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Fiscal Federalism and K-12 Education Funding: Policy Lessons from Two Educational Crises

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We synthesize and critique federal fiscal policy during the Great Recession and Covid-19 pandemic. First, the amount of aid during both crises was inadequate to meet policy goals. Second, the mechanisms used to distribute funds was disconnected from policy goals and provided different levels of aid to districts with equivalent levels of economic disadvantage. Third, data tools are missing making it difficult to understand whether funds were used to meet policy goals. Details for these results are provided along with policy recommendations.

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Abstract

We synthesize and critique federal fiscal policy during the Great Recession and Covid-19 pandemic. First, the amount of aid during both crises was inadequate to meet policy goals. Second, the mechanisms used to distribute funds was disconnected from policy goals and provided different levels of aid to districts with equivalent levels of economic disadvantage. Third, data tools are missing making it difficult to understand whether funds were used to meet policy goals. Details for these results are provided along with policy recommendations.

Key Words

Federal fiscal stimulus, inequality, Great Recession, Covid-19 Pandemic

Introduction

In the wake of the Great Recession and Covid-19, the federal government has distributed nearly a quarter of a trillion dollars in fiscal support to states and school districts to offset disruptions to district resources and student learning. Surprisingly, very little empirical research has assessed the impacts of these funds to determine whether they accomplished their purported goals. Given the magnitude of federal fiscal stimulus, we present policy lessons from these federal efforts aimed at supporting education spending and mitigating losses to student achievement.

We assess three dimensions related to the efficacy of federal fiscal stimulus: (i) were federal funds sufficient to meet policy goals? (ii) were federal funds allocated to students and school districts with the greatest need? and (iii) were federal funds used to accomplish their purported policy goals? In the context of these three dimensions (i.e., magnitude, distribution and use), we examine federal fiscal stimulus under the American Recovery and Reinvestment Act (ARRA) and Covid-19 Elementary and Secondary Schooling Emergency Relief (ESSER) funds, which were made available via Coronavirus Aid, Relief, and Economic Security Act (CARES), Coronavirus Response and Relief Supplemental Appropriations Act (CRRSA), and the American Rescue Plan (ARP).

In short, ARRA funds were sufficient to replace fiscal losses to state spending in the first two years of the Great Recession, but were vastly inadequate to fully offset district spending declines for the duration of the Great Recession. Similarly, plausible estimates of the fiscal cost necessary to recover student learning loss during the Covid-19 pandemic dwarf ESSER funds. Further, by relying on pre-existing funding schemes—state funding formula rules in the case of ARRA and Title I allocation rules in the case of ESSER—both ARRA and ESSER allocated funds incommensurate with policy goals. One notable consequence is that districts with identical levels of student poverty received very different amounts of federal aid. Finally, with respect to the use of federal aid, past and current accounting systems limit the efforts of policymakers and researchers to determine whether the uses of federal funds effectively matched the purported goals of fiscal stimulus.

From a policy perspective, increasing the amount of federal aid might be difficult politically, but publicizing the costs needed to remediate losses (either of revenues in the case of the Great Recession or learning in the case of the Covid-19 pandemic) might help. Moreover, while we do not suggest that federal aid be earmarked for specific uses (i.e., such as with categorical aid), the lack of consistent and complete data collection constrains accountability efforts and likely reduces political support for federal assistance. Requiring districts to record how revenues were spent and publicizing those data by, for example, reporting to the National Center for Education Statistics (NCES) fiscal file, would significantly improve accountability efforts around federal fiscal stimulus during future educational crises. Lastly, we recommend that future federal efforts to provide aid to localities in times of crisis should be less reliant on distributional mechanisms of convenience, such as state funding formulae or Title I allocations, and instead be more tightly connected to policy goals.

Background on Federal Fiscal Stimulus during the Great Recession and Covid-19

The Great Recession inflicted significant long-term damage to the US economy and to P-12 revenues specifically, driven primarily through declines in state revenue (Leachman et al., 2017). By some estimates, school spending declined by seven percent nationally (Jackson et al., 2020), equivalent to $945 per pupil per year for six years (Anglum, Shores, and Steinberg, 2022), with nearly 300,000 school employees laid off (Evans et al., 2019). These losses in resources caused student

achievement to decline, especially in areas with the largest employment losses and among districts serving predominantly economically disadvantaged and minority students (Shores & Steinberg, 2019; Jackson et al., 2019).

To combat declines in state revenue, ARRA distributed nearly $50 billion to state education systems in an effort to restore state funding to the greater of 2007-08 or 2008-09 funding levels.[1] To ensure that federal aid replaced declines in state revenues, Title XIV guidelines stipulated that the State Fiscal Stabilization Fund (SFSF), ARRA's largest P-12 funding mechanism, was to restore state support for education through the "state's primary elementary and secondary funding formulae," and if ARRA was insufficient to support full recovery of state aid, then "the Governor shall allocate those funds … in proportion to the relative shortfall in State support," (H.R. 1—166).

The Covid-19 pandemic also inflicted significant long-term damage to the US economy, but, contrary to expectations, P-12 revenues have been largely unaffected. Initial projections by the Congressional Budget Office estimated $650 billion in total revenues shortfalls over fiscal years 2020 to 2022 (Leachman, 2020); ultimately however, P-12 revenues shortfalls were much less severe, totaling only $22 billion (Leachman and McNichol, 2020).[2] Nevertheless, the federal government provided an unprecedented amount of aid to districts and states via ESSER, which was implemented in three separate federal relief efforts, i.e., CARES, CRRSA, and the ARP. In total, these acts have provided $189.8 billion towards elementary and secondary school education.

In addition to the difference in the magnitude of federal fiscal stimulus, Covid-19 relief is distinct from ARRA in two ways. First, whereas ARRA disbursed aid via the states and state revenues contributions specifically, ESSER was disbursed via Title I, Part A shares.[3] Second, whereas ARRA was intended to offset losses in state revenues, Covid-19 relief had two functions: (i) to expand upon ESEA Title I functionality and (ii) to offset learning loss by providing compensatory learning opportunities to students whose educations were disrupted because of the pandemic.[4]

Were Federal Funds Sufficient to Meet Policy Goals?

Though ARRA and ESSER provided unprecedented amounts of federal aid to states and localities, these amounts were likely insufficient to accomplish their policy goals. We provide details below, but to summarize: lost revenues from the Great Recession totaled $223 billion whereas ARRA aid

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[1] American Recovery and Reinvestment Act of 2009; Public Law 111-5 (H.R. 1), February 17, 2009: https://www2.ed.gov/policy/gen/leg/recovery/statutory/stabilization-fund.pdf.

[2] Retrieved https://www.cbpp.org/research/state-budget-and-tax/pandemics-impact-on-state-revenues-less-than-earlier-expected-but

[3] For CRRSA, see Title III Section 313 (b). Public Law No. 116–260. Consolidated Appropriations Act. 2021. https://www.congress.gov/116/plaws/publ260/PLAW-116publ260.pdf. For ARP, see Public Law No. 117-2. American Rescue Plan Act. 2021. https://www.congress.gov/117/plaws/publ2/PLAW-117publ2.pdf. Part 1, Section 2001 part (c) and (d) stipulate that grant funding to states shall be allocated "in the same proportion as each state received under pat A of title I" of the ESEA Act of 1965 and grants to local educational agencies (LEAs) "in proportion to the amount of funds such local educational agencies received under part of title I" of the ESEA Act of 1965.

[4] CARES, for example, stipulates funds should be used to "provide emergency support through grants to local educational agencies that the State educational agency deems have been most significantly impacted by coronavirus to support the ability of such local educational agencies to continue to provide educational services to their students," (Sec. 18002 (a)). CRRSA, for example, required $17.2 billion for "carrying out Title I and subpart 2 of Part B of Title II of the Elementary and Secondary Education Act of 1965," (Section 313 (b)). And ARP, for example, included multiple stipulations requiring funds to be used to offset learning loss and provide supplemental learning opportunities (Sec. 2001 (e)).

was only $50 billion. Estimated costs to offset learning loss accrued during the Covid-19 pandemic vary widely, but plausible estimates exceed $1 trillion dollars whereas ESSER funds totaled only $189 billion.

Recent estimates indicate that district spending declined following the onset of the Great Recession by $945 per pupil per year from 2008-09 to 2013-14, with greater losses accruing in years 2010-11 to 2013-14 of about $1,000 to $1,600 per pupil per year (Anglum, Shores, and Steinberg; 2022; Shores and Steinberg, 2019). In contrast, for years 2008-09 to 2013-14 ARRA aid amounted to $219 per pupil per year, with most of those funds spent in the years 2009-10 and 2011-12, when educational expenditure losses had not yet peaked. Figure 1 shows how real expenditures declined beginning in 2008-09 relative to pre-recession trends. Figure 1 also shows that ARRA funds (represented in red) offset only part of that loss in the initial years before dissipating in later years. Taken together, ARRA provided $50 billion in aid from 2008-09 to 2013-14, whereas districts sustained cumulative losses of $223 billion during that same period.

The policy goal for ESSER funds was to offset learning losses resulting from the switch to remote instruction and other disruptions to learning brought about by the Covid-19 pandemic. To estimate the amount of federal aid necessary to offset learning loss we need two estimates: (i) the total amount of learning loss resulting from switching from in-person to virtual instruction and (ii) the marginal cost of increasing student achievement (in comparable units). To obtain these estimates, we convert estimates of learning loss into standard deviation units and extrapolate to the equivalent learning loss for one-year (36 weeks) of remote instruction. We draw on estimates of the marginal cost of increasing student achievement from Jackson and Mackevicius (2021) who meta-analyzed causal impacts of school spending on student achievement.

Estimates of learning loss vary widely. At the high end, an impact evaluation from the Netherlands, which isolates variation in achievement from the switch to remote instruction alone (i.e., by holding constant other pandemic-related disruptions to learning) shows losses of 0.48 SD for low-income students and 0.35 SD for non-low-income students (Engzell, et al.,2021).[5] At the low end, Agostinelli and colleagues (2022) identify effects of 0.4 SD for low-income students and no lost learning for non-low-income students based on structural assumptions that non-low-income parents can substitute parental instruction for school instruction. Intermediate estimates from Kuhfield and colleagues (2020; 2022), which are based on current test takers and compared to pre-Covid test scores, estimates lost learning of 0.25 SD for low-income students and 0.21 SD for non-low-income students.[6]

[5] These estimates are based on reported effect sizes for 8 weeks of remote instruction extrapolated to 36 weeks. Parental income is based on parental educational attainment levels and so is not exactly commensurate with US equivalent parental income.

[6] This average is the unweighted mean of estimated learning loss in math (0.26) and ELA (0.17), which is then converted to low-income and non-low-income estimates based on a factor of 1.2 for low-income students and weighted by 0.2 for low-income and 0.8 for non-low-income.

Figure 1: Change in Expenditures during the Great Recession and ARRA Contributions

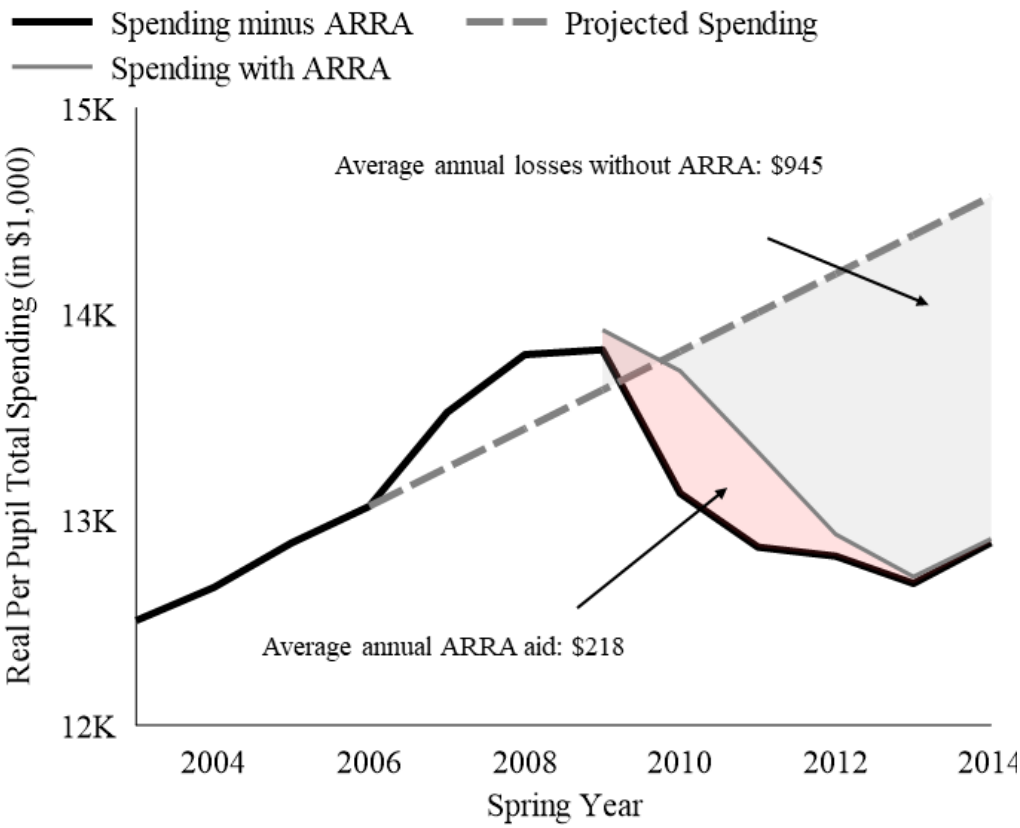


Figure adopted from Shores and Steinberg (2019) and Anglum, Shores, and Steinberg (2022). All dollar values are converted to 2016-17 values and reported in per pupil amounts. Dashed gray line represents predicted spending based on 2002-03 to 2005-06 pre-recession trends. Solid black line represents observed spending. Gray area under the curve depicts lost spending relative to counterfactual spending. Red area under the curve represents ARRA expenditures, i.e., how much lost spending ARRA offset.

The true impact of Covid-19 on population learning loss depends on assumptions. The Agostinelli estimate is likely too small since it assumes perfect substitution for non-low-income parents. The Kuhfield estimates are also likely too small, due to sample attrition concentrated among low-income test takers and endogenous responses from schools, as these estimates include some spent ESSER funds plus adjustments among educational personnel to combat highly publicized learning losses. The Engzell estimates may be too large, since they reflect the initial shock to learning during the first eight weeks of the pandemic, which may have abated as educators became more adept at remote instruction, but they may also be too small, since access to broadband and the welfare system generally is more equitable in the Netherlands compared to the U.S.

The amount of annual educational spending needed to increase achievement based on estimates from Jackson and Mackevicius (2021) is likely larger than most people realize. An additional

$1,000 of annual per pupil spending yields 0.012 SD of achievement growth for low-income students and 0.007 SD for non-low-income students. Relying on the above values associated with lost learning due to 36 weeks of remote instruction and based on 11 million children in poverty and 38.5 million children not in poverty as the number of children affected by Covid-19, the cost to offset total learning loss ranges from $367 billion (using Agostinelli estimates) to $2.36 trillion (using Engzell estimates).

Of course, it may be that not all children were negatively affected by Covid-19 or that the number of weeks in which children were affected was less than 36. To facilitate comparisons, we depict cost estimates for each of the three learning loss estimates by varying the values of two inputs: (i) percentage of the respective populations affected; and (ii) weeks of disrupted learning. These cost estimates are shown in Figure 2. In short, if we use either the Engzell or Kuhfield estimates of learning loss, the $189 billion in ESSER funds would be adequate only under very conservative estimates, for example, if 75% of students were affected for less than nine weeks or 25% of students affected for less than 18 weeks. The $189 billion is adequate under the conservative estimates of learning loss from Agostinelli when we allow 75% of low-income students to be affected for less than 27 weeks.

Were Federal Funds Allocated to those Students and Districts with the Greatest Need?

Both ARRA and ESSER relied on pre-existing distributional channels to allocate federal funds. Consequently, these funds were not (or have not been, in the case of ESSER) allocated to students in accordance with policy goals and, importantly, provided different levels of federal support to equivalently economically disadvantaged school districts, due to either between state differences in state support for economic disadvantage in the case of ARRA or between state differences in Title I funding amounts in the case of ESSER.

First, despite the intent of ARRA to offset losses in district revenues, in practice ARRA aid was not allocated to districts that experienced greater spending declines. Indeed, on average across the U.S. and in individual states, district-level expenditure losses were mostly uncorrelated with ARRA aid (Shores and Steinberg, 2019; Anglum, Shores, and Steinberg, 2022). Further, because of differences in the progressivity of state funding formulae, districts with similar levels of economic disadvantage (poverty or free or reduced-price lunch shares) received very different levels of ARRA aid. Similarly, Title I aid is distributed unevenly across states even for districts with similar levels of poverty, a feature of Title I that has received criticism recently (e.g., Gordon and Reber, 2021). These features of both ARRA aid and Title I are depicted in Figure 3, which plots the predicted aid amount for ARRA and Title I at the 90th percentile of poverty in each state.

For ARRA, in states like South Carolina, New Hampshire, and Colorado, districts in the 90th percentile of economic disadvantage received less than $200 per pupil, whereas in states like North Dakota, Rhode Island, and South Dakota, districts in the 90th percentile of economic disadvantage received more than $500 per pupil. Median aid (among states) for districts at the 90th percentile of economic disadvantage was $300 with values of $172 and $470 at the 10th and 90th percentiles of the state-level distribution, respectively.

Figure 2: Estimated Costs to Offset Learning Loss

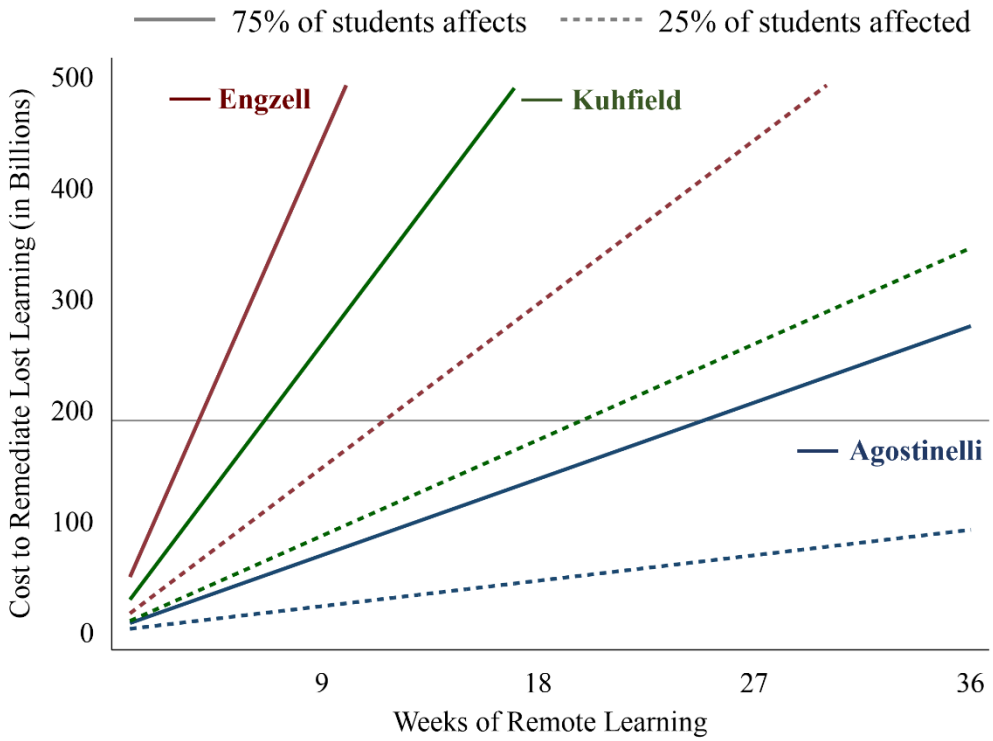


Figure uses achievement effects of Engzell, et al. (2021), Kuhfield, et al. (2020; 2022), and Agostinelli, et al. (2022). In-text estimates are based on 36 weeks of lost learning, which are converted in figure weekly estimates. Costs to increase educational achievement are based on Jackson, et al. (2021). The number of affected students is based on 2017-18 enrollments of 11 million low-income and 38.4 million non-low-income. Figure illustrates variation in cost estimates based on modulating weeks of remote instruction and percentages of children affected by Covid.

For Title I, in states like New Mexico, Oklahoma, and Florida, districts in the 90th percentile of economic disadvantage receive less than $400 per pupil, whereas in states like New Jersey, Wyoming, and Alaska, districts in the 90th percentile receive more than $800 per pupil. Median aid (among states) for districts at the 90th percentile of economic disadvantage is $485 with values of $390 and $773 at the 10th and 90th percentiles of the state-level distribution, respectively.

It is almost certainly the case that states adopt funding rules based on their own priorities and budget constraints, just as the federal government developed distribution rules for allocating Title I.[7] And while there is possible disagreement about those rules adopted by the states and federal government, it is a certainty that the justifications used by the states and federal government do not apply to the policy goals of ARRA and ESSER, as those rules were developed prior to the

[7] For example, Title I provides more money to states both because it is assumed that average state level spending reflects differences in the costs to educate students and to incentivize states to increase spending and to distribute additional spending to economically disadvantaged districts (Snyder, et al., 2019).

Great Recession and the Covid-19 pandemic and were not intended to provide crisis remediation. Yet, the federal government relied on these pre-existing distribution rules which caused federal aid to be unevenly distributed to similarly economically disadvantaged districts and, in the case of ARRA, was uncorrelated with actual declines in district spending.

Were Federal Funds used to Accomplish Their Policy Goals?

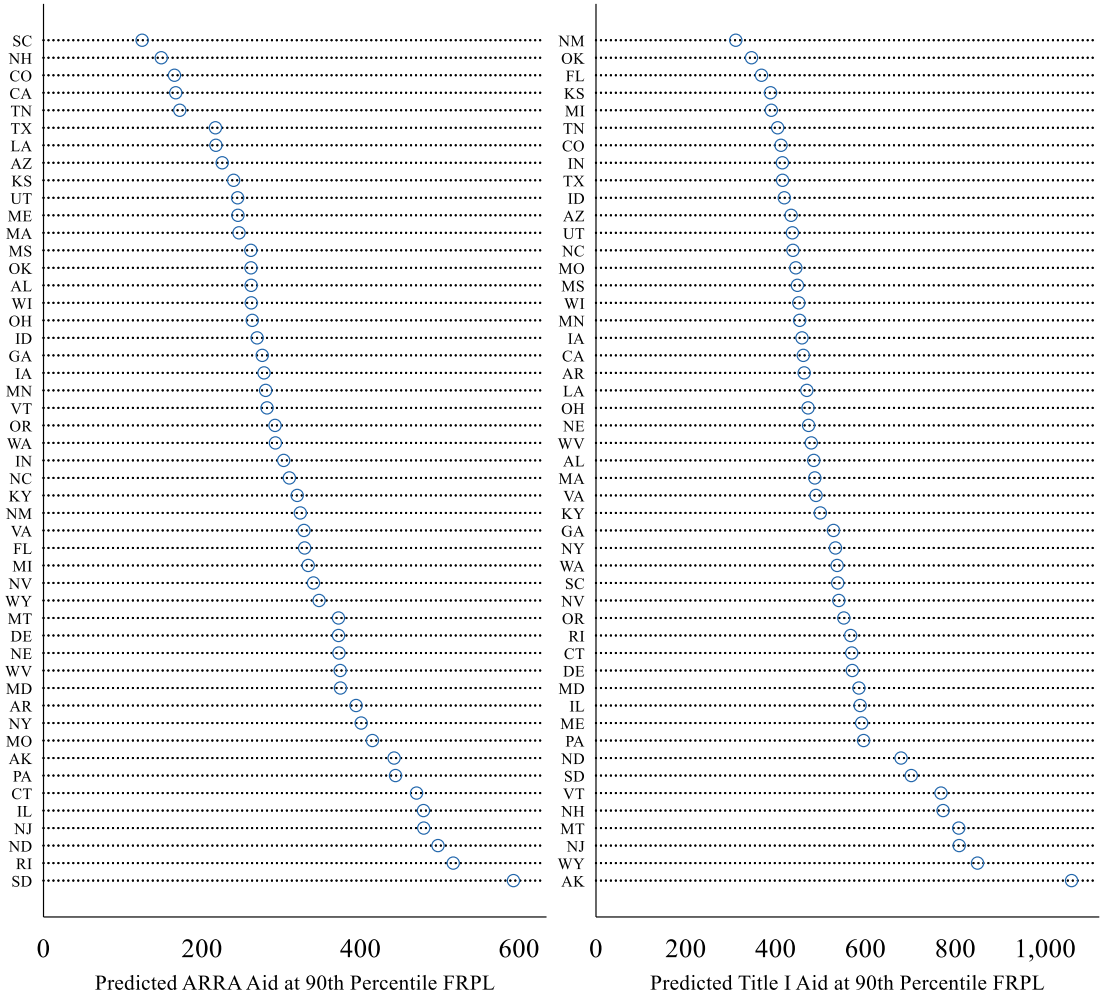
The least amount of information is available to assess this final dimension, a consequence of the limited data collection and accountability systems implemented during the Great Recession and Covid-19. For ARRA, the only national database which documents federal aid is the NCES F-33 fiscal file, which records ARRA expenditures in two categories, capital outlays and instructional expenses. Questions related to how ARRA expenditures were used, which personnel were prioritized, or which grade-levels were prioritized are not answerable given existing data. This lack of data is consequential from an accountability standpoint as well as a scientific one. Regarding accountability, perhaps there is less worry here than one might think since districts were facing significant budget shortfalls and ARRA funds provided only short-term relief, allowing districts to maintain personnel for only a short while. Thus, it seems likely that ARRA funds were used as a stopgap measure to forestall the layoffs to come. From a scientific standpoint, however, the absence of rigorous data collection has reduced opportunities for learning.[8] For example, district layoff policies based on recency (such "last-in first-out" or LIFO policies) are thought to be inequitable (Kraft and Bleiberg, 2021), though analysis of how ARRA contributed to or mitigated such impacts is unavailable. To put it more succinctly, there is not a single study that has estimated the causal effect of ARRA expenditures on student learning, despite ample evidence that expenditure losses were consequential (e.g., Jackson, et al., 2019; Shores and Steinberg, 2019).

For ESSER, there is still time to build in data collection systems that allow for monitoring and evidence-based learning. Calls for accountability are already emerging as anecdotes about frivolous expenditures have emerged.[9] Different accountability systems are available, and if requiring all schools to disaggregate expenditures from ESSER directly is too onerous, a system monitoring approach (e.g., data collection based on samples of schools) is likely to be more feasible (e.g., Fahle, et al., 2019). Opportunities for learning are also enormous. Currently, schools are faced with the difficult task of expediting learning opportunities for segments of the student population. What effects these efforts will have and determining which interventions are most effective are especially urgent now, but any rigorous evidence that emerges from these efforts will be useful in other contexts as well, for example in cases of summer learning loss. Researchers can help guide interventions so that implementation lends itself to credible causal research designs, but policymakers must facilitate these collaborations and support the construction of data systems that allow for evaluation. Such coordination does not yet seem to be the norm.

[8] Such a conclusion is echoed by the Office of Inspector General's report, "Lessons from Implementing the American Recovery and Reinvestment Act of 2009," (2014).

[9] For example, the Associated Press has reported that many schools have used ESSER funds to purchase sporting equipment (2021; downloaded here https://apnews.com/article/coronavirus-pandemic-school-funding-sports-5b468b260ebd2593e53f03f9104d9bca). Stories like these have resulted in a November, 2022 Congressional hearing which raised concerns about how districts were spending ESSER funds.

Figure 3: Predicted ARRA and Title I per pupil aid at the 90th Percentile of Poverty



Predicted ARRA expenditures and Title I revenues per pupil at the 90th percentile of economic disadvantage. Expenditure and revenues data are from the NCES F-33 fiscal file, using observed average ARRA expenditures for years 2008-09—2013-14 and observed Title I revenues for 2017-18, the most recent year available. For ARRA, economic disadvantage is measured using free or reduced-price lunch share, the measure most used by states to allocate categorical aid. For Title I, economic disadvantage is measured using district poverty from the Small Area Income and Poverty Estimate (SAIPE), the measure used by the federal government to determine eligibility. Predicted amounts are derived from random coefficients models, which allow intercepts and slopes to vary among states. The 90th percentile of economic disadvantage is based on national data.

Conclusion

Despite the radically different impacts that the Great Recession and the Covid-19 pandemic have had on US society and on the US K-12 educational system specifically, we are able to document commonalities in federal policy during these two crises. First, we note that the amount of aid provided during the Great Recession and the Covid-19 pandemic, though enormous and larger

than any aid efforts previously made, was inadequate to meet the challenges facing US schools and students. The amount of aid provided during the Great Recession was sufficient at first but the will to continue providing aid as the recession persisted was missing and schools suffered, along with their students (Jackson, et al., 2019; Shores and Steinberg, 2019). For ESSER, plausible estimates suggest that the aid will be insufficient to completely offset declines in student achievement resulting from the switch to remote instruction. Second, federal revenues distributed via pre-existing mechanisms were poorly aligned with policy goals and distributed unequal aid amounts to districts with equivalent levels of economic disadvantage. Lastly, systems of accountability or monitoring have not been adequately constructed to determine whether federal funds were effectively used by the localities receiving federal aid.

The federal government has provided an essential safety net for public schools during these two educational crises. Given that future crises are likely, it is imperative that policy and accountability structures are developed to document how expenditures are used so that the public can continue to trust that these emergency relief funds should continue to be made available. Our concern is that in the absence of proper accountability, continued anecdotal reporting of funds being used for non-essential expenses (such as sporting equipment) will dampen public support for future emergency funding. Given that the aid provided to date was likely inadequate to meet the crises, and because such crises only serve to amplify extant inequalities in the educational system, any dampening of public support for federal aid will only serve to create greater inequality.

References

Agostinelli, Francesco, et al. "When the great equalizer shuts down: Schools, peers, and parents in pandemic times." *Journal of public economics* 206 (2022): 104574.

Anglum, J. Cameron, Kenneth A. Shores, and Matthew P. Steinberg. (2021). Federal Stimulus Aid and School Finance: Lessons from the Great Recession. (EdWorkingPaper: 21-497). Retrieved from Annenberg Institute at Brown University: https://doi.org/10.26300/v68m-1s83

Engzell, Per, Arun Frey, and Mark D. Verhagen. "Learning loss due to school closures during the COVID-19 pandemic." *Proceedings of the National Academy of Sciences* 118.17 (2021).

Evans, William N., Robert M. Schwab, and Kathryn L. Wagner. "The Great Recession and public education." *Education Finance and Policy* 14.2 (2019): 298-326.

Fahle, Erin M., Benjamin R. Shear, and Kenneth A. Shores. "Assessment for monitoring of education systems: The US example." *The ANNALS of the American Academy of Political and Social Science* 683.1 (2019): 58-74.

Kuhfeld, Megan, et al. "Projecting the potential impact of COVID-19 school closures on academic achievement." *Educational Researcher* 49.8 (2020): 549-565.

Kuhfeld, Megan, James Soland, and Karyn Lewis. (2022). Test Score Patterns Across Three COVID-19-impacted School Years. (EdWorkingPaper: 22-521). Retrieved from Annenberg Institute at Brown University: https://doi.org/10.26300/ga82-6v47

Jackson, C. Kirabo, Cora Wigger, and Heyu Xiong. "Do school spending cuts matter? Evidence from the Great Recession." *American Economic Journal: Economic Policy* 13.2 (2021): 304-35.

Jackson, C. Kirabo, and Claire Mackevicius. (2021). The Distribution of School Spending Impacts. (EdWorkingPaper: 21-357). Retrieved from Annenberg Institute at Brown University: https://doi.org/10.26300/e2z3-yc67

Kraft, Matthew A., and Joshua F. Bleiberg. "The Inequitable Effects of Teacher Layoffs: What We Know and Can Do." *Education Finance and Policy* (2021): 1-20.

Leachman, M., Masterson, K., & Figueroa, E. (2017). A punishing decade for school funding. Washington, DC: *Center on Budget and Policy Priorities*.

Leachman, M. (2020). New CBO Projections Suggest Even Bigger State Shortfalls. Washington, DC: *Center on Budget and Policy Priorities*.

Leachman, M., & McNichol, E. (2020). Pandemic's Impact on State Revenues Less Than Earlier Expected But Still Severe. Washington, DC: *Center on Budget and Policy Priorities*.

Shores, Kenneth, and Matthew P. Steinberg. "The great recession, fiscal federalism and the consequences for cross-district spending inequality." *Journal of Education Finance* 45.2 (2019): 123-148.

Shores, Kenneth, and Matthew P. Steinberg. "Schooling during the Great Recession: Patterns of school spending and student achievement using population data." *AERA Open* 5.3 (2019): 2332858419877431.

Snyder, Thomas D., et al. "Study of the Title I, Part A Grant Program Mathematical Formulas. Statistical Analysis Report. NCES 2019-016." *National Center for Education Statistics* (2019).