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]

[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.