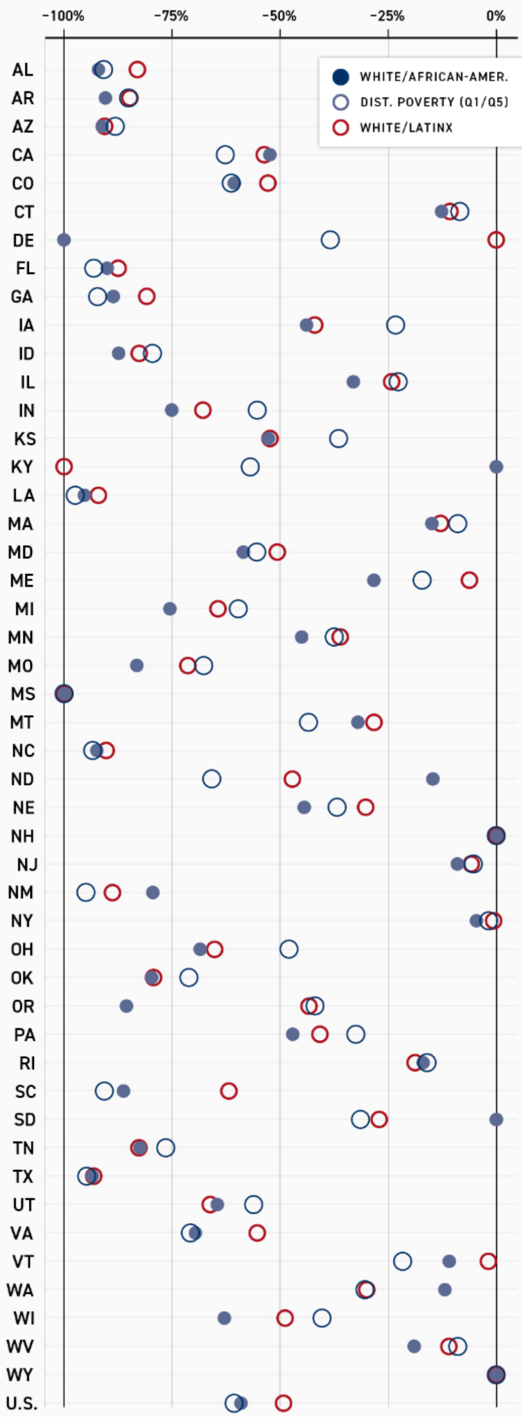
In Figure 11, we present the impact of our simulation, by state and nationally, on opportunity gaps, which are basically calculated as "gaps in gaps." First, we calculate, for each state, average existing adequate funding gaps in 2019 for six groups that enable three pairwise comparisons: the highest- versus lowest-poverty districts (Q5/Q1); the typical African American versus the typical white student; and average gaps of Latinx versus white students. These are our "baseline gaps."

We then compare these baseline gaps with those after our simulation. For the purposes of this particular exercise, however, we will not use the "full compliance" simulation, and instead will compare the baseline gaps with those in which all existing negative funding gaps are closed, without any allocation of excess state or local revenue. This choice is based on the fact that our full simulation will, compared with the "excess-free" version we are using instead, tend to "overstate," albeit moderately, the closing of district poverty-based opportunity gaps. The basic reason for this is simple: the vast majority of all new state aid goes to higher-poverty districts, and, by definition, so too does the vast majority of excess state aid. In addition, on the whole and for the same reason, the full simulation also overstates the closing of Latinx/white opportunity gaps while African American/white gaps are roughly equivalent between versions. In short, then, the estimates without excess state and local revenue are conservative.

That said, the dots in Figure 11 represent the percentage change in each gap. Note that there are two comparisons (the African American/white comparison in Delaware, and the Latinx/white comparison in Kentucky) that actually exceed -100 percent, but they

FIGURE 11

Percent reduction in district poverty- and race/ethnicity-based opportunity gaps by state



NOTE: Percent change in existing (2019) gaps under a simulation with no excess aid (see text). Gaps (existing and simulated) are the difference (in dollars PP) in adequate funding gaps between each combination of district poverty and race/ethnicity groups. Figure does not include AK, DC, HI, or NV, which are not included in the simulation.

SOURCE: SCHOOL FINANCE INDICATORS DATABASE

appear as -100 percent in the figure. In addition, there are three comparisons—the Latinx/white comparison in Delaware (+4.2 percent), the African American/white comparison in Kentucky (+31.3 percent), and the African American/white comparison in South Dakota (+27.3 percent)—that are actually positive but appear as 0 percent in the plot (the national averages, however, reflect these true estimates).

For example, let's look at the national results (bottom row). Our baseline calculations show that the average funding gap in the highest-poverty district quintile (Q5) is -$3,329 per pupil (about $3,300 below estimated adequate levels), whereas the gap in the lowest-poverty (most affluent districts, or Q1) is roughly the inverse—$3,373 per pupil above adequate. This gives us a total baseline district poverty-based (Q1/Q5) opportunity gap of $6,702 per pupil. Our "reduced" simulation yields a moderately larger average Q1 gap of $3,879 (funding is more adequate after our simulation, even in the most affluent districts), but a drastically improved simulated Q5 gap of $1,241 (in states' highest-poverty districts, simulated funding, on average, is above estimated adequate levels). This simulated opportunity gap of $2,638 (Q1 minus Q5) represents a 60 percent improvement over the baseline of $6,702 (or, in Figure 11, a change of -60 percent, represented by the hollow blue circle).

On the one hand, this is not surprising. Our proposed framework allocates most new aid based on estimated funding gaps, which are generally lower (i.e., negative or at least less positive) in higher-poverty districts. This pushes funding up in all districts, but disproportionately so in Q5, closing the opportunity gaps between Q5 and Q1. On the other hand, this is a deliberate part of our framework's design. Any program such as that proposed here, in which funding is allocated toward negative gaps, should be designed generally to reduce opportunity gaps.

We also find a roughly equivalent percentage gap reduction between African American and white students (-59 percent) and a slightly smaller but still very large decrease of 49 percent in the gap between Latinx and white students (the solid blue and hollow red circles, respectively). If we take these (conservative) results at face value, our proposed framework could potentially cut national unequal educational opportunity in half.

From this perspective, the substantial required costs come with benefits that are impressive to say the least.

These national gap reductions, predictably, vary quite a bit by state. The reduction in the poverty-based opportunity gap is at least 80 percent in 11 states, and under 20 percent in 8 states. These discrepancies are in no small part a function of the proportion of states' districts in which funding already meets our estimated adequacy targets. For instance, the reductions in all three gaps—Q1/Q5, African American/white, and Latinx/white—are comparatively small in states such as Connecticut, Massachusetts, New Jersey, New York, Vermont, and West Virginia. That's because these are states in which large shares of districts already meet or exceed our cost targets. This means relatively little new revenue is needed to achieve universal adequacy, and the impact on the gaps of Q5 and students of color is thus attenuated.

Conversely, in states such as Alabama, Arizona, Arkansas, Louisiana, Mississippi, New Mexico, North Carolina, and Texas, large proportions of students attend districts with funding below, often far below, estimated adequate levels. In these states, gap reductions are larger (typically 75-95 percent) because they receive more new funding. Most of this new revenue is targeted based solely on funding gaps, generating large reductions in equal opportunity gaps. In several of these states, our simulation effectively eliminates unequal opportunity gaps.

In general, the three "types" of gap reductions within states tend to be similar in magnitude (i.e., the three dots for each state are relatively close together). A couple of exceptions to this generalization, such as North and South Dakota, have much smaller reductions in their African American/white gaps versus the other two comparisons. This is pretty much due to the very small shares of African American students in these states. One extreme exception, however, is Kentucky, which has a total (100 percent) reduction in its Latinx/white gap, zero reduction in its African American/white gap (again, it is actually +31.3 percent), and a poverty-based gap toward the middle (about -57 percent). This is largely because Kentucky's African American student population is somewhat modest as a share (10 percent of all students), but over half of them attend schools in just one district (Jefferson County) with a small positive funding gap, while another 13 percent are located in the Fayette County district, which has a fairly large positive gap (about $1,700). As a result, the average funding gap for white students actually improves more than that for African American students.

RECOMMENDATIONS

Current federal aid allocation policies, which distribute funds through states to local public school districts based largely on proxies for need/costs such as Census poverty rates, do an admirable job of targeting aid to school districts serving the neediest students. This is not only because indicators such as poverty rates are fairly effective predictors of K-12 costs, but also because higher-poverty districts are more likely than their affluent counterparts to be underfunded. But these policies have one significant, underlying weakness: they fail to consider a states' effort levels (and their capacities to raise revenue).

What we have provided here is a framework, with proof of concept walkthrough calculations, for a reasonable, outcome-oriented new approach to federal aid allocation that builds on the strengths of current federal aid policy while incorporating measures of effort and capacity. We simulate one reasonable manifestation of that framework: a voluntary supplemental federal aid program in which eligibility is contingent upon "fair share" state and local contributions (i.e., minimum effort), and new federal funds fill the gaps between that contribution and adequate funding levels in eligible states. In many respects, this framework harmonizes federal aid with state school finance formulas, which are designed to account for both the differences in needs and costs across local public school districts and the differences in districts' ability to raise their own revenue. In our proposal, federal aid is essentially integrated on top of this existing structure, helping to compensate for funding deficiencies in states and districts that cannot meet their students' needs, even when state and local effort is relatively strong.

The majority of this report lays out the detailed steps of the simulation and examines its results. At several points, we have discussed choices we made that could plausibly be altered in any actual implementation of our framework. These include:

- The specification of our cost model (the NECM);
- The selection of our "benchmark" common student outcome goal of national average test scores;
- Our minimum state and local effort requirements (set roughly at the averages—3.5 percent of GSP and 4.0 percent of API);
- The decision to retain "excess" new state and local revenue; and
- The RLE requirement in determining federal aid in pre-eligible states.

We explained and defended all these choices, but any and every one could potentially be revised under a faithful implementation of our framework. Our simulation is one possible manifestation of that framework, which, we believe, is flexible enough to "withstand" even substantial changes to these and other core features.

IMPLEMENTATION

Federal direct authority over state and local taxation is more limited than state authority over local taxation. Still, implementation of our framework can be guided by approaches taken in the states. We split our implementation recommendations pertaining to the proposal herein into two parts: statutory and regulatory.

First, new federal statues can define the formula by which new federal school aid would be allocated. This statutory formula—like any state school finance formula—would depend on annual federal budget allocations to make that formula whole. A set of calculations to determine the federal aid distribution would be laid out in statute. But, fully funding those calculated amounts requires sufficient federal appropriations. Typically, where those appropriations come up short, aid allocations would be prorated accordingly (proportionately), but the statute itself could include language that protects the most needy and federal aid-dependent states and districts under such circumstances.

Our "proof of concept" simulation also provides a basis for estimating what the federal appropriations would need to be in order to fully fund the new formula. If Congress wished to reduce the federal obligation, it could pass more of the cost onto states by increasing the state and local effort requirement. Conversely, if Congress wished to allocate more revenues, the federal government could relax that requirement while still fully funding cost targets. Simulations of this type are often used in aligning state budgets with local effort requirements toward fulfilling funding adequacy goals (Atchison et al. 2020; Kolbe et al. 2019).

Second, to make that formula work correctly toward edging local districts and states toward adequacy benchmarks, as well as to ensure that the formula adapts with time and context, regulatory guidance and pressures will be required. Our proposals for federal statutory and regulatory changes are laid out below.

STATUTORY

Our proposed formula for distributing federal aid built on the calculations described above would be written into federal law, much as state funding formulas are laid out in state law. This includes the specific equations for determining each district's federal aid allotment and the specific data and measures to which those calculations are applied.

Eligibility for federal aid would be contingent on states raising a minimum contribution level of state and local combined effort as a percentage of either GSP or API, which we argue are the two most appropriate state capacity indicators currently available. We have presented results separately for both versions, but a federal program might use both simultaneously (e.g., eligibility is based on whether states meet minimum requirements in one or the other).

The federal aid formula would calculate the distribution of new federal aid in eligible states to local districts based on the expected local contribution and state aid allocation, where those estimates would be guided by an approach similar to ours, in which:

1. Local districts are being asked only to put up their reasonable local share given their capacity, which could be measured using an index constituted by measures of both wealth and income; and
2. Increases in state aid (in addition to existing state aid, through each state's formula) are allocated toward closing gaps between local contributions and estimated adequate levels.

The federal aid formula will distribute new federal aid to local districts to close all gaps remaining after state and local effort requirements are met. While federal aid may be calculated with respect to a total state and local effort requirement, and that requirement may be reasonably enforceable as a condition to receive federal aid, other parameters in our simulations may be less feasible to control directly through federal legislation. For example, we do not think it is feasible to have the government mandate specific required local effort, and thus the state and local split of funding used in calculating federal aid amounts. Direct enforcement of state and local shares would essentially require the federal government to rewrite and mandate reform of each state's school finance formula. We have, in a sense, done just that in our simulation, but suggest that this portion of our simulation be used as regulatory guidance under any new federal legislation implementing our framework, rather than written into the act itself.

Control over these specific elements, while left to the states, will be addressed under regulatory guidance and supervision for compliance as a condition for continued participation in the federal aid program. Determining whether a state has met its aggregate state and local contribution requirement will be difficult, if implausible, to mandate as a hard requirement under the law, but participation in the program may be contingent on proof of continuous compliance, and, initially, on sufficient progress toward compliance.[9]

9 Green, Baker, and Oluwole (2021, p. 550-53) explain that federal aid programs that impose requirements on states might be subject to legal scrutiny. The Supreme Court (South Dakota v. Dole) laid out a four-part test for determining the limits of the federal government's spending power: 1) the program is in pursuit of the general welfare; 2) any condition for accepting the funds is unambiguously stated so that states can knowingly choose whether to accept the funding; 3) there is a relation between the federal interest and the purpose of the federal funding; and 4) the spending condition does not violate another constitutional provision. We believe our framework meets these requirements, but we also recognize that it may be perceived by the court as an offer "too good to refuse" for some states, and thus as too coercive, given the amount of increased federal aid involved.

REGULATORY

Key elements of regulatory guidance will be to monitor and evaluate states participating in the federal program in order to ensure they are:

1. Obligating equitable local effort;
2. Distributing state aid appropriately with respect to local effort and needs; and
3. Meeting their aggregate state and local effort requirements.

The Department of Education's National Center for Education Statistics will be charged with:

1. Developing an index combining measures of local wealth, housing values, taxable property wealth (if available), and other economic indicators that are predictive of local fiscal capacity, defined as current ability to raise local revenues in support of local public school systems. Regression-based approaches such as those used herein are recommended in determining the right mix of and weight on various predictive measures to be included in the index.
2. Updating (for example, every three years), via cost modeling methods such as those used in our National Education Cost Model, the predicted costs per pupil for each district nationally to achieve the target set of outcome goals (which in our simulation are set to national average outcomes on reading and math assessments in grades 3 to 8).
   a. The NCES will provide "re-calibration" reports on three-year cycles to be used directly in recalculating the distribution of federal aid.
   b. The statutory formula will require that calculations for distributing federal aid be based on these cost estimates, but the statutory formula will defer to regulation herein on the updating of these estimates.
3. Providing each state with reports of district-by-district:
   a. Expected (predicted) local contributions, per the department's fiscal capacity index;
   b. Expected distribution of state aid to local districts toward closing adequacy gaps; and
   c. Statutorily calculated distributions of federal aid based on the calculations of the first two estimates herein.

The Department of Education will also engage in a cycle of reporting and audits of state school finance systems, comparing those systems—i.e., their actual revenues and expenditures across districts—against the recommended frameworks, calculations, and distributions. All of this is consistent with the department's regulatory power (Green, Baker, and Oluwole 2021).

Additionally, several of our past analyses have revealed strong patterns of racial disparity in the funding gaps faced by local public school districts (Baker et al. 2020). We recommend that the department's Office for Civil Rights (OCR) begin collecting, evaluating, and auditing funding gaps across states to assess the prevalence and severity of racial disparities. These audits and data collections may be done biennially as part of existing OCR data collections. These data should be publicly reported and may also trigger investigation into state school finance systems, leading to potential withholding of federal aid if corrective action is not implemented.

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