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ABSTRACT

Congress responded to the COVID pandemic's disruptions to instruction with unprecedented federal aid for school districts. While this relief has been widely characterized as a major windfall for K-12 education, per-pupil amounts vary considerably across districts, as will the costs districts face for COVID mitigation and recovery. In this paper, we conduct simulations to understand the potential distribution of net effects of the pandemic and federal aid on the finances of local school districts in the next several years. In our baseline scenario, we assume one-time adjustment costs of $500 per pupil plus additional costs of $1,000 per student in poverty and $500 per student not in poverty per year for four years. Federal aid was distributed proportional to the longstanding Title I program, which sends more money per pupil to higher poverty districts. Low-poverty districts are therefore projected to face some budgetary shortfalls, while many higher poverty districts are projected to have excess funds, which they could direct towards long-standing challenges. While our findings depend on key assumptions about the COVID-related costs, we find significant district-level variation in simulated net fiscal impacts, in part but not completely due to poverty rates, across all the scenarios we consider.

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I. Introduction

Congress responded to the COVID-19 pandemic and the major disruptions to schooling it caused with nearly $200 billion of federal aid for schools, distributed through the Elementary and Secondary School Emergency Relief (ESSER) funds of three relief packages. This is roughly 12 times the typical level of funding distributed through Title I, the US Department of Education's single largest program for elementary and secondary schools, and amounts to almost $3,500 per pupil, compared to average spending per-pupil in the United States of about $13,000. So far, media attention has focused on a handful of high-profile districts. For example, in Michigan, the distribution of federal relief funds generated major political controversy (Levin 2020), as Detroit received more than $6,000 per pupil, while low-poverty suburban districts like Bloomfield Hills received less than $100 per pupil. And many charter districts that serve students who are demographically similar to those in Detroit Public Schools received less than $1,500 per pupil (Malkus 2021).

In this paper, we address the question of whether the federal aid is enough to cover schools' COVID-related costs systematically and explore how the answer to this question depends on district characteristics. While almost all districts face considerable costs associated with the pandemic, some districts have been impacted more than others. And the amount of per-pupil federal aid that districts received varied considerably across districts: all three ESSER packages sent funds proportionate to existing Title I allocations, which are based largely, but not entirely, on child poverty.

We simulate the net fiscal impact of COVID and the federal relief under a range of assumptions about how much COVID affects costs for schools, how those costs depend on child poverty rates, and the effect of the pandemic on state aid to school districts. Because so much remains unknown about district needs, the efficacy of spending to address "learning loss" and other student needs related to COVID, and the effects of the pandemic on district revenue, this exercise is by necessity an approximation. In our baseline scenario, we assume districts have one-time adjustment costs of $500 per pupil that do not depend on student demographics; we assume districts have to spend an additional $1,000 per student in poverty and $500 per student not in poverty per year for four years starting in 2020-21 to address learning loss and other problems created by the disruption to schooling.

In the baseline scenario, we estimate that about 62 percent of all districts, and over 95 percent of high-poverty districts (those with child poverty rates of 25 percent or more, accounting for about 15 percent of enrollment), have received enough ESSER aid to cover the (assumed) costs associated with COVID. About 85 percent of low-poverty districts are expected to face budgetary shortfalls of more than $200, and about 23 percent would experience shortfalls more than $500 per pupil per year for four years. This is because Title I—and therefore ESSER—sent significantly more funding to higher-poverty districts. Many state governments and local school districts have the fiscal capacity to address potential funding shortfalls in lower-poverty districts, though in some cases, they may be constrained by school funding rules.[1] Most high-poverty districts and many moderate-poverty districts are projected to have excess funds under our baseline scenario; that is, they received more funding from ESSER than necessary to cover the assumed COVID-related costs. These districts often have long-standing unaddressed needs and enroll many students who were not working at grade level even prior to the pandemic; many of these districts could benefit from capital investments, which the substantial influx of ESSER funding may provide a unique opportunity to address.

II. Background

Our simulation of the net fiscal impact of the pandemic on school districts requires assumptions about how COVID changed district costs and revenues. In this section we discuss what guides the thinking behind these assumptions, which we later make explicit (see Table 3). We begin with the spending side, then proceed to revenues.

Effect of COVID on district costs

Our goal is to compare the COVID-related changes in revenue to additional costs a school district *might incur* to respond to COVID. While it is an intuitively appealing exercise to estimate the cost of making up for learning that did not occur, and addressing other student needs wrought by the pandemic, it is not straightforward to make such a calculation. First, we do not know how much "learning loss" the pandemic caused and for whom (see West and Lake 2021 for a recent overview, suggesting students lost a few months of learning on average), nor do we know the extent of effects on mental health and other outcomes. Second, there is considerable uncertainty about what interventions would catch students up academically and address the mental health and other needs of students.

Moreover, focusing new spending exclusively on "COVID-related" learning loss would make little practical sense: an effective intervention for a child who is behind in reading is a good investment even if that child would have been behind in reading absent the pandemic. Well before COVID many students—especially those living in poverty and Black, Hispanic/Latino, and American Indian and Alaska Native (AIAN) students—were not scoring at grade level on standardized tests. Only 35 percent of American fourth graders were assessed as proficient (or above) in reading, and 41 percent were proficient in math in 2019 on the National Assessment of

[1] In addition to state and local laws affecting school finance, including tax and expenditure limitations, "maintenance of equity" provisions in the American Rescue Plan constrain states in how they distribute reductions in revenue across school districts, and how school districts distribute reductions in resources across school buildings.

Educational Progress, also known as the “Nation’s Report Card” (National Center for Education Statistics 2021).

Some of this systemic underperformance is related to limited funding, but not all of it. Research shows additional school funding on average has been associated with improvements in achievement (Jackson 2020), but these magnitudes do not come close to the impacts found in experimental evaluations of the most cost-effective programs, such as high-dosage tutoring (Harris 2009). Leaders face legal, political, and organizational constraints when it comes to selecting programs, and educators face many challenges replicating successful programs in new settings and at a larger scale. It is unrealistic to expect schools to suddenly have the tools at their disposal to resolve these longstanding challenges now, even with the considerable influx of federal funds, so it would be unrealistic for us to estimate the cost of “undoing the effects of COVID.” Instead, we consider a range of hypothetical spending scenarios based on the costs of packages of intervention and mitigation approaches that school districts might plausibly pursue.

To inform the spending levels in our simulations, Table 1 lists some activities districts might spend on in response to COVID, and their associated costs. Not all districts will be able, or want, to undertake all of these activities, even with sufficient funding, due to difficulty finding the right staff, long-term contracts, or other logistical constraints. ESSER funding is temporary (it is a one-time infusion and districts have four years to spend it), so districts may wish to avoid entering into new long-term contracts and direct spending away from salaried positions towards goods or contracted services. While we offer Table 1 as a menu of activities and related prices rather than transactions, survey data suggest that districts are indeed spending their relief funds from the American Rescue Plan on many of these activities (The School Superintendents Association 2021).[2] The COVID school costs appendix explains how we arrive at each of these estimates in greater depth.

Table 1 lists all costs in per-pupil annualized terms. For some activities, like high-dosage tutoring, this per-pupil, per-year unit of measurement is intuitive: the cost is incurred based on the number of pupils served per year. But not all activities involve all students. Cost estimates for high-dosage tutoring range from about $1,500 to $3,800 per student *served*; if half of a district’s students receive tutoring, this would come out to $750 to $1,750 per pupil overall. Given the disproportionate impact of COVID on economically disadvantaged students, we construct spending scenarios in which poor students receive more services than students who are not poor.

[2] The School Superintendents Association’s survey of school district leaders found that approximately three-quarters of respondents are using ARP funds for summer programs and additional enrichment activities, and nearly half will use the funds for high-dosage tutoring. Two-thirds of respondents are using the funding to add support staff, including counselors, social workers, and reading specialists, to their staff. Additionally, school district leaders reported using ARP funds for internet connectivity and technology, educator professional development activities, and the implementation of social-emotional learning practices.

For example, we could assume that a district provides high-dosage tutoring each year for half its students in poverty, and for one-quarter of non-poor students. (In practice, districts might allocate tutors or funds to schools based on poverty, but would likely assign tutors to individual students within a school based on academic needs rather than economic disadvantage.)

Early research on how COVID has affected student achievement suggests that impacts were more negative for students experiencing prolonged periods of distance learning in the 2020-21 school year than for those attending school in person. Some of the costs listed in Table 1 are relevant for all districts, such as transition costs during initial closures in spring of 2020, and expenditures that make in-person schooling safer, like HVAC upgrades and school nurse staffing. Yet the need for other activities, especially those targeting "learning loss," is likely greater in districts that operated remotely for longer, while districts who returned to fully in-person instruction sooner may have less to catch up on. We do not incorporate data about whether schools operated in-person or remote in the analysis.

Revenues

School districts are financed by a combination of taxes they levy directly (local revenue) and aid from their state and the federal government. On average, about 46 percent of revenue is local, and 46 percent is from the state, with the rest coming from federal aid, but these numbers vary considerably both across and within states. Local, state, and federal funds changed in different ways in response to the pandemic and the associated recession. We discuss how revenue from each level of government was affected by the pandemic below.

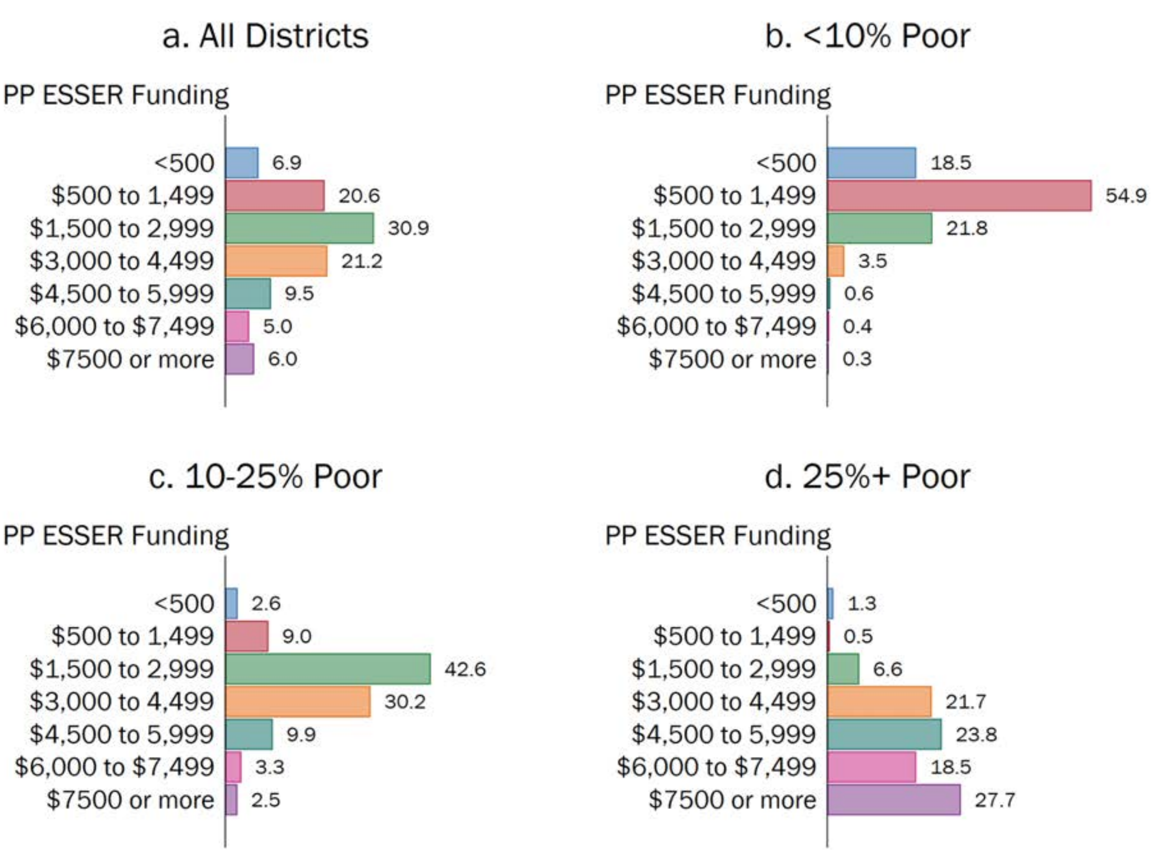
Federal revenues

Though federal revenue is typically small relative to state and local revenue, the federal government increased funding substantially as a result of the pandemic. Congress established an Elementary and Secondary School Emergency Relief (ESSER) Fund with $13.5 billion allocated proportional to past Title I amounts as part of the Coronavirus Aid, Relief, and Economic Security (CARES) Act passed in March 2020. Subsequent relief packages authorized two more ESSER funds with slightly different requirements but the same allocation formula: $54.3 billion under the Coronavirus Response and Relief Supplemental Appropriations Act (CRRSA) and $122.7 billion in the American Rescue Plan (ARP). In this paper, we analyze the impact of the three ESSER funds collectively.[3]

[3] Congress also provided relief to states through a Governor's Emergency Education Relief (GEER) Fund. Governors distributed those funds to school districts, as well as child care providers and institutions of higher education, at their discretion.

Estimated ESSER allocation (including all three rounds of ESSER and weighted by district enrollment) was $3,431 per pupil but varies considerably (we describe how we make these estimates below): districts in the 10th percentile received an estimated $774 per pupil, while those in the 90th percentile received $7,192 per pupil (Appendix Table 1). Figure 1 shows the distribution of per-pupil ESSER funding for all districts and by district poverty rate. If all COVID-induced costs to districts were incurred uniformly per pupil (that is, without additional costs for students in poverty), one could simply compare the ESSER levels in Figure 1 with district costs from COVID to answer the question of whether federal funding is sufficient. For example, if costs are less than $1,500 per pupil, then 28 percent of districts did not receive enough federal funds. The simulation exercise described below allows costs to vary based on student poverty and incorporates potential reductions in state aid to estimate net fiscal impacts of the pandemic under alternative scenarios.

Figure 1. Distribution of Per-Pupil ESSER Funding



Title I allocates funding based on the number of *poor children* in the district, so much of the variation in per-pupil ESSER funding is due to differences in child poverty rates. At the same time, Title I funding amounts per eligible child vary even conditional on child poverty rates. For example, consider the poorest districts, with at least a quarter of children in poverty: 8 percent of students attend districts receiving less than $3,000 per pupil in ESSER funds, while 28 percent attend districts receiving $7,500 or more per pupil. That is because the formulas rely on lagged state-level average spending per-pupil, and reward low-population states, as well as states and districts with historically high poverty levels (relative to newly high-poverty places) (Gordon and Reber 2020). The formulas also direct more funds to higher enrollment districts conditional on child poverty rates.

State revenues

State budget shortfalls can lead to cuts in state aid to local school districts, especially since many states have balanced budget requirements. The instability of state revenue over the business cycle poses a particular problem to poorer districts, which rely more heavily on state aid, compared to their lower-poverty counterparts. While local revenue per pupil is negatively correlated with district poverty rates in nearly all states, the opposite is typically true for per-pupil state and federal aid. Across the states, state revenue per pupil is either uncorrelated with child poverty rates (at the school district level), or *positively* correlated with it—in other words, most states distribute state aid progressively, providing more funding per pupil to higher-poverty districts.[4]

Early in the pandemic, many (including us) were concerned that reductions in revenues to state governments would translate to reductions in state aid for local school districts, as happened during the Great Recession (Gordon and Reber 2020; Clemens and Veuger 2020). Instead, the stock market recovery, relative stability of incomes for high-earners, and federal aid to states meant that the impact of the pandemic on state revenues was short-lived in most (or all) states. State governments also will receive $195 billion from the ARP.

The impact of the recession on states' economic activity and their own-source revenue varied considerably. States that rely more on progressive income taxes and capital gains taxes fared well as the incomes of higher-income households were steady and the stock market recovered; states that rely on sales or energy taxes—and those with large leisure and hospitality sectors—fared worse (Dadayan and Rueben, 2021). Comparing own-source state revenue collected from April 2020 to March 2021 with the same period a year earlier shows that only a handful of states experienced major reductions in own-source revenue.[5] But even for those states with the most drastic reductions—in the most extreme example, revenue fell around 40 to 45 percent over that time in Alaska—federal relief to states replaced lost own-source revenue multiple times over.

[4] This interactive from the Urban Institute shows how redistributive each state is and how the states compare.

[5] We thank Lucy Dadayan for sharing unpublished estimates from the Urban Institute's State and Local Finance Initiative.

For the bulk of our analyses, we assume state revenue to school districts is unaffected by COVID, since at this point the fiscal position of all states appears to be at least as good as before the pandemic; many states have surpluses. Some states did experience major shortfalls earlier in the pandemic, and indeed some did cut funding to schools temporarily, so we consider one scenario assuming that states cut aid to school districts. We do not incorporate projected state government surpluses in our analyses, as it is not clear whether or how these surpluses would translate into state funding for school districts. Though states often earmark a set share of general revenue or specific funding streams (e.g., lottery or tobacco taxes) for their education budgets, this would not apply to the federal relief funds for states. However, we note that to the extent that ESSER funding is not enough to meet the COVID-related, or long standing, needs of some school districts, many states are in a good fiscal position and could increase their own education spending to help address these issues.

Local revenues

The majority of local revenue raised by school districts is from property taxes, which are relatively stable in recessions. During the Great Recession, revenues from property taxes proved more stable than income or sales tax collections even though property values declined, as local governments were able to adjust property tax rates to hold revenue constant (Evans, Schwab, and Wagner 2019). Some school districts are fiscally dependent, meaning they do not levy taxes themselves but receive local revenue from a "parent government," usually a city or county government. These parent governments may also rely on other revenue sources, like sales taxes, in addition to or instead of property taxes. Still, because most districts depend primarily on property taxes for local revenue, which were largely unaffected by the pandemic, we do not incorporate shocks to local revenue into our fiscal impact scenarios.

III. Methods and data

The goal of this paper is to assess whether federal aid to local school districts is enough to cover COVID-related costs, and how the answer to this question varies across districts with different characteristics. The three ESSER funds were divided among states and then among districts within states proportionate to Title I funding in previous years (FY2019 for the CARES Act funding, and FY2020 for the other two funds), so in theory, one simply needs to compare the ESSER funding to expected costs. This is not straightforward, however, because the Title I formulas are quite complex, making it difficult to draw conclusions about how much different districts will receive by inspecting the formulas. (In fact, the formulas lead to allocations that are sufficiently confusing that Congress mandated a study to help understand them in 2016.) In addition, whether or not federal aid is sufficient depends on other factors—notably the costs of addressing COVID and the impact on state aid to local school districts—that are uncertain. We therefore simulate changes to school districts' costs and revenues under a range of assumptions.

Parameters

The simulations have four parameters which vary across scenarios. We consider the following categories of COVID-related spending that school districts might need to undertake: (1) one-time "all-student" costs; (2) per-pupil "recovery" costs for poor students; and (3) per-pupil "recovery" costs for non-poor students. We assume the recovery costs are spread over four years and express them in per-pupil annual terms. The precise division between one-time and recovery costs is not critical, nor is the time pattern of spending. The key point is that higher-poverty districts are assumed to need more money to address the effects of COVID. We discuss the assumptions we make about costs in the different scenarios below.

The fourth parameter is the percentage reduction in state aid. We use estimates of shortfalls in states' own-source revenue made earlier in the pandemic (Whitaker 2020). These estimates overstate the state revenue shortfalls, but reflect the relative impacts across states (for example, shortfalls are larger in states with large travel and leisure sectors) to provide a sense of the effect of incorporating impacts on state aid on our understanding of how many districts—and which districts—received enough federal aid. We assume state aid to school districts is reduced proportional to each state's revenue shortfall (as if states made across-the-board cuts to balance their budget). That is, if a state has a 2 percent revenue shortfall, we assume state aid to all districts in the state is cut by 2 percent, which will affect districts that rely more on state aid.

Data

To simulate the net fiscal impact of the pandemic under alternative spending and revenue scenarios, we use school-district level data on enrollment, revenue by source, and Title I funding from the Annual Survey of School District Finances/F33 for the 2018-19 school year (the most recent available). We use data on the racial composition of enrollment from the NCES Common Core of Data and child poverty rates from the Census Small Area Income and Poverty Estimates (SAIPE). The child poverty rate from SAIPE is based on children who live in the district's geographic boundaries, whether or not they attend public schools; this is the measure used to allocate Title I. Implicitly, our simulations proceed as if the ESSER funding came in 2018-19; this approach will surely mis-estimate ESSER funding and other aspects of school finance for some individual districts, but we expect the patterns we identify in the analysis based on 2018-19 data to be similar to what we would see with more up-to-date data.

Table 2 presents summary statistics for the districts in our sample. Due to various data limitations, we exclude districts in Hawaii, Vermont, and the District of Columbia, districts with enrollment less than 150, districts that are missing key variables, and charter school districts. Our working sample of 11,673 districts accounts for about 94 percent of public school enrollment. The average district enrolled 4,055 students, and the average child poverty rate in the sample is 16.4 percent. (All summary statistics other than enrollment itself are weighted by enrollment.)

The average district had enrollment that was 52 percent white, 26 percent Hispanic, 15 percent Black, 5 percent Asian and 1 percent American Indian and Alaska Native (AIAN) and had about $13,000 in current expenditure and $15,000 in total revenue per pupil.[6] About $1,100 in revenue was from the federal government, with the remainder roughly split between state and local sources.

Scenarios

Table 3 shows the parameters (columns 1-4) we use for the four scenarios (rows 1-4) we consider in the analysis. In the baseline scenario (row 1) we assume $500 per-pupil in one-time all-student costs, corresponding to the transition costs noted in the last row of Table 1 and described further in the cost appendix. Because that estimate was based on district reports of spring 2020 costs and the pandemic is ongoing, we double these costs in the larger all-student costs scenario (row 2).

We assume districts also have costs associated with COVID recovery that span at least several years as districts cope with significant disruptions to schooling and COVID-related trauma for students. These are not estimates of annual total, current, or instructional spending per student, but of additional spending over the counterfactual, incurred in response to COVID. We assume districts incur such costs annually over the four-year ESSER spending period.[7] In practice, these costs might be weighted toward COVID mitigation (personal protective equipment, air filters, etc.) in the early years and additional instructional support (tutoring, counseling, etc.) in later years.

Because the impact of COVID has been so much more severe for disadvantaged communities, we assume higher per-pupil recovery costs for students in poverty in each scenario. Column 2 contains annual per-pupil recovery cost assumptions for poor students, and column 3 for students who are not poor. Our baseline annual cost estimate is $1,000 per poor student (in rows 1, 2, and 4), and $500 per non-poor student (in each scenario). The activities and corresponding costs detailed in Table 1 provide a rough way to interpret these magnitudes. For example, a district spending $500 per non-poor student could provide a quarter of those students with high-dosage tutoring, or upgrade or replace the HVAC systems for about half the non-poor students. A district spending $1000 per poor student could provide half of those students with high-dosage

[6] Total expenditures include current and capital expenditures. Consistent with the literature, we focus on current expenditures here.

[7] Districts have until September 2024 to obligate funds from the American Rescue Plan (ARP), so the funds could be spent over more than four years. Similarly, districts mostly did not access CARES funding in the Spring of 2020, though they knew that funding would become available soon. For the purposes of this exercise, we are less concerned about the precise timing of spending but want to allow a distinction between one-time costs and ongoing costs and differential ongoing costs for poor and non-poor students.

tutoring, upgrade or replace HVAC systems for all of those students, or send about two-thirds of poor students to summer school.

Those examples could address some long standing needs that districts have had insufficient resources to address, but may be insufficient to fully serve students deeply impacted by COVID. We offer an alternative high costs for poor students scenario, described in row 3, in which districts spend an additional $3,000 (as opposed to $1,000) per poor student in response to COVID. $3,000 per pupil is a significant amount of funding compared with average current expenditure of about $13,000 per pupil (Table 2). It could fund high-dosage tutoring for three-quarters of students in poverty, along with HVAC upgrades or replacements and more than doubling socio-emotional supports for all students in poverty.

To explain how the simulation works, we walk through the calculations for Montgomery County Public Schools (MCPS) in Maryland; see the methods appendix for more detail. In 2018-19, MCPS enrolled 162,680 students, had a poverty rate of 8.2 percent, received $25.6 million in Title I funding, $925 million in state aid, and had total revenue of about $3.34 billion. The three ESSER funds totaled about 12 times a normal year's Title I allocation, so we estimate MCPS will receive about $319 million in ESSER funding (12 X $25.6 million), or about $2,000 per pupil. Under the baseline assumption of $500 per pupil, we estimate $81 million in one-time all-student costs ($500 X 162,680), leaving $238 million in ESSER funds, which we assume is spent over four years, so $59.5 million per year is available for recovery. Under the baseline assumption that recovery costs $500 and $1,000 per-pupil, per-year for non-poor and poor students, respectively, MCPS would need to spend $88 million per year for four years (there are roughly 13,322 poor students and 149,357 non-poor students in the district). This means that under these baseline assumptions, MCPS would face a net shortfall of $28.5 million or $175 per pupil, equal to less than 1 percent of total revenue. In scenario 4, we assume that state aid declines by 2.5 percent—or $23 million (2.5 percent of $925 million)—in which case the shortfall would be $51.9 million or $319 per pupil.

We next do the same calculations for Chicago Public Schools. Chicago has a higher poverty rate and is estimated to receive about $8,000 per pupil in ESSER funds and to have a surplus of $1,267 per pupil per year for four years under the baseline assumptions. This does not necessarily mean that Chicago will be "overfunded;" instead, it means that ESSER funds are more than enough to cover COVID-related costs under the baseline assumptions. However, as is common in high-poverty school districts, many of Chicago's students were not working at grade level or had unmet needs prior to the pandemic; any "excess" ESSER funding could be put to good use addressing those needs.

IV. Results

Before presenting the results of the simulated net fiscal impacts of COVID under the four scenarios, we discuss the effects on federal revenue (the estimated ESSER allocations) and state aid (which applies to scenario 4 only). To understand how the simulated fiscal effects of COVID vary across districts depending on their poverty rate, racial composition, and enrollment, we regress the outcomes (ESSER allocations, simulated reductions in state aid, and simulated net fiscal impacts in the four scenarios) on these district characteristics.

Distribution of effects on federal revenue

Table 4 shows the regression estimates for estimated per-pupil ESSER funding. We assume ESSER is spent over four years and annualize the effects. This normalization is for ease of interpretation and not substantive; some districts may choose to spend their funds more quickly and others spread them out. The average annualized per-pupil ESSER allocation is $858 (corresponding to $3,431 total, Appendix Table 1). All regressions are weighted by enrollment. Since ESSER was distributed proportionate to Title I and we estimate the ESSER allocation by simply multiplying a district's reported Title I funding by 12 (assuming the funding is allocated as prescribed by law), this analysis is therefore effectively an analysis of how Title I is distributed.

In the first three columns, we regress per-pupil ESSER on the share of children in poverty, racial and ethnic composition, and enrollment separately, and we include all three in column 4. In column 5, we add state fixed effects to understand the correlates of funding *within* states. For every 10 percentage point increase in the share of children in poverty, a district's annualized per-pupil ESSER allocation is about $610 higher, on average (column 1). The share of children in poverty explains 64 percent of the variation in ESSER allocations, consistent with the fact that it is the most important—but not the only—input in the Title I formulas. The Title I formulas also have some state-specific factors and incorporate non-linearities in the share of children in poverty (Gordon and Reber 2020).

Districts with high shares of American Indian and Alaska Native (AIAN), Black, or Hispanic students received more ESSER funding per-pupil, and districts with higher Asian and Pacific Islander shares received less, compared to districts with more white students (column 2). For example, for every 10 percentage point increase in the share of students who are Black, annual per-pupil ESSER is about $200 more, on average. Each 10 percentage point increase in the Hispanic share is associated with a $100 increase. Racial composition does not enter the Title I formulas, so any correlation of racial composition with ESSER funding is due to a correlation of racial composition with variables that are used in the formulas, most importantly, the share of children in poverty. Larger districts received more per-pupil ESSER funding, on average (column 3). The distribution of district size is highly skewed: the coefficient implies that moving from the 25th to 75th percentile of the enrollment distribution is associated with an additional $170 per pupil, and moving from the 10th to the 90th percentile is associated with an additional $327 per pupil. Enrollment, *per se,* also does not enter the Title I formulas directly, but two of the formulas allocate more funding per eligible child to districts with large *numbers* of poor students, which benefits larger districts more. Enrollment is virtually uncorrelated with the share of children in poverty (not reported).

In column 4, we include all three sets of variables at the same time, and in column 5 we add state fixed effects. Not surprisingly, the coefficients on the racial composition variables and log enrollment are smaller when the share of children in poverty is also included in the regression (and the sign is reversed for the coefficient on the share of students who are Asian). Controlling for the share of children in poverty and district size, school districts serving more AIAN or Black students received more ESSER funding per pupil. The same is true within states (the coefficients are slightly larger); and within states, Hispanic-serving school districts also get more, and Asian-serving districts less ESSER, on average, compared to districts with high white shares of students. Again, these regressions are simply showing how the way that Title I is allocated benefits different types of districts. A full explanation of what aspect of the formulas account for these correlations is beyond the scope of this paper; we refer interested readers to a Congressionally-mandated study of the formulas (Snyder et al. 2018).

Distribution of effects on state revenue

Table 5 shows the same set of regressions with the simulated reduction in state aid per pupil as the dependent variable. Recall that this parameter is only relevant for Scenario 4 (State Aid Shortfall). We simulate the state aid shortfall by multiplying the projected state own-source revenue shortfall by each district's state aid. Essentially, we assume that states do across-the-board cuts proportional to their own revenue shortfalls (which, as discussed above, did not last nearly as long as initially expected). Districts that depend more on state aid and/or are in states with bigger revenue shortfalls will have larger simulated state revenue shortfalls. In practice, projected state-level revenue shortfalls (in percentage terms) are not correlated with district-level characteristics (not reported); that is, the states where own-source state revenue was more impacted by the pandemic are similar in terms of the share of students in poverty, racial composition, and district size, compared to states where state revenue was less affected. Therefore, the correlations in Table 5 are mostly driven by how much per-pupil state aid different types of districts receive. With or without controls, districts with higher shares of children in poverty have higher simulated state revenue shortfalls. This is because most states allocate more aid to poorer districts, so they would be more affected by (simulated) cuts to state aid. The coefficients on the racial composition variables are only statistically significant in the specification with state fixed effects, and in any case, are not substantively large.

Distribution of simulated net fiscal impacts

We focus the discussion here on the distribution of net fiscal impacts overall and by district poverty and racial composition and present summary statistics (Appendix Table 2) and regression analyses (Appendix Tables 3) for completeness.

Figure 2 shows the distribution of net fiscal impacts, weighted by enrollment, for the four scenarios. The average net impact across the scenarios ranges from a shortfall of $177 (with the assumption of higher costs for poor students) to a "windfall" of $151 per-pupil in the baseline scenario. In each scenario, however, the projected net impact varies a lot across districts. For ease of exposition, we refer simply to districts throughout the discussion, but recall that these statistics are weighted by enrollment; we refer to net impacts within $200 per pupil (in either direction) of the no-COVID counterfactual as minimal fiscal impacts.

Figure 2. Simulated Net Fiscal Impact Per-Pupil, Alternative Scenarios

For the baseline scenario, about a third of districts would experience minimal fiscal impacts, and less than 10 percent would face a shortfall of $500 or more (per pupil per year for four years) and would need to find alternative sources of revenue to cover the costs assumed in this scenario. About 10 percent of districts would have an extra $500-$1,000 per pupil to spend, and 7 percent could spend $1,000 or more per pupil beyond the costs assumed in the baseline.

In scenario 2, where we assume the one-time all-student costs are $1,000 per pupil instead of $500, over half of districts would experience a shortfall of more than $200 per pupil (annually for four years). In scenario 3, which assumes higher recovery costs for poor students, roughly a third of districts would experience shortfalls more than $500, and another third would have shortfalls of $200-500; only a small share of districts would experience significant windfalls. Finally, scenario 4, which incorporates reductions in state aid, has similar impacts to scenario 2 (which raised one-time costs).

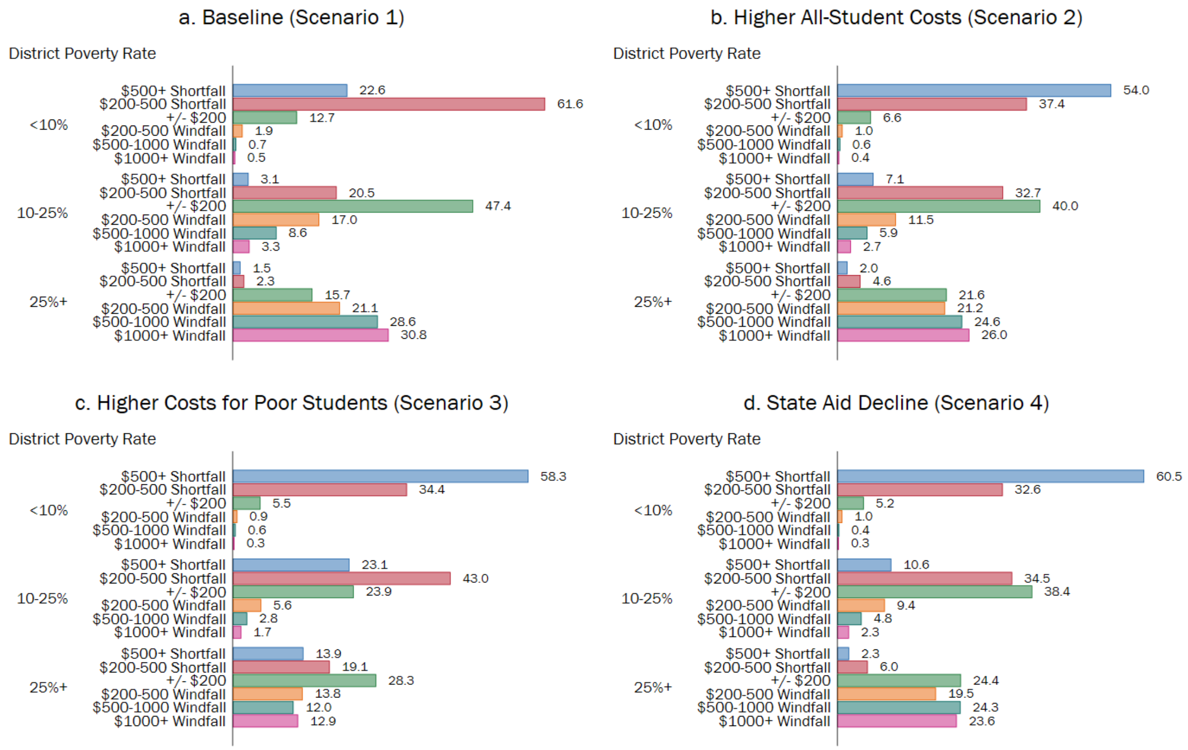
In figure 3, we show how the simulated effects vary with district poverty rate. We group districts with child poverty rates of less than 10 percent (low), 10-25 percent (medium), and more than 25 percent (high) together. The low poverty districts account for 28 percent of districts and (coincidentally) serve 28 percent of students. The medium poverty districts comprise 55 percent of districts and 56 percent of students, and 16 percent of districts serving 15 percent of students are in the high poverty group.

The strong, positive relationship between the share of children in poverty and the per-pupil ESSER allocation (Figure 1 and Table 4) explains why higher-poverty districts are more likely to have windfalls and low-poverty districts more likely to have shortfalls across all the scenarios. In the baseline scenario, almost all high-poverty districts are projected to have enough ESSER funding to cover their costs, and almost 60 percent would have a windfall of $500 per pupil per year for four years or more. The results for scenario 3 suggest that most high-poverty districts received enough ESSER funding to cover $500 per pupil in transition costs plus $500 for every non-poor child and $3,000 for every poor child each year for four years. Many could afford substantially more than this.

About 61 percent of low-poverty districts would experience modest annualized shortfalls of $200-500 per pupil, and 23 percent would face shortfalls greater than $500 per pupil per year (panel a). In all the other scenarios, large shares of low-poverty districts face substantial shortfalls. In the case of scenario 2, it is because there are assumed to be substantial all-student costs, but ESSER effectively only allocates aid for poor students, so the aid does not match the needs. In scenario 3, ESSER is not enough to cover both the moderate all-student and non-poor student costs and the high recovery costs for the relatively small number of poor students these districts serve.

The results for districts with moderate poverty rates, not surprisingly, fall in between those for low- and high-poverty districts: The typical district in this range would experience minimal net fiscal impacts in the baseline scenario. Less than a quarter of such districts would experience large shortfalls (more than $500 per pupil per year) in any scenario, and less than 15 percent would experience substantial windfalls in any scenario.

Figure 3. Simulated Net Fiscal Impact Per-Pupil, by Child Poverty



In Figure 4, we show how the distribution of net fiscal impacts varies depending on the racial composition of enrollment. We divide districts into three categories based on the share of enrollment that is non-white: districts that are less than 25 percent non-white (these districts comprise 30 percent of enrollment nationally), 25 to 75 percent non-white (45 percent of enrollment), and more than 75 percent non-white (25 percent of enrollment).[8] Recall that the distribution of ESSER funding does not take race into account explicitly, nor do any of the parameters assumed in the simulation. Differences in simulated net fiscal impacts by racial composition of districts arise because of the correlation of racial composition with poverty and other features of the Title I formulas, as discussed above. Interestingly, even controlling for the share of children in poverty, districts serving more AIAN, Black, and Hispanic students have larger (positive) net fiscal impacts across scenarios, though controlling for poverty yields smaller magnitudes (Appendix Tables 3a-3d). Due to the high correlation (about 0.5) between the non-white share and the share of children in poverty, the patterns in Figure 4 largely mirror those in Figure 3.

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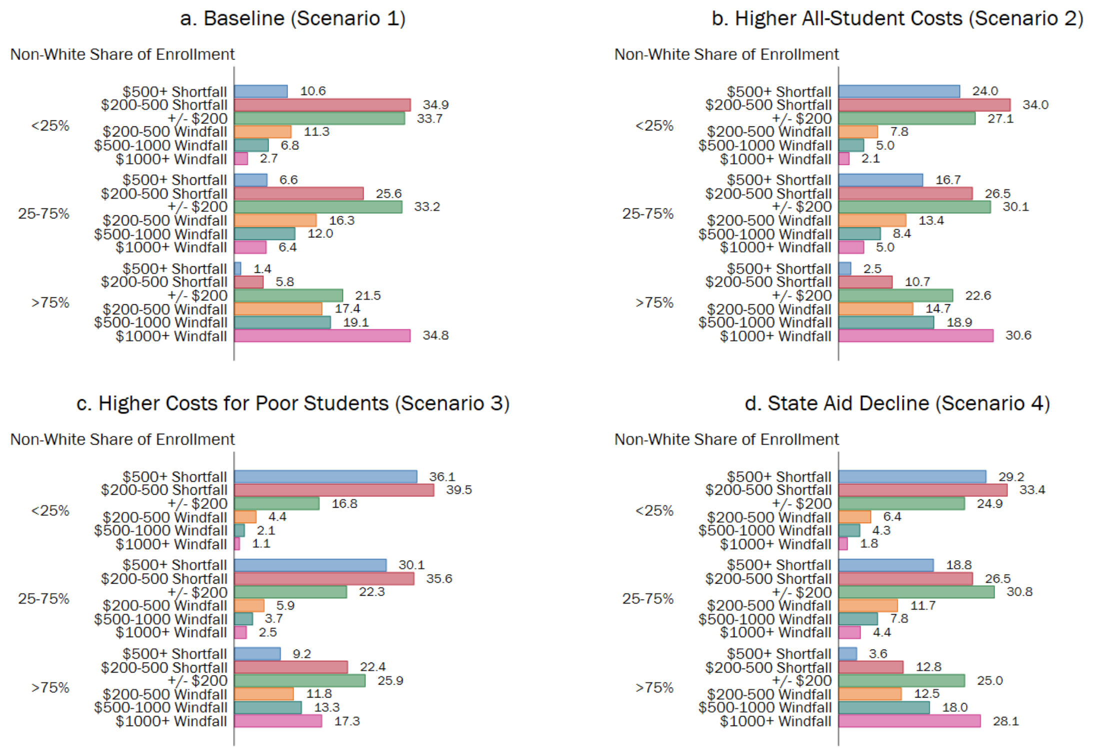
[8] We divide districts according to the non-white share of enrollment for simplicity. Appendix Tables 3a to 3d present regression analyses that consider all the racial/ethnic categories and enters the enrollment share in the regression linearly rather than categorically. There are some differences in net fiscal impacts across non-white racial groups, but the categorical variables in Figure 4 capture the key relationship between net fiscal impacts and racial composition. (Notably, the sign is flipped for Asians relative to the other non-white groups, but this group is small.)

In the baseline scenario, about 7 percent of predominately non-white districts are projected to face shortfalls more than $200 per-pupil annually for four years, and more than a third are projected to have a windfall of more than $1,000 per pupil annually for four years. Most high-poverty districts received enough ESSER funding to afford the higher costs of COVID recovery for poor students in Scenario 3, and about a third would have a substantial windfall even in that scenario. Many predominately white districts would need to find other sources of revenue to cover the COVID costs assumed across scenarios, and the distribution of net fiscal impacts for districts that are between 25 and 75 percent non-white falls in the middle; most received enough ESSER funding to cover costs in the baseline scenario, but about a third would face shortfalls.

Figure 4. Simulated Net Fiscal Impact Per-Pupil, by Racial Composition



V. Discussion

The fiscal impact of COVID on states was both less than expected and less than the impact of the Great Recession, and federal aid to states in response to COVID was substantial. In this context, ESSER funding is not critical for addressing state revenue shortfalls or for fiscal stimulus. But school districts have incurred and continue to face new, often substantial, costs because of COVID. An important limitation of our analysis is that we do not have district-level data on how

COVID affected instructional modalities (remote, hybrid, or in-person) and educational achievement. Without this information, it is hard to know how the revenue windfalls correspond to the distribution of COVID-induced local needs. The return to in-person instruction and to universal standardized testing should make it possible for researchers to address these questions.

By design, high poverty districts benefit most from ESSER funding. Even under our scenario with the highest remediation costs for students in poverty—$3,000 per pupil per year for four years—we estimate the majority of higher poverty districts will receive more than enough to cover these costs. The high correlation between child poverty and district racial composition means that predominately non-white districts received substantially more ESSER funding, enough to cover considerable COVID-related costs. And while high-poverty districts in states that operated close to normally during 2020-21 may have fewer needs for interventions targeting COVID-specific learning loss, they could direct ESSER funding to address long-standing unmet educational needs of their students.

ESSER funding presents a unique opportunity for many high-poverty districts, many of which serve predominately non-white student populations, to invest. Because these funds are a one-time infusion, districts may be reluctant to take on new recurring obligations, including through hiring, anticipating the "fiscal cliff" when funds run out and are not replaced. But they can enter into contracts for high-dosage tutoring or teacher coaching, or make improvements to infrastructure. Ideally, if districts learn that certain programs or investments they make with ESSER funds are effective, they would look for ways to fund those programs when ESSER funding runs out—by redirecting funds from less-effective programs or seeking new revenue sources.

Because of COVID's disproportionate impact on low income students, the decision to weight poverty heavily in ESSER allocations was appropriate, but the reliance on Title I allocations leaves most low poverty districts with moderate to large shortfalls. It also directs substantial windfalls to many—but not all—high poverty districts, with a relatively quick timeline for spending. Normally, $16 billion per year is distributed using these formulas; the three rounds of ESSER funding sent over $190 billion, amplifying concerns about aspects of the Title I formulas that are not transparent and may appear arbitrary or unfair (Gordon and Reber 2020). Given how much has already been distributed proportional to Title I, Congress may wish to consider alternative, simpler ways of incorporating child poverty into federal aid in the future.

States—especially those that are flush with surplus from ARP—may wish to help districts address shortfalls, which would mean sending money specifically to low-poverty districts. Congress worried that states would "undo" the progressive allocation of ESSER and in ARP created "maintenance of equity" requirements for states (governing how they distribute any cuts to school districts) and districts (governing how they spread any cuts across schools). These requirements could limit the ability of states to direct more funding to lower-poverty districts that received less ESSER funds. State school finance laws also constrain state's discretion at responding to the specific pattern of windfalls and shortfalls created by ESSER. And some state finance programs limit how much districts can raise locally. Federal funding directed disproportionate resources to higher poverty districts—with disproportionate needs. However, if state or local laws, including school finance regimes and tax and expenditure limitations, prevent these lower-poverty districts from raising revenue to address their own COVID-induced needs, the progressive nature of federal relief could create unintended problems.

Distributional issues aside, ESSER funding could present an enormous opportunity for many districts, especially high-poverty districts. Well-chosen interventions and investments could have larger impacts compared to additional funding induced by changes to state school funding formulas because the politics of budgeting and staffing can make it challenging to free up significant funds for new (potentially more cost-effective) programming without a substantial influx of new funding. District needs vary, and the best use of funds will also vary, and some districts may choose to use ESSER similarly to how they spend existing revenue.

This analysis was designed to shed light on the magnitudes of federal aid for schools compared to reasonable assumptions about the costs associated with the COVID pandemic. The analysis suggests that many low-poverty districts and some moderate-poverty districts could face funding shortfalls, though most would be modest and state and local governments are mostly in a good fiscal position to help address these. We estimate that many high-poverty and some moderate-poverty districts will have moderate to substantial windfalls. This implies that ESSER funding is more than enough to address the "COVID costs" assumed in our scenarios, but that does not necessarily mean it is too much, or even enough, to fully address the needs of students, many of whom were struggling before the pandemic. Though advocates, parents, and policymakers are interested in how funds can be used to address pandemic-related needs, it is challenging to disentangle those from long standing unmet needs, particularly in high-poverty districts that received substantial ESSER funding. In practice, a focus more on which uses of funds are likely to be cost-effective and less on which of students' problems were *caused by COVID* (which is essentially unknowable) could prove useful in districts with substantial ESSER windfalls.

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Tables

Table 1. Costs of activities schools might undertake in response to COVID

Activity	Cost
Match/SAGA high-dosage tutoring as implemented in Chicago Public Schools (Anders, Guryan, and Ludwig 2016)	$3,800 per pupil served per year
Match/SAGA estimate if operating at scale in Chicago Public Schools (Anders, Guryan, and Ludwig 2016)	$2,500 per pupil served per year
High-dosage tutoring at scale with AmeriCorps volunteers (Kraft and Falken 2020)	$1,461 per pupil served per year
HVAC replacement or upgrade	$949 per pupil per year (spread over 4 years)
COVID testing prior to fall 2021 (universal)	$2,430 per pupil per year
COVID testing from fall 2021 forward	Cost *to school districts*: approximately zero.
Summer school	$1,402 per pupil per year
Hiring one full-time nurse per school	$172 per pupil per year
Increasing socio-emotional supports	$600 per pupil per year
Transition costs	$500 per pupil one-time costs

See Cost Appendix for sources and calculations.

Table 2. Summary Statistics, District Characteristics

	Mean	Std Dev	Median	10th pctile	90th pctile	N
Enrollment	4,055	15,139	1,356	297	7,984	11,683
Child Poverty Rate	16.4%	9.0%	15.7%	5.6%	28.8%	11,673
Percent AIAN	1.1%	5.4%	0.3%	0.1%	1.3%	11,674
Percent Asian	5.4%	7.9%	2.5%	0.4%	14.9%	11,674
Percent Black	15.3%	18.2%	8.2%	0.7%	40.0%	11,674
Percent Hispanic	26.4%	25.3%	16.4%	2.8%	69.1%	11,674
Percent White	51.8%	30.1%	54.3%	9.5%	91.6%	11,674
PP Current Exp	13,029	4,853	11,548	9,005	19,267	11,683
PP Total Revenue	15,314	5,438	13,770	10,473	21,943	11,683
PP Local Revenue	7,105	4,821	5,720	2,631	13,830	11,683
PP State Aid	7,094	3,247	6,479	3,628	11,809	11,683
PP Federal Aid	1,115	738	999	440	1,926	11,683

Authors' calculations. Summary statistics are weighted by enrollment (except enrollment). Enrollment, expenditure and revenue data are from Census Annual Survey of School District Finances/F-33 Fiscal Year 2019; racial composition is from NCES Common Core of Data; child poverty rate is from Census Small Area Income and Poverty Estimates (SAIPE). Vermont, Hawaii, and Washington, D.C., districts with enrollment less than 150, and districts with per-pupil total revenue greater than 5,000 or less than 40,000 are excluded.

Table 3. Simulated Cost and Revenue Scenarios

	(1) Per-Pupil One-Time Costs	(2) Per-Pupil Annual Cost for Poor Students	(3) Per-Pupil Annual Costs for Non-Poor Students	(4) State Aid Impact
1. Baseline	$500	$1,000	$500	None
2. Larger All-Student Costs	$1,000	$1,000	$500	None
3. High Costs for Poor Students	$500	$3,000	$500	None
4. State Aid Shortfall	$500	$1,000	$500	Moderate

Per-pupil one-time costs (column 1) are assumed to have occurred once and apply to all students and districts. Per-pupil costs for poor students (column 2) and for non-poor students (column 3) are average projected annual per-pupil costs spent over four years for poor and non-poor students, respectively. The Moderate state aid impact scenario assumes that state aid is reduced by the average of the FY2020 estimated impact and the middle scenario for FY2021 divided by 3. See text for details.

Table 4. Predictors of Projected ESSER Allocation Per Pupil

	(1) Per-Pupil ESSER	(2) Per-Pupil ESSER	(3) Per-Pupil ESSER	(4) Per-Pupil ESSER	(5) Per-Pupil ESSER
Share of Children in Poverty	6069.2***			5584.1***	5731.5***
	(441.0)			(354.4)	(51.3)
Share AIAN		2410.9***		888.6*	1011.7***
		(447.7)		(435.0)	(69.8)
Share Asian		-760.7		423.5	-137.7**
		(426.3)		(303.5)	(49.5)
Share Black		1994.0***		440.4**	624.1***
		(205.0)		(145.9)	(26.0)
Share Hispanic		980.7***		19.3	105.7***
		(124.7)		(164.0)	(22.5)
ln(Enrollment)			99.3**	46.1*	79.5***
			(31.7)	(21.8)	(2.7)
Constant	-137.5***	307.1***	-88.4	-602.9**	
	(39.0)	(48.2)	(280.9)	(199.3)	
Observations	11,673	11,674	11,683	11,665	11,665
State Fixed Effects	No	No	No	No	Yes
Mean of the DV	857.9	857.3	857.7	857.4	857.4
R^2	0.637	0.391	0.061	0.675	0.763

Robust standard errors in parentheses. Per-pupil ESSER values assume ESSER aid is spent over four years. See text for details about simulated variables. Vermont, Hawaii, and Washington, D.C., districts with enrollment less than 150, and districts with per-pupil total revenue greater than 5,000 or less than 40,000 are excluded.

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 5. Predictors of Per-Pupil Shortfall in State Aid, Scenario 4

	(1) PP State Revenue Shortfall	(2) PP State Revenue Shortfall	(3) PP State Revenue Shortfall	(4) PP State Revenue Shortfall	(5) PP State Revenue Shortfall
Share of Children in Poverty	204.6**			193.4***	286.7***
	(61.1)			(47.5)	(6.8)
Share AIAN		127.5		64.1	14.6
		(124.9)		(130.9)	(9.2)
Share Asian		-48.2		49.2	-96.6***
		(35.1)		(32.7)	(6.5)
Share Black		21.1		0.3	4.0
		(24.7)		(32.3)	(3.4)
Share Hispanic		44.3		35.8	39.1***
		(42.3)		(44.5)	(3.0)
ln(Enrollment)			-4.0	-7.7**	-1.9***
			(3.1)	(2.6)	(0.4)
Constant	128.4***	148.1***	200.5***	190.2***	126.8***
	(10.7)	(9.0)	(25.3)	(24.8)	(3.2)
Observations	11673	11674	11683	11665	11665
State Fixed Effects	No	No	No	No	Yes
Mean of the DV	162.0	161.9	162.0	161.9	161.9
R^2	0.061	0.032	0.009	0.092	0.651

Robust standard errors in parentheses. Dependent variable is simulated per-pupil state aid shortfall; see text for details. Vermont, Hawaii, and Washington, D.C., districts with enrollment less than 150, and districts with per-pupil total revenue greater than 5,000 or less than 40,000 are excluded.

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Appendix Table 1. Summary Statistics, ESSER Funding

	Mean	Std Dev	Median	10th pctile	90th pctile	N
Estimated ESSER Per Pupil	3,431	2,733	2,941	774	7,192	11,683
Estimated ESSER Per Poor Pupil	19,660	8,487	18,525	11,085	29,774	11,673
ESSER Per Pupil (AEI Data)	3,249	2,514	2,817	781	6,699	14,147
ESSER Per Poor Pupil (AEI Data)	19,561	7,472	18,686	11,579	28,228	11,124

Authors' calculations. Summary statistics are weighted by enrollment. See text for details. Vermont, Hawaii, and Washington, D.C., districts with enrollment less than 150, and districts with per-pupil total revenue greater than 5,000 or less than 40,000 are excluded. AEI data (Malkus, 2021) include charter school districts, but we do not have child poverty data for these districts so cannot calculate ESSER per poor child.

Appendix Table 2. Simulated Per-Pupil Funding Net Fiscal Impact, Alternative Scenarios

	Mean	Std Dev	Median	10th pctile	90th pctile	N
1. Baseline	151	648	20	-461	1023	11,673
2. Higher All-Student Costs	26	648	-105	-586	898	11,673
3. Higher Cost for Poor Students	-177	522	-302	-606	482	11,673
4. State Aid Shortfall	-11	627	-149	-596	828	11,673

Authors' calculations. Weighted by enrollment; see Methods Appendix for details. Vermont, Hawaii, and Washington, D.C., districts with enrollment less than 150, and districts with per-pupil total revenue greater than 5,000 or less than 40,000 are excluded.

Appendix Table 3a. Predictors of Per-Pupil Net Revenue Impact, Baseline (Scenario 1)

	(1) PP Net Impact	(2) PP Net Impact	(3) PP Net Impact	(4) PP Net Impact	(5) PP Net Impact
Share of Children in Poverty	5569.2***			5084.1***	5231.5***
	(441.0)			(354.4)	(51.3)
Share AIAN		2271.3***		888.6*	1011.7***
		(445.8)		(435.0)	(69.8)
Share Asian		-629.6		423.5	-137.7**
		(401.1)		(303.5)	(49.5)
Share Black		1869.0***		440.4**	624.1***
		(197.2)		(145.9)	(26.0)
Share Hispanic		906.1***		19.3	105.7***
		(127.5)		(164.0)	(22.5)
ln(Enrollment)			96.2**	46.1*	79.5***
			(30.5)	(21.8)	(2.7)
Constant	-762.5***	-366.4***	-765.4**	-1227.9***	-1592.0***
	(39.0)	(44.5)	(268.0)	(199.3)	(23.9)
Observations	11673	11665	11673	11665	11665
State Fixed Effects	No	No	No	No	Yes
Mean of the DV	150.9	150.5	150.9	150.5	150.5
R^2	0.597	0.377	0.064	0.638	0.737

Robust standard errors in parentheses. Dependent variable is simulated annual per-pupil net revenue; see text for details. Vermont, Hawaii, and Washington, D.C., districts with enrollment less than 150, and districts with per-pupil total revenue greater than 5,000 or less than 40,000 are excluded.

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Appendix Table 3b. Predictors of Per-Pupil Net Revenue Impact, Higher All-Student Costs (Scenario 2)

	(1) PP Net Impact	(2) PP Net Impact	(3) PP Net Impact	(4) PP Net Impact	(5) PP Net Impact
Share of Children in Poverty	5569.2***			5084.1***	5231.5***
	(441.0)			(354.4)	(51.3)
Share AIAN		2271.3***		888.6*	1011.7***
		(445.8)		(435.0)	(69.8)
Share Asian		-629.6		423.5	-137.7**
		(401.1)		(303.5)	(49.5)
Share Black		1869.0***		440.4**	624.1***
		(197.2)		(145.9)	(26.0)
Share Hispanic		906.1***		19.3	105.7***
		(127.5)		(164.0)	(22.5)
ln(Enrollment)			96.2**	46.1*	79.5***
			(30.5)	(21.8)	(2.7)
Constant	-887.5***	-491.4***	-890.4**	-1352.9***	-1717.0***
	(39.0)	(44.5)	(268.0)	(199.3)	(23.9)
Observations	11673	11665	11673	11665	11665
State Fixed Effects	No	No	No	No	Yes
Mean of the DV	25.9	25.5	25.9	25.5	25.5
R^2	0.597	0.377	0.064	0.638	0.737

Robust standard errors in parentheses. Dependent variable is simulated annual per-pupil net revenue; see text for details. Vermont, Hawaii, and Washington, D.C., districts with enrollment less than 150, and districts with per-pupil total revenue greater than 5,000 or less than 40,000 are excluded.

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Appendix Table 3c. Predictors of Per-Pupil Net Revenue Impact, Higher Costs for Poor Students (Scenario 3)

	(1) PP Net Impact	(2) PP Net Impact	(3) PP Net Impact	(4) PP Net Impact	(5) PP Net Impact
Share of Children in Poverty	3569.2***			3084.1***	3231.5***
	(441.0)			(354.4)	(51.3)
Share AIAN		1706.6***		888.6*	1011.7***
		(439.3)		(435.0)	(69.8)
Share Asian		-104.5		423.5	-137.7**
		(330.4)		(303.5)	(49.5)
Share Black		1371.8***		440.4**	624.1***
		(169.2)		(145.9)	(26.0)
Share Hispanic		606.3***		19.3	105.7***
		(143.4)		(164.0)	(22.5)
ln(Enrollment)			83.7**	46.1*	79.5***
			(25.8)	(21.8)	(2.7)
Constant	-762.5***	-561.0***	-974.2***	-1227.9***	-1592.0***
	(39.0)	(31.2)	(220.4)	(199.3)	(23.9)
Observations	11673	11665	11673	11665	11665
State Fixed Effects	No	No	No	No	Yes
Mean of the DV	-177.1	-177.4	-177.1	-177.4	-177.4
R^2	0.378	0.292	0.074	0.442	0.595

Robust standard errors in parentheses. Dependent variable is simulated annual per-pupil net revenue; see text for details. Vermont, Hawaii, and Washington, D.C., districts with enrollment less than 150, and districts with per-pupil total revenue greater than 5,000 or less than 40,000 are excluded.

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Appendix Table 3d. Predictors of Per-Pupil Net Revenue Impact, State Aid Decline (Scenario 4)

	(1) PP Net Impact	(2) PP Net Impact	(3) PP Net Impact	(4) PP Net Impact	(5) PP Net Impact
Share of Children	5364.6***			4890.7***	4944.8***
in Poverty	(416.9)			(340.6)	(51.0)
Share AIAN		2143.8***		824.5*	997.0***
		(390.0)		(366.6)	(69.5)
Share Asian		-581.3		374.3	-41.1
		(406.3)		(292.6)	(49.3)
Share Black		1848.0***		440.1**	620.1***
		(188.3)		(136.5)	(25.8)
Share Hispanic		862.0***		-16.6	66.6**
		(94.6)		(129.5)	(22.3)
ln(Enrollment)			100.2**	53.8*	81.4***
			(28.6)	(20.5)	(2.7)
Constant	-890.9***	-514.6***	-966.0***	-1418.1***	-1718.8***
	(41.5)	(42.4)	(254.7)	(184.3)	(23.8)
Observations	11673	11665	11673	11665	11665
State Fixed Effects	No	No	No	No	Yes
Mean of the DV	-11.1	-11.4	-11.1	-11.4	-11.4
R^2	0.592	0.383	0.074	0.642	0.722

Robust standard errors in parentheses. Dependent variable is simulated annual per-pupil net revenue; see text for details. Vermont, Hawaii, and Washington, D.C., districts with enrollment less than 150, and districts with per-pupil total revenue greater than 5,000 or less than 40,000 are excluded.

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Cost Appendix

This appendix explains the estimates in Table 1 and is not intended as a comprehensive summary of all COVID-related costs schools may incur.

High-dosage tutoring

Anders, Guryan, and Ludwig (2016) conducted a randomized controlled trial of Match/SAGA tutoring in Chicago Public Schools: on average, ninth and tenth grade students at risk of dropping out gained one to two additional school years in math in a single year. That program had one tutor working with two students at a time, teaching on-grade-level material aligned with current classwork while relying on assessment to identify specific skills missed in previous years and teaching those as well.

Not all tutoring programs are created equal, but the most effective so-called "high-dosage" ones are consistently associated with a specific combination of programmatic features. High-dosage tutoring, optimally implemented, should include: three to five 30-minute tutoring sessions per week, during the school day at the school site; student:tutor ratios of no more than 4:1 and ideally 2:1; the same tutor assigned to students for the entire school year; initial and ongoing tutor training and supervision; and high quality instructional materials (Kraft and Falken 2020). A meta-analysis drawing on studies conducted in a range of pre-COVID contexts found such programs produce learning gains corresponding to three to 15 additional months of schooling (Nickow, Oreopoulos, and Quan 2020).

HVAC replacement or upgrade

According to the GAO, 41 percent of school districts need to replace or update their HVAC systems; based on this figure, approximately 36,000 schools need updates to or replacements for their HVAC systems (Government Accountability Office 2020). If, theoretically, half of these schools needed updates to their ventilation system, and the other half needed completely new ventilation systems, the total cost for these updates would be approximately $72 billion (Griffith and Pearce 2020). Dividing this figure by the 36,000 schools in need of new or updated HVAC systems, this results in a cost of approximately $2 million per school. Based on the average public school enrollment of 527 students per school, the cost per pupil is approximately $3,795 (Riser-Kositsky 2019). Spreading this over four years, the annual per-pupil cost would be $949.

COVID testing prior to fall 2021 (universal)

RAND reports test prices ranged from $5 (rapid) to $130 (PCR) per test (Evans, Schwartz, and Master 2021); EdWeek reports a similar range from $10 to $120 (Gewertz 2021). $67.50 is the midpoint of this range. If each student were tested once a week over a 180-day school year, the cost per pupil would be $2,430.

COVID testing from fall 2021 forward

As of fall 2021, school districts can turn to a range of funding sources to support COVID testing. For example, Los Angeles Unified School District, which is held up as a national exemplar with its weekly universal testing program, is relying mainly on funds from the Federal Emergency Management Association (Newberry, Gomez, and Blume 2021). The Department of Health and Human Services is allocating $10 billion of its American Rescue Plan funding to support school testing. In the 2020-21 school year, districts were likely to bear the costs of testing themselves, though Massachusetts used state funds to support rapid testing from January 2021 (Finlaw 2021). School districts in Pennsylvania can also access testing funded by the state for the 2021-22 school year (O'Neill and Alexander 2021).

Summer school
RAND reports that a five-week summer program consisting of six hours of academic and enrichment activities each day would cost between $1,070 and $1,700 per student (Schwartz et al. 2018). When adjusted to December 2020 dollars, this ranges between $1,340, or $1,464 (Evans, Schwartz, and Master 2021). When the average of these values is taken, the cost per pupil would be $1,402.

Hiring one full-time nurse per school
Both the American Academy of Pediatrics and the National Association of School Nurses recommend that each school have at least one registered nurse (Buttner 2021). During the 2015-16 academic year, only 52 percent of public schools had a full-time nurse (National Center for Education Statistics 2020). Based on the average school nurse salary of $64,630, and adding 40 percent of this cost for benefits, the average yearly cost associated with adding a full-time school nurse would be $90,482 (Bureau of Labor Statistics 2021). Given that there is an average of 527 students in each school (Riser-Kositsky 2019), the cost per pupil of hiring one full-time registered nurse in a school would be about $172.

Increasing socio-emotional supports
The National Association of School Psychologists predicts student needs for socio-emotional supports have doubled or tripled under COVID. Zhou, Molfino, and Travers (2021) estimate that increasing spending on these supports commensurately, by 250 percent, would cost approximately $600 per pupil.

Transition costs
This category could include spending associated with transitioning to remote instruction (such as purchasing equipment for teachers and students, training teachers, or purchasing curricula materials) or with opening safely for in-person instruction (such as upgrading ventilation, reducing group size or operating more busses to increase spacing, or purchasing masks and other personal protective equipment). We model these costs as a constant per-pupil amount that is incurred once, though in practice these costs began in the Spring of 2020 and due to the spread of the delta variant may continue to be relevant in the 2021-22 school year; we assume per-pupil one-time costs of $500 in the baseline scenario.[9]

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[9] We draw on Zhou, Molfino and Travers (2021), who report on interviews with "leaders of large, urban school systems." These leaders reported new costs over the spring of 2020, of up to $750-1,000 per pupil. The largest component of these new costs was technology for implementing distance learning. They also describe simultaneous cost savings from cutting some in-person programming, like field trips and sports, and cuts to staff who did not hold full-time, full-year positions; these savings were limited to $200-300 per pupil. Zhou, Molfino and Travers attribute these relatively small cost savings to districts' attempts to remain ready to pivot back to in-person instruction. Because the additional costs are described as "as high as approximately $750-1,000 per-pupil" and we do not see the full distribution, we use the lower end of that range for our estimate. If a district incurred $750 in new costs, and saved $250 (the midpoint of the savings range), the net new costs would be $500.

Methods Appendix

We assume that school districts incurred one-time all-student costs. These could be costs related to the transition to remote learning (like new curriculum or training or devices) or to COVID mitigation during in-person learning (for example, upgrades to ventilation systems, reconfiguration of the physical plant, personal protective equipment (PPE), cleaning supplies, etc.). Separately, we assume that districts face ongoing costs, spread out over four years starting during the 2020-21 school year; we allow these per-pupil costs to be higher for students in poverty. This is meant to capture the notion that districts need to spend additional money to address the educational and other needs of students because of the pandemic. These needs—and the approaches to addressing them—may vary across districts and change over time. For example, districts may have spent on additional transportation or reduced group size in 2020-21 to facilitate in-person instruction, but in later years they may shift to funding additional counselors or tutors to accelerate learning and address mental health issues. As a shorthand, we refer to these ongoing costs as recovery costs, but they could include a range of costs; the key is that they vary depending on the child poverty rate of the district.[10]

We simulate the net fiscal impact of COVID and federal aid as follows. Parameters **in bold** are varied in different scenarios, summarized in Table 3.

1. *Simulated Total ESSER* is equal to *Title I funding* (reported in F33) X 12. The total of the three ESSER funds was about 12 times the total allocated for Title I in the most recent year, and ESSER funding is proportional to Title I, so scaling Title I provides an estimate of ESSER funding.
2. *Simulated Total One-Time COVID Costs* is equal to ***Per-Pupil One-Time All-Student COVID Cost*** (assuming to be $500 in the Baseline Scenario) X *enrollment* (reported in F33).
3. *Simulated Annualized Net Total ESSER* is *Simulated Total ESSER* less *Simulated Total One-Time COVID Costs*, annualized by dividing by four. Dividing by four is an approximation, as different rounds of ESSER came with different spending timelines. *Simulated Annualized Net Total ESSER* is what is available to districts for recovery, annualized. Note that some districts did not receive enough ESSER funding to cover these fixed costs. Those districts will have negative *Net Total ESSER*.

[10] Districts have until September 2024 to obligate funds from ARP, so the funds could be spent over more than four years. Similarly, districts mostly did not access CARES funding in the Spring of 2020, though they knew that funding would become available soon. For the purposes of this exercise, we are less concerned about the precise timing of spending but want to allow a distinction between one-time costs and ongoing costs and differential ongoing costs for poor and non-poor students.

4. *Simulated Total State Aid* is equal to *Total State Aid* (from F33) X ***State Revenue Shock Factor*** (equal to 1 in the baseline scenario, indicating no change in state aid). In alternative scenarios, we assume shortfalls in state revenue translate proportionally to reductions in state aid to school districts, as discussed in the main text.
5. *Simulated Total Revenue* is equal to *Actual Local Revenue* (from F33) plus *Actual Federal Aid* (from F33) plus *Simulated Total State Aid* plus *Simulated Net Total ESSER*. This assumes no change in local revenue or to federal aid other than ESSER. In the baseline scenario, this is simply reported total revenue plus estimated annualized ESSER funding.
6. The *Number of Poor Students* is equal to *Enrollment* (from F33) X *Child Poverty Rate* (from SAIPE). The *Number of Non-Poor Students* is equal to *Enrollment* less the *Number of Poor Students*. Note that the child poverty rate in SAIPE is for children living in the district, so this calculation implicitly assumes that the poverty rate among public school enrollment is the same as for residents.
7. *Simulated Annualized Recovery Cost for Poor Students* is equal to the *Number of Poor Students* X ***Per-Pupil Annualized Recovery Cost for Poor Students*** (equal to $1,000 in the Baseline Scenario). The *Simulated Annualized Recovery Cost for Non-Poor Students* is equal to the *Number of Non-Poor Students* X ***Per-Pupil Annualized Recovery Cost for Non-Poor Students*** (equal to $500 in the Baseline Scenario).
8. *Simulated Total Required Revenue* is equal to *Actual Total Revenue* (from F33) plus Simulated *Annualized Recovery Cost for Poor Students* plus Simulated *Annualized Recovery Cost for Non-Poor Students*. (Recall that the one-time costs were netted out of simulated ESSER.)
9. *Simulated Per-Pupil Shortfall* is equal to *Simulated Total Required Revenue* less *Simulated Total Revenue*, divided by *Enrollment* (from F33). This is the key output of the exercise.