Where Did Pandemic-Era Fiscal Aid to States Land?*

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Abstract

Using variation in pandemic-era fiscal aid to states driven by the strength of political representation, we find that incremental pandemic-era fiscal aid to states was most likely to end up in the category of general administrative service spending and employee benefit funding. Spending on categories that motivated the aid in the first place, such as healthcare, education, and infrastructure, may also have increased but does not show robust patterns. Total state government revenues and expenditures had increased by around 70 cents per dollar of committed federal funds by 2022. Of this, the statistically significant categorical spending effects are 38 cents to general government expenditures (the residual that excludes healthcare, education, infrastructure, and other functional categories) and 7 cents to pension funding, even though the latter use was inconsistent with the objectives of the legislation. The pension contribution increases are driven by the states where public employees have above-median representation on state pension fund boards.

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1 Introduction

In 2020 and 2021, federal lawmakers enacted nearly $1 trillion in financial aid for state and local governments. While to some extent legislated under uncertainty about the effects of COVID-19 on state and local government budgets (Clemens and Veuger (2020)), ultimately states found themselves with substantial surpluses after revenues far surpassed enacted budgets in 2021 and 2022 (NASBO (2022)). Furthermore, Clemens and Veuger (2021) show that stronger political representation at the state level increased per capita federal aid payments substantially across the four major relief packages: the CARES Act, the Families First Coronavirus Response Act (FFCRA), the Response and Relief Act (RRA), and the American Rescue Plan Act (ARPA).

Each of the main pieces of legislation carried restrictions on how states were permitted to use the funds. The CARES Act stipulated that funds could not be used for expenses that were planned for in the budget most recently approved before the passage date of the act. The RRA required that the money be used for purposes directly related to pandemic impacts, including public health measures or economic relief. The ARPA also required that funds be used to respond to the public health emergency or its negative economic impacts, and clarified additional conditions. Funds could be used to provide premium pay to essential workers and investments in infrastructure (such as water, sewer, and broadband).

In general, funds were not intended to be used to offset tax reductions or as contributions to pension funds. For example, the Treasury Department stipulated the following in its final rule implementing the Coronavirus State Fiscal Recovery Fund and the Coronavirus Local Fiscal Recovery Fund from ARPA: "In addition, Congress specified two types of ineligible uses of funds: funds may not be used for deposit into any pension fund or, for states and territories only, to directly or indirectly offset a reduction in net tax revenue resulting from a change in law, regulation, or administrative interpretation" (Department of the Treasury, 2022). Similarly, Treasury guidance for the CARES Act noted as an example of an ineligble expenditure "[p]ayroll or benefits expenses for employees whose work duties are not substantially dedicated to mitigating or responding to the COVID–19 public health emergency" (Department of the Treasury, 2021).

This paper is the first comprehensive analysis of what states actually did with the resulting windfall funds. Drawing on a unique data set that combines data from annual comprehensive financial reports (ACFRs) with pension and employee benefit funding and expenditures, and using the variation in federal aid generated by each state's number of congressional representations per million residents (as in Clemens and Veuger (2021)), we document the following facts.

First, for every $1000 of committed federal aid per capita, $655 appears as increased intergovernmental grant revenue in states over the years 2020-2022, from which we infer that approximately $0.655 of every dollar of committed federal aid to state and local governments was disbursed to state governments by the end of fiscal year 2022. Second, total revenues of states increased by approximately as much, indicating that states did not offset the federal revenue windfall with other revenue sources. Third, total expenditures of states increased by $770 per capita for every $1000 of federal aid committed, statistically indistinguishable from the revenue estimate. Fourth, the spending categories in which expenditures increase most strongly and significantly are General Government Expenditures ($379 per $1000 of federal aid) and state and local pension contributions ($74 per $1000 of federal aid). General government expenditures consists of the non-healthcare, non-educational functions of government, and include expenditures on administrative services and various departments. This category accounted for nearly half of the $770 spending increase we document while accounting for less than 10 percent of total expenditures. We do not find any statistically significant evidence that aid increased expenditures in any one of the functional categories of healthcare, education, or infrastructure, nor are there statistically significant increases in these aggregated functional categories, although we cannot reject the hypothesis that they also increased.

The results demonstrate that federal government money was more likely to end up in the general administrative services categories and employee benefit funding than in categories that motivated the aid in the first place. This paper therefore contributes to literature that considers what state and local governments do with money directed to them for specific, earmarked purposes (see for example Bundorf and Kessler (2022); Leung (2022) in the context of Medicaid matching grants and Baicker and Gordon (2006) in the context of state education spending). It also contributes to the literature on the general effects of federal grants to states on state spending (Bradford and Oates (1971), Hines and Thaler (1995), Knight (2002)), and how intergovernmental grants are generally deployed (Clemens and Veuger (2023)), albeit in a context where specific restrictions were placed on the ability of states of return money directly to taxpayers. While it is documented that 43 states adopted some form of tax relief in 2021 or 2022 (Walczak (2023)), 21 of which cut state income tax rates, we do not find evidence consistent with these tax cuts being larger for states that received larger amounts of pandemic federal aid. We do find that the programs were largely successful in their goals to induce state governments to spend additional money. However, there was considerable leakage into general governmental administrative services and, despite legislative intent to the contrary, pension contributions also increased.

We also study heterogeneous treatment effects of federal aid with respect to pension fund board composition. As categorized by Andonov, Hochberg, and Rauh (2018), who study public pension fund investment performance in alternative assets, public pension funds in the US broadly have three types of board representatives: members of the pension plan itself, public officials, and members of the general public. Andonov, Bauer, and Cremers (2017) find variation in asset allocation and liability discount rates across these plan types. In an older study, Chen, Kriz, and Ebdon (2015) find that over the period 2001-2009, board with more political appointees and employee members had better funding and suggest this occurs through political influence.

In our setting, we hypothesize that pension systems with strong plan member board representation are particularly more likely to exert and benefit from influence that results in increases in pension contributions to pension plans when there are slack funds in state and local government. We find that the pension contribution increases are driven completely by the states where public employees have above-median (44%) representation on state pension fund boards. In these states, the increase in contributions amounts to $155 per thousand dollars of federally committed aid, whereas in the other half of states we find no effects. Our work therefore also relates to the literature mentioned above on pension fund board composition and economic outcomes. [1]

Our paper also relates to the corporate finance literature on what firms do with cash windfalls (Blanchard, de Silanes, and Shleifer, 1994; Kaplan and Zingales, 1997; Lamont, 1997; Rauh, 2006; Almeida, Campello, and Weisbach, 2004; Riddick and Whited, 2009). Since funds were not intended to be returned to taxpayers in the form of tax cuts, one expects an even stronger effect on expenditures than without such constraints. Our finding

[1] See also Coronado, Engen, and Knight (2003); Bradley, Pantzalis, and Yuan (2016); Useem and Mitchell (2000); Mitchell and Hsin (1999); Mitchell and Yang (2008).

that states that received more federal aid also increased funding to pension plans suggests that the fungibility of public funds limited the impact of the restrictions on what the windfalls could actually be used for. Furthermore, we find no measurable significant effect on infrastructure spending, highlighting the difficulties faced by the federal government if it wishes to induce state spending on specific purposes.

The finding that federal aid increased pension funding builds on research that shows that decisions about the management and funding of pension liabilities generally take place in a context where both the sponsoring entity and the pension program itself play key roles (Bodie, 1990; Jin, Merton, and Bodie, 2006; Shivdasani and Stefanescu, 2009; Cocco, 2014). Much of the associated research has focused on how shocks to pension funds affect investment or spending decisions by the sponsoring firms or governments (Rauh, 2006; Shoag, 2010), or how the management of pension risk responds to financial conditions of the sponsoring entity (Rauh, 2009; Love, Smith, and Wilcox, 2011), with some research on how the use of financial slack affects corporate pension funding (Bartram (2018)). Our findings show that despite legislative stipulations against using certain federal aid funding for pension contributions, states that received more aid in fact increased contributions to their pension funds.

This paper proceeds as follows. Section 2 describes the data, institutional setting, and summary statistics. Section 3 describes the empirical strategy. Section 4 presents the results. Section 5 concludes.

2 Data and Summary Statistics

2.1 Data Sources

Relief Measures We analyze federal aid resulting from the CARES Act, the Families First Coronavirus Response Act (FFCRA), the Response and Relief Act (RRA), and the American Rescue Plan Act (ARPA), which were the four major pieces of relief legislation enacted during the COVID-19 pandemic. Note that this section's description of COVID-19 relief legislation draws heavily on the description from Clemens and Veuger (2021). Readers interested in detailed legislative histories should look to the more expansive discussion there.

Taken together, the CARES Act, FFCRA, RRA, and ARPA provided as much as $6 trillion in income support to households, a combination of loans, grants, and tax relief to firms and non-profits, funding for (public) health efforts, and intragovernmental grants to subnational governments. Our analysis focuses on this final category, which includes roughly $900 billion in aid to state and local government entities. Following Clemens and Veuger (2021), we use data from Committee for a Responsible Federal Budget (2021) as the primary source for constructing our fiscal assistance variables. More specifically, we use data from the Committee for a Responsible Federal Budget's (CRFB's) COVID-19 Money Tracker as of August 19th, 2021. Also as in Clemens and Veuger (2021), we supplement the CRFB data with information from a number of sources. Our main independent variable is the grand total of aid distributed to each state per resident in millions of dollars.

Figure 1 provides an initial look at the distribution of funds across states, separately for the four major pieces of pandemic relief legislation. The shading in the figure illustrates that the distribution of money across states has not been equal, with low-population states receiving relatively more per person than larger states. The magnitude and correlates of variations in aid across states will become more evident as we anlalyze the first-stage relationship between aid and political representation.

Political Representation Instrument We use a state's number of congressional representatives per million residents to instrument for federal aid per capita. Clemens and Veuger (2021) establish a relationship between the relative representation of states in Congress and the amount of aid they were allocated during the pandemic. Smaller states receive relatively more representation per capita due primarily to the structure of the Senate, in which states have two senators regardless of population. We measure Congressional representation using rosters from the House of Representatives and Senate during the 116th and 117th Congresses from Lewis and Sonnet (2021). Because Congressional representation in 2020 was allocated according to state population in the 2010 census, it cannot have been influenced by the effects of the COVID-19 pandemic on population.

Fiscal Outcome Data State governments publish an annual report, the so-called annual comprehensive financial report ("ACFR"), similar to corporations. We collect total revenue and expenditure data, including their breakdown into major revenue and expenditure categories, and balance sheet items, such as cash and total debt, from these annual reports. In addition we use the aggregate financial strength score of Giesecke and Duffy (2023). Giesecke and Duffy construct their aggregate financial strength score from 10 fiscal dimensions, which include the liquidity and reserve position, leverage, as well as, pension and other post-employment benefit obligations, and funding pressure related to pension and other post-employment benefits.[2]

Pension Data We collect pension data from disclosures under Governmental Accounting Standards Board statement number 67 (GASB 67) from all state pension systems, plus a sample of local and other municipal plans, following Giesecke and Rauh (2022). The local plans consist of all municipal plans in the top 170 cities by population according to the US Census and the top 100 counties by population. Additionally, we collect associated school district and transportation authority pension systems where applicable. The result is a total of 648 state and local funds, of which 271 are state funds and 377 are local funds. The sample covers approximately 90% of all assets of public pension funds in the United States. The GASB 67 disclosures contain information about employer and employee contributions, assets, and net pension liability. We classify pension plans as teacher plans based on information about their member composition. Concretely, we classify 43 state plans and 10 local plans as teachers' pension funds.

Government Credit Spreads An important market based indicator of the fiscal strength of an issuer is the credit spread. Credit spreads measure the compensation that investors receive for the risk taken when investing in the debt of an issuer. We use option-adjusted credit spreads for tax-exempt general obligation bonds of state governments from the Stanford Municipal Finance Dashboard.[3] The credit spreads are based on secondary market transactions of all debt securities of a state obligor in the municipal bond market.[4]

[2]The interactive version of the states' financial fundamentals is accessible via Stanford public finance dashboard, which is available at https://municipalfinance.stanford.edu/apps/page_state_fund_comp.

[3]The Stanford Municipal Finance Dashboard is available at https://municipalfinance.stanford.edu.

[4]The linkage between debt securities and the obligor uses the universe of debt security disclosures under the U.S. Securities and Exchange Commission (SEC) Rule 15c2-12. More details can be found in Giesecke, Mateen, and Jardim Sena (2022).

Pension Board Data We use information on the composition of pension fund boards based on the classification in Andonov, Hochberg, and Rauh (2018). The data are updated to 2020.[5] As described in Andonov, Hochberg, and Rauh (2018), the three main categories of board members are government officials, plan participants, and members of the general public. A further classification is available based on the mechanism by which each board member obtained their position, whether by election or being appointed or ex officio. We focus on the primary categorization, as incentives to influence contributions are more likely to vary by the nature of the board member's position as a stakeholder than exactly how they were appointed to the board. To construct the board variable, we take the average of the plan member board share across state-level pension funds in the state.[6] There is substantial heterogeneity in the make-up of boards across states. At the median, the plan member representation on the board is 44%. The mean is 39% and the standard deviation is 23%.

2.2 Summary Statistics

Summary statistics can be found in Tables 1 and 2. Table 1 reports summary statistics for our instrument, our measure of federal fiscal relief, and other control variables. Table 2 reports summary statistics for our outcome variables.

3 Empirical Strategy

3.1 Empirical Specification

We use an instrumental-variable approach to estimate the effect of federal relief to state and local governments on the revenue and expenditure decisions of state governments. Following the empirical strategy of Clemens, Veuger, and Hoxie (2022) and Clemens, Hoxie, Kearns, and Veuger (2023), our instrument relies on variations in the strength of political representation across states. After presenting the basic strategy in the current sub-section, we discuss its validity in sub-section 3.2.

[5] The updated data are available here: http://www.aleksandarandonov.com/data.html.

[6] In around one-third of cases, there is more than one state-level pension fund. Due to data limitations we do not use local pension funds, as in some states there are a large number of smaller local pension funds and board data are not available for them.

The first stage of our instrumental-variables estimation framework is described by the following equation:

$$Aid_i = \gamma_0 + \gamma_1 \text{Repr. p.c.}_i + \gamma_2' X_i + \epsilon_i \tag{1}$$

where Aid_i is the per capita fiscal relief allocated to state and local governments and Repr. p.c.$_i$ is state i's number of congressional representatives per million residents (constructed as described in Subsection 2.1). X_i is a vector of controls that we further discuss below. The second stage of our instrumental-variable approach is:

$$\Delta Y_{i,t,t+1} = \beta_0 + \beta_1 \widehat{Aid}_i + \beta_2' X_i + u_i \tag{2}$$

where $\Delta Y_{i,t,t+1}$ is the change of the outcome variables between fiscal year 2019 and 2022. $\widehat{Aid}_i$ is the predicted value of relief from the first stage.

In our baseline specification we exclude Alaska, North Dakota, and Wyoming due to the degree of their reliance on severance taxes. Over the course of the pandemic, fossil fuel prices exhibited substantial variation unrelated to economic fundamentals or pandemic relief. We show in additional specifications that including the three states and controlling for the severance tax share yields quantitatively and qualitatively similar results.

We conduct additional robustness checks with respect to the control vector X_i. In our baseline specification, the sole covariate in X_i is the growth in state s's real GDP per capita in the year preceding the pandemic. We show in robustness analyses that omitting this control has little effect on the magnitude and statistical significance of our estimates. Similarly, our estimates are little affected by including additional controls for trends in the pre-pandemic labor market and eligibility for the Municipal Liquidity Facility, or for a measure of the stringency of the economic restrictions states introduced in response to the pandemic.

3.2 Instrument Relevance and Exogeneity

A valid instrument must satisfy both the relevance and exogeneity (or exclusion) restrictions. To serve as a good instrument, congressional representation first needs to be statistically related, or relevant, to the amount of aid committed and distributed by the federal government. As established by Clemens and Veuger (2021), Congressional representation per million residents has a strong relationship with per capita distributions of federal aid to state and local governments. As can be seen in Figure 2, states with high levels of representation received far more aid per resident than did the less populous and thus less intensively represented states. Indeed, an additional representative per million residents predicts just under $1,000 in additional aid per resident, with several of the more intensively represented states receiving more than $2,000 per capita more in federal aid than did the less highly represented states.

As shown in previous work (Clemens, Veuger, and Hoxie, 2022; Clemens, Hoxie, Kearns, and Veuger, 2023), the relationship between congressional representation and allocations of fiscal assistance emerged strongly with the March 2020 passage of the CARES Act and was strengthened further with the March 2021 passage of the ARP Act. The analyses in these earlier papers track the relationship between the political representation instrument and the running total of aid committed across the four major pieces of pandemic relief legislation. These analyses show that in all months after March 2020, the relationship between the instrumental variable and federal aid is economically substantial and statistically significant at the 1 percent level. Estimates for months extending from April 2020 through March 2021 imply that an additional representative or senator per million residents predicts roughly $650 in additional fiscal aid per capita. This rises towards $1,000 in April 2021. The increase associated with April 2021 reflects the fact that, like the funding formulae in the CARES Act, the funding formulae in the American Rescue Plan Act disproportionately benefited the residents of relatively over-represented states.

Our baseline first-stage F-statistic of 64.58 (see column 1 of Table 3) substantially exceeds the traditional rule-of-thumb threshold value of 10 used to reject a null hypothesis of weak instruments (Stock and Yogo, 2002). Our first stage is also robust to the combination of pre-pandemic controls included in the regression, as shown in Table 3. The estimated F-statistic remains large whether we use our baseline covariate set, an augmented covariate set, or estimate the first stage without a supplemental covariate set. The point estimate describing the relationship between the instrument and federal aid is little changed across specifications, ranging from 0.850 to 0.865 across the four columns of Table 3. These estimates imply an incremental funding advantage of $850 and $865, respectively, for each additional representative or senator a state is allocated per million residents. Additionally, the point estimates from specifications with covariates differ little from the bivariate regression coefficient of 0.84, as shown in Figure 2.

The exogeneity (or exclusion) restriction requires that, conditional on the variables included in the covariate set, congressional representation must be structurally unrelated to other factors that influenced state and local government budgets during the pandemic. Here it becomes relevant to more fully discuss both our sample inclusion criteria and the variables we include in the vector X_i. In our baseline specification, X_i includes growth of state s's real GDP per capita in the year preceding the pandemic. In a more extensively controlled specification, X_i further includes the share of population in state s that lives in a local jurisdiction eligible for financing through the Federal Reserve's Municipal Liquidity Facility, as well as the pre-pandemic changes in state and local government employment per capita and separately, in private employment per capita. We also investigate whether our results are robust to controlling for the stringency of the economic restrictions states introduced during the pandemic.

Importantly, the data support the general argument that the degree of a state's over- or under-representation was largely unrelated to the needs it faced as a consequence of the pandemic. The Clemens and Veuger (2021) analysis of the small-state advantage shows that it is more or less orthogonal to an extensive set of proxies for dimensions of state and local government funding needs, including forecasted revenue shocks, economic shocks, the size of their public sector, and acreage of federal land. Controlling for these dimensions of perceived or actual need does not qualitatively affect the relationship between our instrument and the amount of federal funds allocated.

One factor that does emerge as a correlate of both aid and state revenues during the pandemic's initial months is the reliance of states on natural-resource-related severance taxes. In particular, large flows of aid went to resource rich Alaska, North Dakota, and Wyoming, each of which are also states at the top of the distribution of severance tax reliance. This is relevant because severance tax revenues were hit particularly hard by the early-pandemic decline in oil prices, which was associated with a decline in the initiation of new resource extraction efforts. We take two approaches to accounting for this issue. Our primary approach is to remove the three outlier states from the sample. Our second approach is to leave these states in the sample while controlling directly for the severance tax share and potentially related macroeconomic factors. Because the former approach is econometrically cleaner than the latter, it is our preferred approach.

A key question with a bearing on the plausibility of our instrument's exogeneity is whether it is correlated with the pre-pandemic trajectories of the outcomes we analyze. To provide an answer to this question, we have constructed two sets of variables that describe pre-pandemic changes in our outcome variables. In particular, we construct the simple change from 2018 to 2019 as well as the cumulative change from 2017 to 2019. Our analysis of pre-pandemic changes from 2017 to 2019 appear in Tables A.1, A.2, and A.3. That is, Tables A.1, A.2, and A.3 present estimates of our baseline specification of the two stage least-squares model described by equations (1) and (2), in which X_i includes only the growth of state s's real GDP per capita in the year preceding the pandemic.

The results of these pre-trend checks are strongly reassuring. Overall, the estimates reveal no instance of a statistically strong relationship between our identifying variation (i.e., the variations in fiscal aid that are predicted by our instrument) and changes in states' budgetary outcomes prior to the pandemic and the associated fiscal relief legislation. Additionally, the economic magnitudes of the associated estimates tend to be small. $1,000 in fiscal relief predicted by our instrument, for example, predicts a -$6 change in intergovernmental grants from 2017 to 2019, as shown in column 1 of Table A.1. A scatter plot depiction of this null result can be found in Appendix Figure A.1. The associated estimate for the change from 2018 to 2019 is -$1 (result not shown.) The estimate for our broadest aggregate of tax revenues is just under $50 (with an associated t-statistic of less than 1, as shown in column 2 of Table A.1), while the estimate for our broadest expenditure aggregate is -$32 (with an associated t-statistic of roughly 0.25, as shown in column 1 of Table A.2). As will be seen in the following section, the point estimates associated with these checks for pre-pandemic trends tend to be smaller than our baseline estimates by an order of magnitude. Table A.3 reveals similarly weak correlations between our identifying variation and pre-pandemic changes in contributions to public pension funds. Finally, Table A.4 shows that the pre-trend checks for the primary budgetary outcomes we analyze yield similarly small estimates in specifications that include no covariates in the vector X_i.

4 Results

The federal government delivered unprecedented amounts of aid to state and local governments during the pandemic. We assess where those dollars landed by analyzing sets of outcomes related to revenues, expenditures, pension contributions, and balance sheets.

4.1 Revenue Outcomes

Table 4 presents estimates of Equation (2) for outcomes related to state revenues. Columns 1 through 3 show the impact of an additional $1,000 in federal fiscal aid per capita on three types of state revenue: revenue from intergovernmental grants, tax revenue, and other own-source revenue.

As one might expect, additional federal aid to state and local governments translates into an increase in intergovernmental grant revenue for the state, at a rate of about 65%. There are at least two straightforward reasons why we might expect this number to smaller than 100%: not all monies had been disbursed yet by the end of 2022, and some went directly to local and other subnational governments.

The other two categories of state revenue do not show an impact from federal aid that is significantly different from zero at conventional confidence levels. This is in line with the small impact of the aid on macroeconomic activity estimated by Clemens, Veuger, and Hoxie (2022). The overall effect on revenue, in Column 4, is close to $700 for an additional $1,000 in federal aid, and indistinguishable from the effect on intergovernmental grant revenue.

4.2 Expenditure Outcomes

In Table 5 we study the consequences of federal aid for various expenditure outcomes. An additional $1,000 in federal aid leads to over $770 in additional expenditure overall, split, in terms of point estimates, almost evenly between a precisely estimated $379 increase in general government expenditures and an imprecisely estimated increase in all other expenditures. General government includes the legislative branch, the staff of the state's executive, and the budget of various general purpose governmental departments like the finance division, the department of revenue, and other miscellaneous administrative divisions. Notably, general government expenditures accounts less than 10 percent of state spending, but accounted for nearly half ($379 out of $770) of the spending increases we link to federal aid. All other expenditures represents healthcare, educational, public safety, and miscellaneous expenses. Table A.11 breaks down other expenditures into these finer subcategories.

4.3 Pension Outcomes

Table 7 delves into a particular type of expenditures: pension contributions. Looking at 271 state pensions and 377 local plans, Column 1 shows that for each $1,000 in federal aid, an additional $74 made its way into pension funds. Looking at the type of pensions plans into which these contributions were made, Column 4 highlights that teacher pension plans played a particularly important role, seeing contributions increase by close to $73 for each $1,000 in federal aid. This amount is estimated with sufficient precision that we can rule out amounts below $36. Columns 2 and 3, on the other hand, suggest that our estimates of additional contributions to state and local funds–there are teacher plans in both categories–are not precise enough to distinguish them from zero.

4.4 Heterogeneity by Board Representation

Table 7 considers whether responses are heterogeneous for boards with different member composition. We find that the pension contribution increases are driven completely by the states where public employees have above-median (44%) representation on state pension fund boards. In these states, the increase in contributions amounts to $155 per thousand dollars of federally committed aid, whereas in the other half of states we find no effects.

4.5 Balance Sheet Outcomes

Turning from flows to stocks, Table 8 assesses the impact of federal aid on state balance sheets. Perhaps unsurprisingly given the in- and outflows documented above, we do not observe a statistically impact on financial strength scores, liquid assets, cash holdings, or debt. Figure 3 documents a similar lack of consequences for general obligation bond spreads.

4.6 Robustness Tests

We present results for a battery of robustness tests in various appendix tables and figures. Table A.5 presents our main results for the full sample of states, adding back in the three states with large severance tax shares (Alaska, North Dakota, and Wyoming). While the estimates are less precise, and the revenue results in particular are affected by the role severance tax plays in these over-represented states, the broad picture stands unchanged: additional federal grants raise revenue and spending, especially general government expenditures. Tables A.6, A.7, A.8, and A.9 illustrate that these central results are not qualitatively affected by varying the set of controls. More specifically, Table A.6 demonstrates that our results are not sensitive to the exclusion of covariates altogether, while Table A.7 shows that are results are not sensitive to augmenting the covariate set with additional controls for pre-pandemic macroeconomic trajectories and for differential access to the Federal Reserve's municipal lending facility. Table A.8 shows that the estimates we obtain when the high severance tax states are returned to the sample are also robust to the inclusion of these additional controls. Table A.9 shows that our baseline estimates are robust to the addition of a control for the stringency of the economic restrictions states imposed in response to the pandemic. Table A.10 shows our results for pension contributions are similarly robust.

5 Conclusion

Our analysis provides the first comprehensive assessment of how state governments have ultimately utilized the windfalls in federal aid they received through COVID-19 relief legislation. As detailed above, we draw on a unique dataset and an estimation strategy that leverages the dramatic variations in funds that were committed to states with low vs. high levels of per resident representation in the U.S. Congress.

Our analysis documents the following facts. First, for every $1000 of committed federal aid per capita, $655 appears as increased intergovernmental grant revenue in states over the years 2020-2022. Second, total revenues of states increased by approximately as much, indicating that states did not offset the federal revenue windfall with other revenue sources. Third, total expenditures of states increased by $770 per capita for every $1000 of federal aid committed, statistically indistinguishable from the revenue estimate. Fourth, the spending categories in which expenditures increase most strongly and significantly are General Government Expenditures ($379 per $1000 of federal aid) and state and local pension contributions ($74 per $1000 of federal aid). General government expenditures consists of the non-healthcare, non-educational functions of government, and include expenditures on administrative services and various departments. This category accounted for nearly half of the $770 spending increase we document while accounting for less than 10 percent of total expenditures at baseline. We do not find any statistically significant evidence that aid increased expenditures in any one of the functional categories of healthcare, education, or infrastructure, nor are there statistically significant increases in these aggregated functional categories, although we cannot reject the hypothesis that they also increased. Finally, we find that an addition $1000 of federal aid generated a roughly $70 increase in contributions to state and local pension plans.

With no observed increases in liquid cash positions and essentially full spending of received aid, our findings suggest that the pandemic aid programs were largely successful in their goal of inducing state governments to spend additional money. However, we also find evidence of considerable leakage into general governmental administrative services, while pension contributions increased as well, in apparent contradiction of legislative purpose.

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Figures and Tables

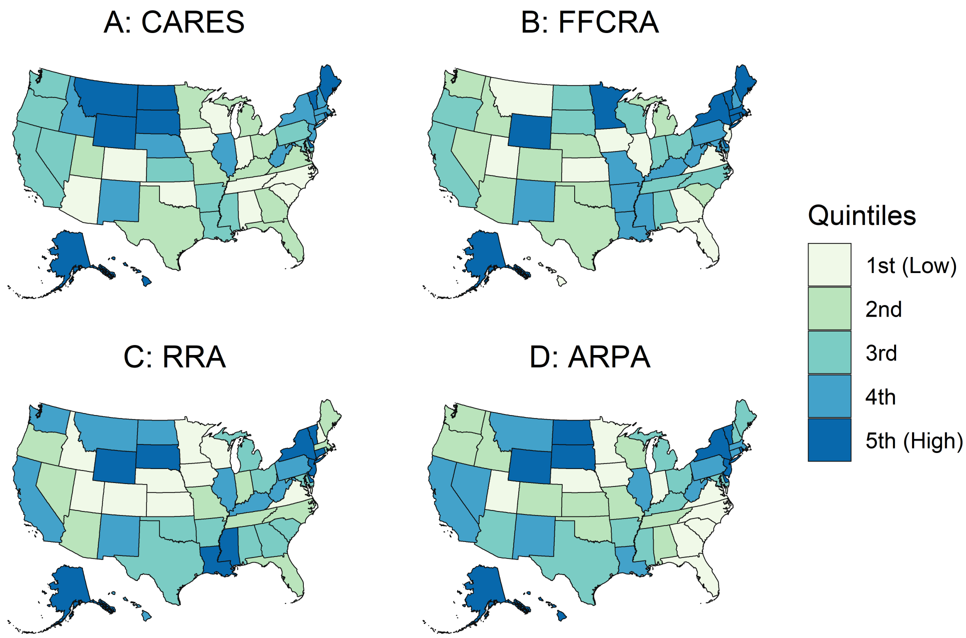


Figure 1: Pandemic Aid by Relief Package

Notes: This figure shows the quintiles of total state and local government funds per capita for the 50 US states by bill. The quintiles are shown for the CARES Act, Families First Act, Recovery and Relief Act, and American Rescue Plan Act in panels A, B, C, and D respectively. This figure appeared earlier as Figure A2 in Clemens and Veuger (2021).

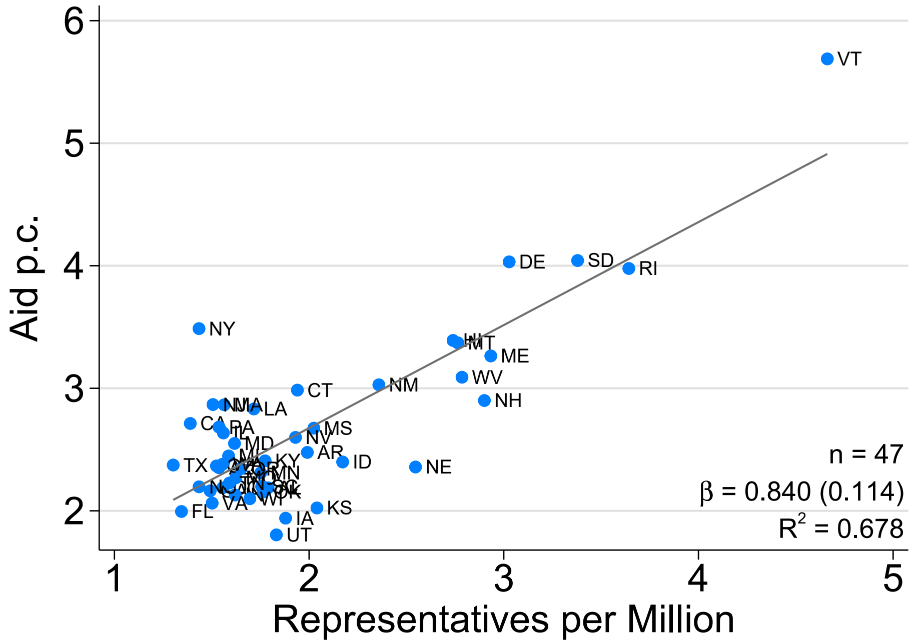


Figure 2: Representatives per Million and Pandemic Aid Per Capita

Notes: The figure shows the bivariate scatter plot between the representatives per million and the aid per capita for our baseline sample.

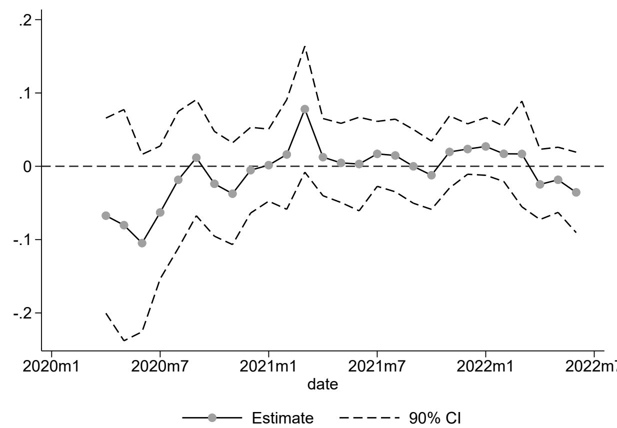


Figure 3: Pandemic Aid and Credit Spreads

Notes: The table estimates two stage least square specifications of the following form. First stage: $Aid_i = \gamma_0 + \gamma_1 \text{Repr. p.c.}_i + \gamma_2' X_i + \epsilon_i$. Second stage: $\Delta Y_{i,t,t+1} = \beta_0 + \beta_1 \widehat{Aid}_i + \beta_2' X_i + u_i$. $\Delta Y_{i,t,t+1}$ measures the change in the credit spread with respect to January 2020. The sample includes all 32 states for which tax-exempt general obligations bond transactions in the secondary market are available. Dashed lines represent the 90% confidence interval of the estimates.

	Mean	p25	p50	p75	count
Aid p.c. (thsd USD)	2.826	2.197	2.462	3.029	50
Federal Reps. per Million	2.137	1.557	1.761	2.547	50
Δ Public Empl. '18-'19	0.020	-0.022	0.026	0.058	50
Δ Private Empl. '18-'19	0.226	0.041	0.257	0.396	50
Δ Real GDP p.c. '18-'19	0.096	0.046	0.090	0.137	50
Sh. Pop. Municipal Liquidity Facility	0.423	0.256	0.378	0.552	50
Severance Tax Share	0.019	0.005	0.012	0.018	50
S&L NPL p.c. '19	4319.878	2073.421	3532.545	5074.365	50
State NPL p.c. '19	3925.741	2047.218	3402.014	4992.421	50
Local NPL p.c. '19	615.838	114.040	282.197	749.529	32
Teacher NPL p.c. '19	2421.631	1622.927	2028.058	3018.445	33
Oxford Stringency Index	0.235	0.222	0.229	0.245	50
Plan Member Board Share 2020 (%)	0.388	0.222	0.441	0.556	50

Table 1: Control Variable Summary Statistics

Notes: The table shows the summary statistics of the instrument, the relief measure and other control variables. An observation count of less than 50 indicates that the information is unavailable for some states.

	Mean	p25	p50	p75	count
$\Delta_{'19-'22}$ Teacher Contr. (USD)	84.854	23.661	43.707	107.504	33
$\Delta_{'19-'22}$ Local Contr. (USD)	18.500	2.412	8.556	17.670	32
$\Delta_{'19-'22}$ State Contr. (USD)	191.179	73.130	118.945	257.020	50
$\Delta_{'19-'22}$ S&L Contr. (USD)	203.020	76.887	124.901	266.211	50
$\Delta_{'19-'22}$ Liquid Assets (USD)	1442.006	954.234	1299.329	1613.251	48
$\Delta_{'19-'22}$ Cash (USD)	960.215	340.009	916.093	1455.335	48
$\Delta_{'19-'22}$ Debt (USD)	126.739	-64.680	37.140	216.568	26
$\Delta_{'19-'22}$ Aggregate Financial Score (0-100)	10.883	7.646	10.589	14.626	48
$\Delta_{'19-'22}$ Total Exp. (USD)	5386.032	3978.162	4953.894	6474.356	48
$\Delta_{'19-'22}$ Gen Gov't Exp. (USD)	478.364	146.087	388.112	790.388	48
$\Delta_{'19-'22}$ Other Own Rev. (USD)	555.938	202.746	319.419	662.476	48
$\Delta_{'19-'22}$ Funct. Exp. (USD)	2204.082	1285.773	2045.955	2805.517	48
$\Delta_{'19-'22}$ Public Safety Exp. (USD)	202.479	4.218	87.675	206.358	33
$\Delta_{'19-'22}$ Education Exp. (USD)	600.024	449.872	635.700	858.589	48
$\Delta_{'19-'22}$ Health Exp. (USD)	1496.021	785.292	1430.359	2177.181	47
$\Delta_{'19-'22}$ Misc Exp. (USD)	2703.586	1725.266	2477.327	3549.104	48
$\Delta_{'19-'22}$ Total Tax (USD)	1308.313	915.411	1358.058	1804.636	48
$\Delta_{'19-'22}$ Intergov. Grants (USD)	4482.687	3309.931	4201.641	5390.793	48
$\Delta_{'19-'22}$ Other Own Rev. (USD)	555.938	202.746	319.419	662.476	48
$\Delta_{'19-'22}$ Total Rev. (USD)	6346.938	4887.469	5778.454	7622.610	48

Table 2: Outcome Variable Summary Statistics

Notes: The table shows the summary statistics of outcome variables. An observation count of less than 50 indicates that the information is unavailable for some states.

	Aid p.c. (thsd USD)			
	(1)	(2)	(3)	(4)
Federal Reps. per Million	0.857***	0.863***	0.850***	0.865***
	(0.107)	(0.0933)	(0.144)	(0.112)
Δ Real GDP p.c. '18-'19	1.712	1.823*	1.020	1.027
	(1.047)	(1.048)	(1.616)	(1.464)
Severance Tax Share		0.0116**		0.0120*
		(0.00481)		(0.00600)
Δ Public Empl. '18-'19			-0.908	-1.121
			(1.225)	(1.120)
Δ Private Empl. '18-'19			-0.228	-0.193
			(0.303)	(0.311)
Δ Real Wages p.c. '18-'19			2.028	2.220
			(2.710)	(2.160)
Δ Real Income p.c. '18-'19			-0.263	-0.130
			(1.343)	(1.284)
Sh. Pop. Municipal Liquidity Facility			0.556**	0.543**
			(0.245)	(0.237)
Constant	0.793***	0.753***	0.618**	0.543**
	(0.230)	(0.199)	(0.275)	(0.209)
R^2	0.706	0.839	0.732	0.856
F-stat on excluded instrument	64.577	85.709	34.651	59.633
Observations	47	50	47	50

Table 3: TSLS - First Stage Estimates

Notes: The table displays the first stage of a two stage least square specifications of the following form. First stage: $Aid_i = \gamma_0 + \gamma_1 \text{Repr. p.c.}_i + \gamma_2' X_i + \epsilon_i$. Alaska, North Dakota, and Wyoming are omitted in columns (1) and (3) due to the large severance tax share in their revenue composition. *,**, *** indicates significance at the 0.1, 0.05, 0.01 level, respectively. Standard errors are robust to heteroskedasticity.

	$\Delta_{'19-'22}$ Intergov. Grants	$\Delta_{'19-'22}$ Total Tax	$\Delta_{'19-'22}$ Other Own Rev.	$\Delta_{'19-'22}$ Total Rev.
	(1)	(2)	(3)	(4)
Aid p.c. (thsd USD)	645.8**	68.66	-36.13	678.3**
	(276.7)	(113.3)	(112.9)	(340.5)
Δ Real GDP p.c. '18-'19	4614.9*	2716.7**	1840.0	9171.6**
	(2660.6)	(1191.9)	(1848.9)	(3986.3)
Constant	2300.9***	987.2***	437.7	3725.8***
	(754.7)	(331.4)	(423.6)	(920.3)
R^2	0.341	0.123	0.029	0.343
Dependent Variable Mean 2019	2295	3039	1297	6631
Model	IV	IV	IV	IV
Observations	45	45	45	45

Table 4: Pandemic Aid and Primary Government Revenue Outcomes (Cumulative Per Capita), 2022

Notes: The table estimates two stage least square specifications of the following form. First stage: $Aid_i = \gamma_0 + \gamma_1 \text{Repr. p.c.}_i + \gamma_2' X_i + \epsilon_i$. Second stage: $\Delta Y_{i,t,t+1} = \beta_0 + \beta_1 \widehat{Aid}_i + \beta_2' X_i + u_i$. Nevada and California have not published their FY 2022 CAFR. Alaska, North Dakota, and Wyoming are omitted due to the large severance tax share in their revenue composition. Outcome variables are measured as cumulative per capita changes. That is, we use the cumulative change in FY 2020-2022 in excess of those in FY 2019 in the numerator. The outcome variables are expressed as USD per capita. Total revenues consist of intergovernmental grants, total tax revenue, and other own source revenue. Intergovernmental grants constitutes operating, capital, and general purpose grants. Total taxes include sales, property, income, and other miscellaneous taxes. Notable other sources of own source revenue include investment earnings and service charges. *,**, *** indicates significance at the 0.1, 0.05, 0.01 level, respectively. Standard errors are robust to heteroskedasticity.

	$\Delta_{'19-'22}$ Total Exp.	$\Delta_{'19-'22}$ Gen Gov't Exp.	$\Delta_{'19-'22}$ All Other Exp.
	(1)	(2)	(3)
Aid p.c. (thsd USD)	770.1**	378.5***	391.6
	(340.9)	(127.8)	(344.2)
Δ Real GDP p.c. '18-'19	7070.0*	-440.0	7509.9**
	(3854.9)	(1001.6)	(3460.1)
Constant	2759.7***	-468.8	3228.5***
	(872.9)	(338.2)	(937.1)
R^2	0.321	0.100	0.225
Dependent Variable Mean 2019	6309	419	5890
Model	IV	IV	IV
Observations	45	45	45

Table 5: Pandemic Aid and Primary Government Expenditure Outcomes (Cumulative Per Capita), 2022

Notes: The table estimates two stage least square specifications of the following form. First stage: $Aid_i = \gamma_0 + \gamma_1 \text{Repr. p.c.}_i + \gamma_2' X_i + \epsilon_i$. Second stage: $\Delta Y_{i,t,t+1} = \beta_0 + \beta_1 \widehat{Aid}_i + \beta_2' X_i + u_i$. Nevada and California have not published their FY 2022 CAFR. Alaska, North Dakota, and Wyoming are omitted due to the large severance tax share in their revenue composition. Outcome variables are measured as cumulative per capita changes. That is, we use the cumulative change in FY 2020-2022 in excess of those in FY 2019 in the numerator. The outcome variables are expressed as USD per capita. General government expenditures consists of the non-healthcare, non-educational functions of government. This includes the legislative branch, the staff of the state's executive, and the budget of various general purpose governmental departments like the finance division, the department of revenue, and other miscellaneous administrative divisions. All other expenditure represents healthcare, educational, public safety, and miscellaneous expenses. Total expenses are the sum of all other expenditure, general government expenses, and infrastructure expenses. *,**, *** indicates significance at the 0.1, 0.05, 0.01 level, respectively. Standard errors are robust to heteroskedasticity.

	$\Delta_{'19-'22}$ S&L Contr.	$\Delta_{'19-'22}$ State Contr.	$\Delta_{'19-'22}$ Local Contr.	$\Delta_{'19-'22}$ Teacher Contr.
	(1)	(2)	(3)	(4)
Aid p.c. (thsd USD)	71.97*	68.77*	0.293	80.27***
	(38.16)	(39.46)	(3.045)	(19.98)
Δ Real GDP p.c. '18-'19	-374.1	-307.7	-68.35	-221.7
	(269.8)	(219.7)	(135.3)	(217.0)
S&L NPL p.c. '19	0.0378***			
	(0.00498)			
State NPL p.c. '19		0.0371***		
		(0.00545)		
Local NPL p.c. '19			0.0270***	
			(0.00763)	
Teacher NPL p.c. '19				0.0277***
				(0.0107)
Constant	-111.2	-103.6	7.939	-175.7***
	(96.04)	(100.1)	(9.274)	(47.32)
R^2	0.549	0.512	0.462	0.442
Dependent Variable Mean 2019	360	316	64	166
Model	IV	IV	IV	IV
Observations	47	47	32	31

Table 6: Pandemic Aid and Pension Contribution Outcomes (Cumulative Per Capita), 2022

Notes: The table estimates two stage least square specifications of the following form. First stage: $Aid_i = \gamma_0 + \gamma_1 \text{Repr. p.c.}_i + \gamma_2' X_i + \epsilon_i$. Second stage: $\Delta Y_{i,t,t+1} = \beta_0 + \beta_1 \widehat{Aid}_i + \beta_2' X_i + u_i$. Nevada and California have not published their FY 2022 CAFR. Alaska, North Dakota, and Wyoming are omitted due to the large severance tax share in their revenue composition. Outcome variables are measured as cumulative per capita changes. That is, we use the cumulative change in FY 2020-2022 in excess of those in FY 2019 in the numerator. The outcome variables are expressed as USD per capita. We have a total of 43 state plans + 10 local plans categorized as teachers' pension funds (out of 271 state plans and 377 local plans). We only have teacher plans for about 33 states (The remaining states cover teachers in their general employee plan.). *,**, *** indicates significance at the 0.1, 0.05, 0.01 level, respectively. Standard errors are robust to heteroskedasticity.

	$\Delta_{'19-'22}$ S&L Contr.			
	(1)	(2)	(3)	(4)
Aid p.c. (thsd USD)	155.3***	-47.22		
	(12.56)	(37.10)		
Δ Real GDP p.c. '18-'19	-284.8	-214.5	-246.4	
	(314.1)	(366.0)	(246.8)	
S&L NPL p.c. '19	0.0285***	0.0392***	0.0373***	
	(0.00923)	(0.00584)	(0.00484)	
Aid p.c. x High representation			149.9***	155.3***
			(13.18)	(12.56)
Aid p.c. x Low representation			-52.76	-47.22
			(39.81)	(37.10)
Low Representation			229.9*	203.5*
			(118.5)	(112.8)
High Representation			-347.2***	-322.4***
			(53.48)	(59.36)
Δ GDP p.c. '18-'19 x Low Representation				-214.5
				(366.0)
Δ GDP p.c. '18-'19 x High Representation				-284.8
				(314.1)
S&L NPL p.c. '19 x Low Representation				0.0392***
				(0.00584)
S&L NPL p.c. '19 x High Representation				0.0285***
				(0.00923)
Constant	-322.4***	203.5*		
	(59.36)	(112.8)		
R^2	0.784	0.584		
Sample	High Representation	Low Representation	Full Sample	Full Sample
Model	IV	IV	IV	IV
Observations	22	25	47	47

Table 7: Pension Contribution Outcomes and Board Composition (Cumulative Per Capita), 2022

Notes: The table estimates the heterogeneity in pension contributions with respect to the pension board composition. Columns (1) and (2) present the estimates based on a subsample of states with a member representation of the pension board above median and below the median, respectively. Column (3) represents the IV estimates with aid being interacted with the member representation dummy. Column (4) estimates a fully interacted specification of column (3). Alaska, North Dakota, and Wyoming are omitted due to the large severance tax share in their revenue composition. *,**, *** indicates significance at the 0.1, 0.05, 0.01 level, respectively. Standard errors are robust to heteroskedasticity.

	$\Delta_{'19-'22}$ Aggregate Financial Score	$\Delta_{'19-'22}$ Liquid Assets	$\Delta_{'19-'22}$ Cash	$\Delta_{'19-'22}$ Debt
	(1)	(2)	(3)	(4)
Aid p.c. (thsd USD)	-0.650	81.20	169.7	10.14
	(0.984)	(148.0)	(151.9)	(83.85)
Δ Real GDP p.c. '18-'19	9.796	1632.4	763.6	235.1
	(9.651)	(1794.1)	(1567.0)	(1099.1)
Constant	12.41***	961.0**	357.6	82.12
	(2.675)	(441.0)	(420.4)	(207.9)
R^2	0.002	0.070	0.072	0.006
Dependent Variable Mean 2019	58.919	644	439	1993
Model	IV	IV	IV	IV
Observations	45	45	45	25

Table 8: Pandemic Aid and Balance Sheet Outcomes, 2022

Notes: The table estimates two stage least square specifications of the following form. First stage: $Aid_i = \gamma_0 + \gamma_1 \text{Repr. p.c.}_i + \gamma_2' X_i + \epsilon_i$. Second stage: $\Delta Y_{i,t,t+1} = \beta_0 + \beta_1 \widehat{Aid}_i + \beta_2' X_i + u_i$. Nevada and California have not published their FY 2022 CAFR. Alaska, North Dakota, and Wyoming are omitted due to the large severance tax share in their revenue composition. Cash, debt, and liquid asset (all cash and investments) outcomes are measured as per capita changes between FY 2019 and FY 2022. The aggregate financial score outcome is just the change in the score between FY 2019 and FY 2022. The aggregate financial score measures ten different dimensions of fiscal strength (see Giesecke and Duffy (2023) for more details). *,**, *** indicates significance at the 0.1, 0.05, 0.01 level, respectively. Standard errors are robust to heteroskedasticity.

Appendix Figures and Tables

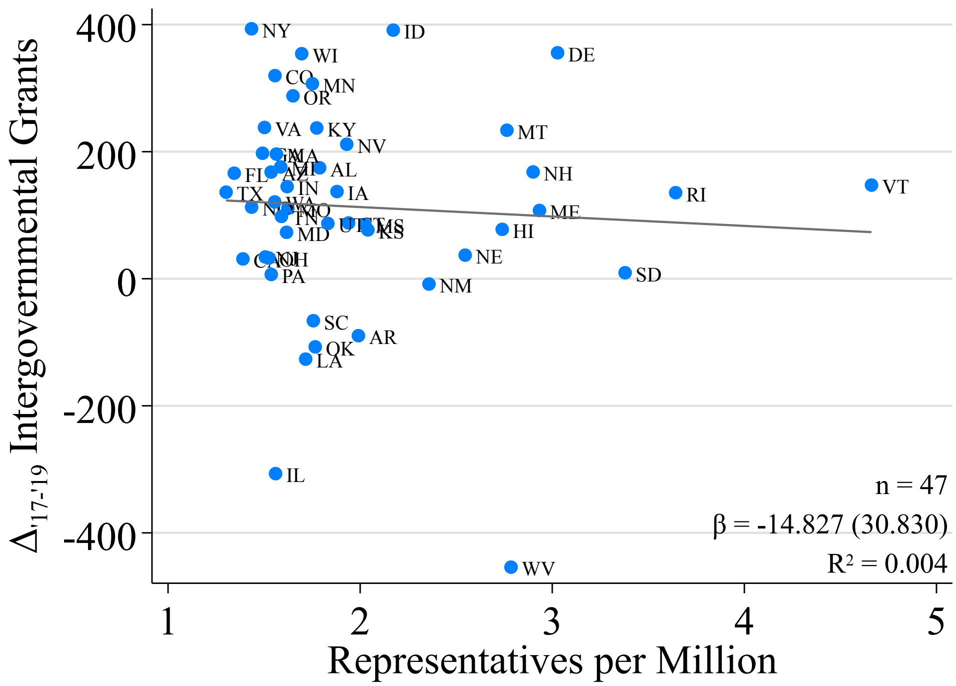
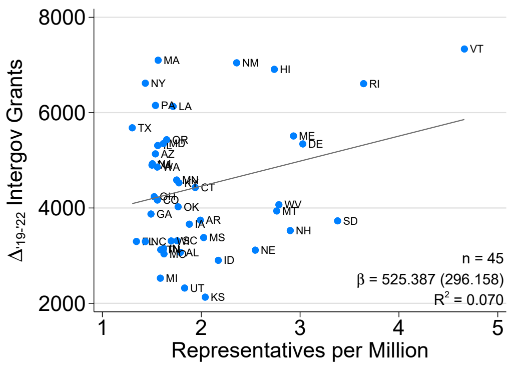
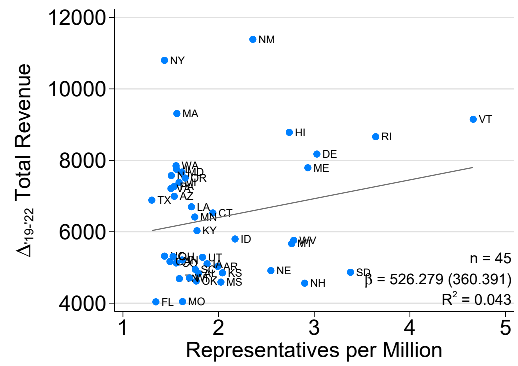


Figure A.1: Representatives per Million and Intergovernmental Grants 2017-2019

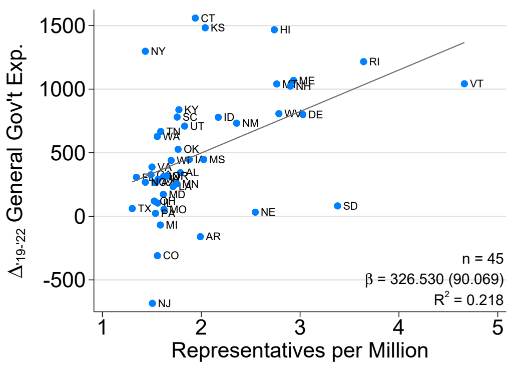
Notes: The figure shows the reduced form scatter plot for the pre-trend in intergovernmental grants, defined as the per capita change between 2017 and 2019, for our baseline sample that excludes Alaska, North Dakota, and Wyoming.



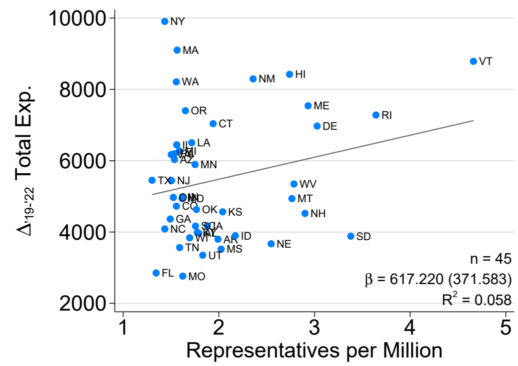
(a) Intergovernmental Revenues



(b) Total Revenue



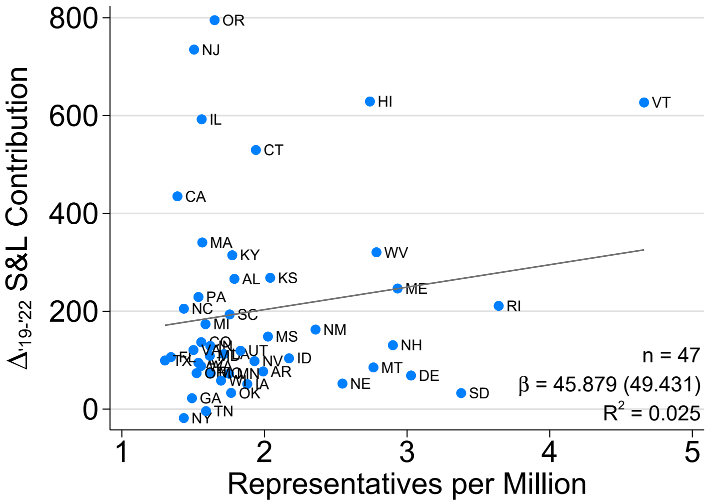
(c) General Government Expenditure



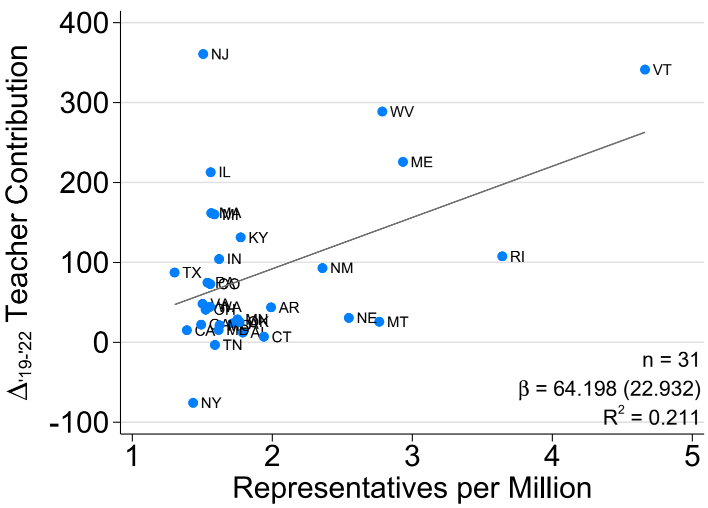
(d) Total Expenditure Outcomes

Figure A.2: Representatives per Million and Income Statement Outcomes (Cumulative per Capita)

Notes: The figure shows the reduced form scatter plots of revenue and expenditure outcomes for our baseline sample that excludes Alaska, North Dakota, and Wyoming.



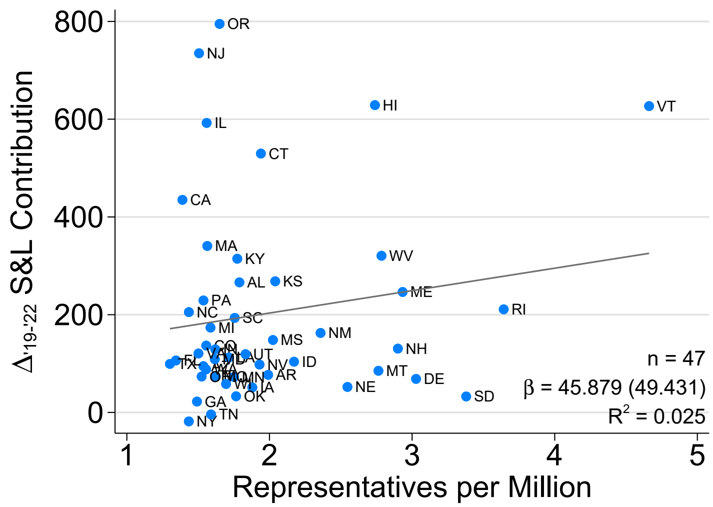
(a) State & Local Contributions



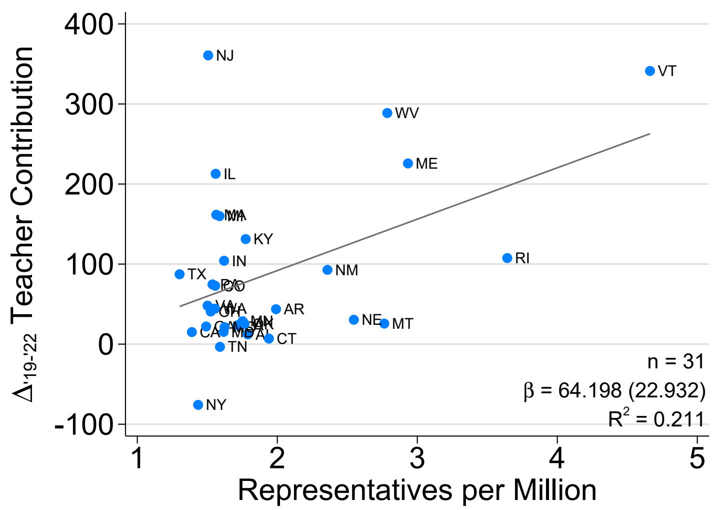
(b) Teacher Contributions

Figure A.3: Representatives per Million and Pension Outcomes (Cumulative per Capita)

Notes: The figure shows the reduced form scatter plots of pension contributions for our baseline sample that excludes Alaska, North Dakota, and Wyoming.



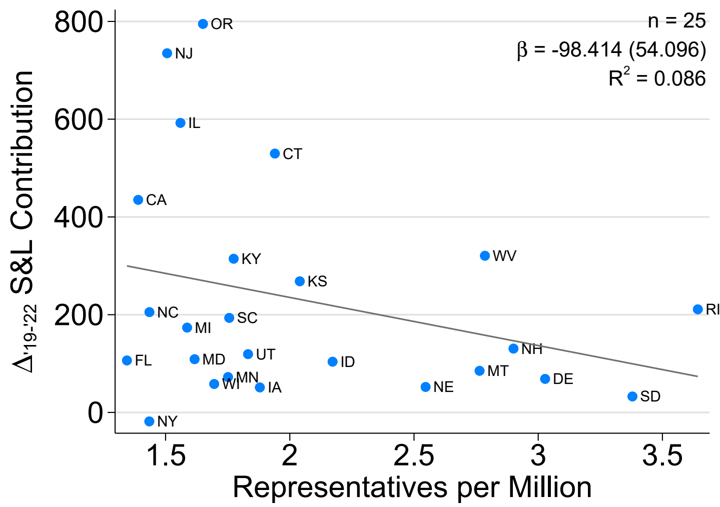
(a) State & Local Contributions



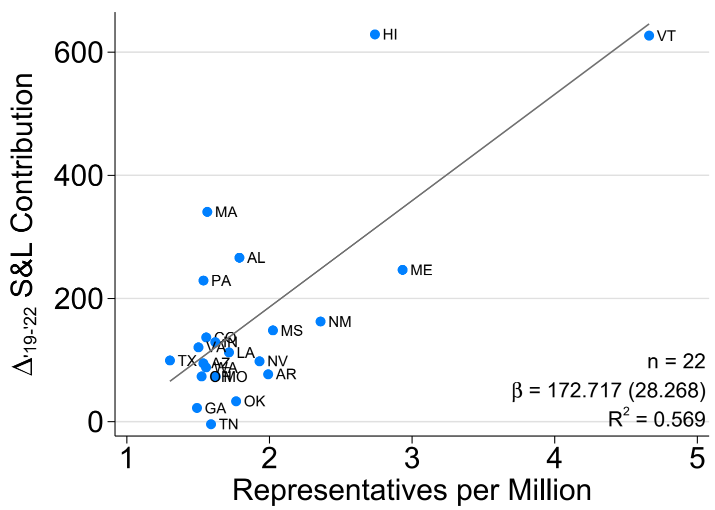
(b) Teacher Contributions

Figure A.4: Representatives per Million and Pension Outcomes (Cumulative per Capita)

Notes: The figure shows the reduced form scatter plots of pension contributions for our baseline sample that excludes Alaska, North Dakota, and Wyoming.



(a) Low Member Representation



(b) High Member Representation

Figure A.5: Representatives per Million and Pension Outcomes (Cumulative per Capita)

Notes: The figure shows the reduced form scatter plots of pension contributions for state and local contributions. Figure A.5a shows the relationship for states for which the member representation is below the median and Figure A.5b shows states with above median representation. The sample that excludes Alaska, North Dakota, and Wyoming.

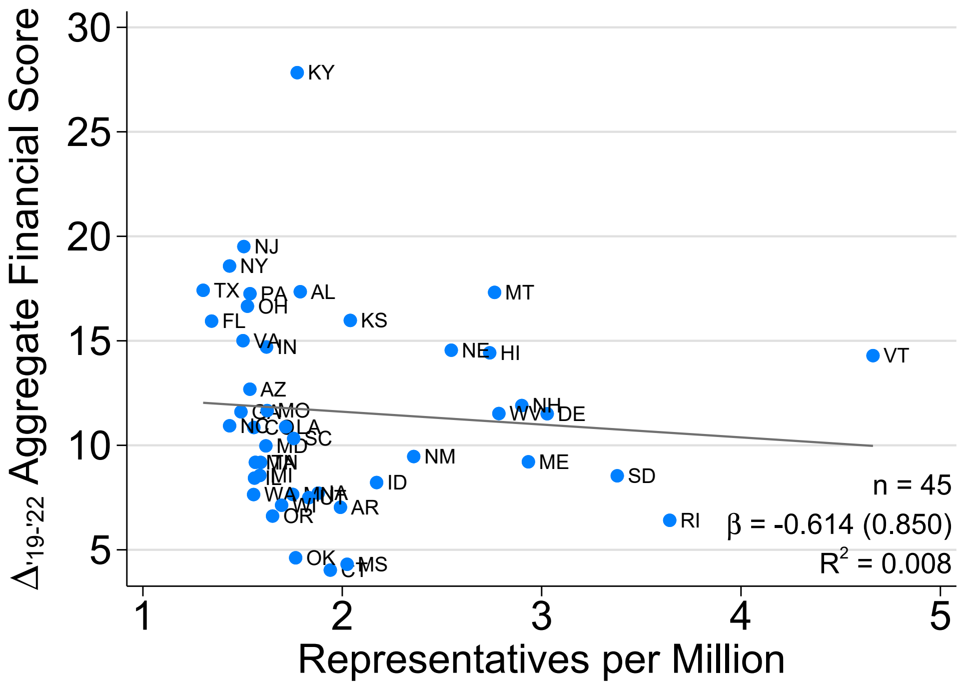


Figure A.6: Representatives per Million and Aggregate Financial Score Outcomes

Notes: The figure shows the reduced form scatter plot for the aggregate fiscal strength score as defined by Giesecke and Duffy (2023) for our baseline sample that excludes Alaska, North Dakota, and Wyoming.

	$\Delta_{'17-'19}$ Intergov. Grants	$\Delta_{'17-'19}$ Total Tax	$\Delta_{'17-'19}$ Other Own Rev.	$\Delta_{'17-'19}$ Total Rev.
	(1)	(2)	(3)	(4)
Aid p.c. (thsd USD)	-5.887	49.32	-37.58	5.854
	(28.55)	(62.28)	(28.28)	(77.47)
Δ Real GDP p.c. '18-'19	1000.2**	508.6	169.0	1677.8**
	(404.2)	(678.0)	(408.2)	(797.2)
Constant	30.09	372.5*	237.1***	639.7***
	(82.47)	(192.1)	(85.39)	(218.4)
R^2	0.184	0.045	.	0.098
Dependent Variable Mean 2018	2212	2674	1187	6073
Model	IV	IV	IV	IV
Observations	47	47	47	47

Table A.1: Pandemic Aid and Pre-Pandemic Trends in Primary Government Revenue Outcomes (Cumulative Per Capita)

Notes: The table estimates two stage least square specifications of the following form. First stage: $Aid_i = \gamma_0 + \gamma_1 \text{Repr. p.c.}_i + \gamma_2' X_i + \epsilon_i$. Second stage: $\Delta Y_{i,t,t+1} = \beta_0 + \beta_1 \widehat{Aid}_i + \beta_2' X_i + u_i$. Nevada and California have not published their FY 2022 CAFR. Alaska, North Dakota, and Wyoming are omitted due to the large severance tax share in their revenue composition. Outcome variables are measured as cumulative per capita changes. That is, we use the cumulative change in FY 2020-2022 in excess of those in FY 2019 in the numerator. The outcome variables are expressed as USD per capita. Total revenues consist of intergovernmental grants, total tax revenue, and other own source revenue. Intergovernmental grants constitutes operating, capital, and general purpose grants. Total taxes include sales, property, income, and other miscellaneous taxes. Notable other sources of own source revenue include investment earnings and service charges. *,**, *** indicates significance at the 0.1, 0.05, 0.01 level, respectively. Standard errors are robust to heteroskedasticity.

	$\Delta_{'17-'19}$ Total Exp.	$\Delta_{'17-'19}$ Gen Gov't Exp.	$\Delta_{'17-'19}$ All Other Exp.
	(1)	(2)	(3)
Aid p.c. (thsd USD)	-32.57	14.48	-47.04
	(122.8)	(60.95)	(95.48)
Δ Real GDP p.c. '18-'19	1045.2	-867.6	1912.8**
	(1220.6)	(553.5)	(921.1)
Constant	335.9	31.85	304.1
	(349.6)	(193.4)	(275.8)
R^2	0.020	0.037	0.062
Dependent Variable Mean 2018	6021	425	5596
Model	IV	IV	IV
Observations	47	47	47

Table A.2: Pandemic Aid and Pre-Pandemic Trends in Government Expenditure Outcomes (Cumulative Per Capita)

Notes: The table estimates two stage least square specifications of the following form. First stage: $Aid_i = \gamma_0 + \gamma_1 \text{Repr. p.c.}_i + \gamma_2' X_i + \epsilon_i$. Second stage: $\Delta Y_{i,t,t+1} = \beta_0 + \beta_1 \widehat{Aid}_i + \beta_2' X_i + u_i$. Nevada and California have not published their FY 2022 CAFR. Alaska, North Dakota, and Wyoming are omitted due to the large severance tax share in their revenue composition. Outcome variables are measured as cumulative per capita changes. That is, we use the cumulative change in FY 2020-2022 in excess of those in FY 2019 in the numerator. The outcome variables are expressed as USD per capita. General government expenditures consists of the non-healthcare, non-educational functions of government. This includes the legislative branch, the staff of the state's executive, and the budget of various general purpose governmental departments like the finance division, the department of revenue, and other miscellaneous administrative divisions. All other expenditure represents healthcare, educational, public safety, and miscellaneous expenses. Total expenses are the sum of all other expenditure, general government expenses, and infrastructure expenses. *,**, *** indicates significance at the 0.1, 0.05, 0.01 level, respectively. Standard errors are robust to heteroskedasticity.

	$\Delta_{'17-'19}$ S&L Contr.	$\Delta_{'17-'19}$ State Contr.	$\Delta_{'17-'19}$ Local Contr.	$\Delta_{'17-'19}$ Teacher Contr.
	(1)	(2)	(3)	(4)
Aid p.c. (thsd USD)	-13.42	-10.45	-4.241*	-2.650
	(18.11)	(17.65)	(2.284)	(16.40)
Δ Real GDP p.c. '18-'19	552.4*	501.7*	81.56***	133.3
	(297.6)	(292.0)	(30.10)	(132.2)
S&L NPL p.c. '19	0.0148***			
	(0.00355)			
State NPL p.c. '19		0.0150***		
		(0.00349)		
Local NPL p.c. '19			0.0129***	
			(0.00212)	
Teacher NPL p.c. '19				0.0160***
				(0.00594)
Constant	-18.58	-24.53	7.128	-5.528
	(62.14)	(61.01)	(5.835)	(40.63)
R^2	0.236	0.203	0.688	0.261
Dependent Variable Mean 2018	360	316	64	166
Model	IV	IV	IV	IV
Observations	47	47	32	31

Table A.3: Pandemic Aid and Pre-Pandemic Trends in Pension Contribution Outcomes (Cumulative Per Capita)

Notes: The table estimates two stage least square specifications of the following form. First stage: $Aid_i = \gamma_0 + \gamma_1 \text{Repr. p.c.}_i + \gamma_2' X_i + \epsilon_i$. Second stage: $\Delta Y_{i,t,t+1} = \beta_0 + \beta_1 \widehat{Aid}_i + \beta_2' X_i + u_i$. Nevada and California have not published their FY 2022 CAFR. Alaska, North Dakota, and Wyoming are omitted due to the large severance tax share in their revenue composition. Outcome variables are measured as cumulative per capita changes. That is, we use the cumulative change in FY 2020-2022 in excess of those in FY 2019 in the numerator. The outcome variables are expressed as USD per capita. We have a total of 43 state plans + 10 local plans categorized as teachers' pension funds (out of 271 state plans and 377 local plans). We only have teacher plans for about 33 states (The remaining states cover teachers in their general employee plan.). *,**, *** indicates significance at the 0.1, 0.05, 0.01 level, respectively. Standard errors are robust to heteroskedasticity.

	$\Delta_{'17-'19}$ Intergov. Grants	$\Delta_{'17-'19}$ Total Rev.	$\Delta_{'17-'19}$ Gen Gov't Exp.	$\Delta_{'17-'19}$ Total Exp.	$\Delta_{'17-'19}$ Aggregate Financial Score
	(1)	(2)	(3)	(4)	(5)
Aid p.c. (thsd USD)	-17.65	-13.87	24.68	-44.86	0.962
	(36.82)	(87.40)	(63.12)	(126.1)	(0.836)
Constant	160.1*	857.7***	-80.88	471.7	0.938
	(96.70)	(239.1)	(176.4)	(342.4)	(2.185)
R^2	.	.	.	0.008	.
Dependent Variable Mean 2018	2278	6467	443	6278	55.410
Model	IV	IV	IV	IV	IV
Observations	47	47	47	47	47

Table A.4: Regression Results for Pre-Pandemic Trends with No Controls

Notes: The table estimates two stage least square specifications of the following form. First stage: $Aid_i = \gamma_0 + \gamma_1 \text{Repr. p.c.}_{\cdot_i} + \gamma_2' X_i + \epsilon_i$. Second stage: $\Delta Y_{i,t,t+1} = \beta_0 + \beta_1 \widehat{Aid}_i + \beta_2' X_i + u_i$. Nevada and California have not published their FY 2022 CAFR. Alaska, North Dakota, and Wyoming are omitted due to the large severance tax share in their revenue composition. Outcome variable definitions do not differ from those defined previously. *,**, *** indicates significance at the 0.1, 0.05, 0.01 level, respectively. Standard errors are robust to heteroskedasticity.

	$\Delta_{'19-'22}$ Intergov. Grants	$\Delta_{'19-'22}$ Total Rev.	$\Delta_{'19-'22}$ Gen Gov't Exp.	$\Delta_{'19-'22}$ Total Exp.	$\Delta_{'19-'22}$ Aggregate Financial Score
	(1)	(2)	(3)	(4)	(5)
Aid p.c. (thsd USD)	397.2	124.8	335.8***	593.6*	-0.761
	(323.9)	(509.8)	(105.6)	(340.9)	(0.873)
Δ Real GDP p.c. '18-'19	5006.4*	10253.9**	-696.7	6323.4	11.66
	(2868.7)	(4608.2)	(1092.5)	(4251.5)	(9.632)
Severance Tax Share	0.150	5.388	-23.48***	-52.80**	
	(17.67)	(35.90)	(7.314)	(23.59)	
Severance Oil Exposure					-0.162***
					(0.0512)
Constant	2892.8***	5018.4***	-299.4	3363.5***	12.71***
	(826.1)	(1265.9)	(278.2)	(848.2)	(2.344)
R^2	0.249	0.166	0.118	0.270	0.247
Dependent Variable Mean 2019	2361	7023	453	6560	60.497
Model	IV	IV	IV	IV	IV
Observations	48	48	48	48	48

Table A.5: Regression Results with Full Sample

Notes: The table estimates two stage least square specifications of the following form. First stage: $Aid_i = \gamma_0 + \gamma_1 \text{Repr. p.c.}_i + \gamma_2' X_i + \epsilon_i$. Second stage: $\Delta Y_{i,t,t+1} = \beta_0 + \beta_1 \widehat{Aid}_i + \beta_2' X_i + u_i$. Nevada and California have not published their FY 2022 CAFR. Outcome variable definitions do not differ from those defined previously. *,**, *** indicates significance at the 0.1, 0.05, 0.01 level, respectively. Standard errors are robust to heteroskedasticity.

	$\Delta_{'19-'22}$ Intergov. Grants	$\Delta_{'19-'22}$ Total Rev.	$\Delta_{'19-'22}$ Gen Gov't Exp.	$\Delta_{'19-'22}$ Total Exp.	$\Delta_{'19-'22}$ Aggregate Financial Score
	(1)	(2)	(3)	(4)	(5)
Aid p.c. (thsd USD)	613.9**	615.0*	381.6***	721.2*	-0.718
	(289.1)	(367.7)	(131.0)	(370.4)	(1.032)
Constant	2822.5***	4762.3***	-518.5	3558.8***	13.52***
	(779.7)	(994.3)	(345.8)	(1030.6)	(2.980)
R^2	0.281	0.207	0.095	0.240	.
Dependent Variable Mean 2019	2361	7023	453	6560	58.919
Model	IV	IV	IV	IV	IV
Observations	45	45	45	45	45

Table A.6: Regression Results with No Controls

Notes: The table estimates two stage least square specifications of the following form. First stage: $Aid_i = \gamma_0 + \gamma_1 \text{Repr. p.c.}_i + \gamma_2' X_i + \epsilon_i$. Second stage: $\Delta Y_{i,t,t+1} = \beta_0 + \beta_1 \widehat{Aid}_i + \beta_2' X_i + u_i$. Nevada and California have not published their FY 2022 CAFR. Alaska, North Dakota, and Wyoming are omitted due to the large severance tax share in their revenue composition. Outcome variable definitions do not differ from those defined previously. *,**, *** indicates significance at the 0.1, 0.05, 0.01 level, respectively. Standard errors are robust to heteroskedasticity.

	$\Delta_{'19-'22}$ Intergov. Grants	$\Delta_{'19-'22}$ Total Rev.	$\Delta_{'19-'22}$ Gen Gov't Exp.	$\Delta_{'19-'22}$ Total Exp.	$\Delta_{'19-'22}$ Aggregate Financial Score
	(1)	(2)	(3)	(4)	(5)
Aid p.c. (thsd USD)	826.6***	1048.3**	373.1**	767.2*	0.547
	(313.5)	(423.5)	(165.3)	(412.2)	(1.472)
Δ Public Empl. '18-'19	1623.3	4342.2	228.0	-68.26	15.03
	(3812.8)	(4922.9)	(1977.3)	(4716.0)	(17.50)
Δ Private Empl. '18-'19	1121.6	2242.9*	-69.86	132.0	6.693
	(902.5)	(1331.1)	(514.6)	(1195.2)	(4.371)
Δ Real GDP p.c. '18-'19	1686.3	3255.7	-140.4	5851.4	-4.886
	(3179.7)	(3791.3)	(1662.4)	(4475.4)	(13.33)
Sh. Pop. Municipal Liquidity Facility	517.7	1006.6	-196.0	1088.4	-0.594
	(965.3)	(1343.7)	(426.1)	(1429.4)	(4.768)
Constant	1618.5**	2337.8**	-392.1	2414.0**	9.167**
	(775.5)	(976.6)	(356.8)	(965.2)	(3.712)
R^2	0.408	0.464	0.110	0.331	0.089
Dependent Variable Mean 2019	2295	6631	419	6309	58.919
Model	IV	IV	IV	IV	IV
Observations	45	45	45	45	45

Table A.7: Regression Results with Expanded Controls

Notes: The table estimates two stage least square specifications of the following form. First stage: $Aid_i = \gamma_0 + \gamma_1 \text{Repr. p.c.}_i + \gamma_2' X_i + \epsilon_i$. Second stage: $\Delta Y_{i,t,t+1} = \beta_0 + \beta_1 \widehat{Aid}_i + \beta_2' X_i + u_i$. Nevada and California have not published their FY 2022 CAFR. Alaska, North Dakota, and Wyoming are omitted due to the large severance tax share in their revenue composition. Outcome variable definitions do not differ from those defined previously. *,**, *** indicates significance at the 0.1, 0.05, 0.01 level, respectively. Standard errors are robust to heteroskedasticity.

	$\Delta_{'19-'22}$ Intergov. Grants	$\Delta_{'19-'22}$ Total Rev.	$\Delta_{'19-'22}$ Gen Gov't Exp.	$\Delta_{'19-'22}$ Total Exp.	$\Delta_{'19-'22}$ Aggregate Financial Score
	(1)	(2)	(3)	(4)	(5)
Aid p.c. (thsd USD)	423.7	171.8	299.5**	490.6	0.105
	(339.5)	(549.2)	(123.8)	(360.3)	(1.142)
Δ Public Empl. '18-'19	-1820.2	-4497.7	559.7	490.7	13.97
	(3928.3)	(5875.3)	(1823.3)	(4519.4)	(14.58)
Δ Private Empl. '18-'19	309.7	612.1	-289.3	-676.4	6.008
	(880.8)	(1393.7)	(453.6)	(1100.3)	(4.062)
Δ Real GDP p.c. '18-'19	3551.7	7213.8	29.94	6680.6	-1.948
	(3608.3)	(5087.4)	(1634.9)	(4830.0)	(13.01)
Sh. Pop. Municipal Liquidity Facility	1058.0	2357.7	-159.4	1252.9	-0.537
	(1031.8)	(1592.4)	(386.4)	(1445.7)	(4.376)
Severance Tax Share	-0.988	3.812	-21.80***	-48.92**	
	(17.73)	(31.74)	(7.838)	(24.27)	
Severance Oil Exposure					-0.217***
					(0.0703)
Constant	2496.2***	4170.5***	-156.1	3229.8***	10.45***
	(862.7)	(1271.1)	(262.9)	(875.6)	(3.038)
R^2	0.284	0.250	0.159	0.267	0.301
Dependent Variable Mean 2019	2361	7023	453	6560	60.497
Model	IV	IV	IV	IV	IV
Observations	48	48	48	48	48

Table A.8: Regression Results with Expanded Controls and Sample

Notes: The table estimates two stage least square specifications of the following form. First stage: $Aid_i = \gamma_0 + \gamma_1 \text{Repr. p.c.}_i + \gamma_2' X_i + \epsilon_i$. Second stage: $\Delta Y_{i,t,t+1} = \beta_0 + \beta_1 \widehat{Aid}_i + \beta_2' X_i + u_i$. Nevada and California have not published their FY 2022 CAFR. Outcome variable definitions do not differ from those defined previously. *,**, *** indicates significance at the 0.1, 0.05, 0.01 level, respectively. Standard errors are robust to heteroskedasticity.

	$\Delta_{'19-'22}$ Intergov. Grants	$\Delta_{'19-'22}$ Total Rev.	$\Delta_{'19-'22}$ Gen Gov't Exp.	$\Delta_{'19-'22}$ Total Exp.	$\Delta_{'19-'22}$ Aggregate Financial Score
	(1)	(2)	(3)	(4)	(5)
Aid p.c. (thsd USD)	643.5**	673.8*	379.1***	768.8**	-0.668
	(278.1)	(346.4)	(126.0)	(342.9)	(0.942)
Δ Real GDP p.c. '18-'19	4503.0*	8956.1**	-413.7	7007.7*	8.949
	(2586.8)	(3902.3)	(1011.9)	(3775.1)	(9.304)
Oxford Stringency Index	-3566.3	-6867.1	838.9	-1985.2	-26.99
	(8405.4)	(10321.5)	(2672.8)	(10750.5)	(31.84)
Constant	3155.9	5372.0*	-669.9	3235.6	18.88**
	(2302.2)	(2776.1)	(771.9)	(2808.7)	(8.066)
R^2	0.343	0.349	0.101	0.321	0.016
Dependent Variable Mean 2019	2295	6631	419	6309	58.919
Model	IV	IV	IV	IV	IV
Observations	45	45	45	45	45

Table A.9: Regression Results with Covid Controls

Notes: The table estimates two stage least square specifications of the following form. First stage: $Aid_i = \gamma_0 + \gamma_1 \text{Repr. p.c.}_i + \gamma_2' X_i + \epsilon_i$. Second stage: $\Delta Y_{i,t,t+1} = \beta_0 + \beta_1 \widehat{Aid}_i + \beta_2' X_i + u_i$. Nevada and California have not published their FY 2022 CAFR. Alaska, North Dakota, and Wyoming are omitted due to the large severance tax share in their revenue composition. The Oxford Stringency Index aggregates information about several different government policy responses to the Covid-19 pandemic into an index measuring the restrictiveness of government response. Outcome variable definitions do not differ from those defined previously. *,**, *** indicates significance at the 0.1, 0.05, 0.01 level, respectively. Standard errors are robust to heteroskedasticity.

	$\Delta_{'19-'22}$ S&L Contr.				
	(1)	(2)	(3)	(4)	(5)
Aid p.c. (thsd USD)	76.65**	71.71*	72.05**	81.22*	78.86**
	(38.21)	(37.83)	(31.41)	(41.56)	(31.74)
S&L NPL p.c. ’19	0.0383***	0.0377***	0.0382***	0.0379***	0.0383***
	(0.00479)	(0.00504)	(0.00480)	(0.00474)	(0.00441)
Δ Real GDP p.c. ’18-’19		-376.8	-394.7	-404.1	-421.8
		(273.8)	(257.1)	(384.8)	(360.4)
Oxford Stringency Index		-167.5			
		(685.6)			
Severance Tax Share			-5.405***		-5.717***
			(1.572)		(1.804)
Δ Public Empl. ’18-’19				-62.06	5.825
				(375.2)	(325.8)
Δ Private Empl. ’18-’19				53.30	47.26
				(127.0)	(123.1)
Sh. Pop. Municipal Liquidity Facility				-70.00	-70.85
				(98.47)	(86.36)
Constant	-162.7*	-70.61	-103.0	-115.0	-99.83
	(97.53)	(194.5)	(79.25)	(95.14)	(80.69)
R^2	0.530	0.550	0.570	0.552	0.573
Dependent Variable Mean 2019	360	360	360	360	360
Model	IV	IV	IV	IV	IV
Observations	47	47	50	47	50

Table A.10: Pandemic Aid and S&L Pension Contributions (Cumulative Per Capita), 2022

Notes: The table estimates two stage least square specifications of the following form. First stage: $Aid_i = \gamma_0 + \gamma_1 \text{Repr. p.c.}_{\cdot i} + \gamma_2' X_i + \epsilon_i$. Second stage: $\Delta Y_{i,t,t+1} = \beta_0 + \beta_1 \widehat{Aid}_i + \beta_2' X_i + u_i$. Nevada and California have not published their FY 2022 CAFR. Alaska, North Dakota, and Wyoming are omitted in columns (1) and (3) due to the large severance tax share in their revenue composition. The Oxford Stringency Index aggregates information about several different government policy responses to the Covid-19 pandemic into an index measuring the restrictiveness of government response. Outcome variable definitions do not differ from those defined previously. *,**, *** indicates significance at the 0.1, 0.05, 0.01 level, respectively. Standard errors are robust to heteroskedasticity.

	$\Delta_{'19-'22}$ All Other Exp.	$\Delta_{'19-'22}$ Funct. Exp.	$\Delta_{'19-'22}$ Health Exp.	$\Delta_{'19-'22}$ Education Exp.	$\Delta_{'19-'22}$ Public Safety Exp.	$\Delta_{'19-'22}$ Misc Exp.
	(1)	(2)	(3)	(4)	(5)	(6)
Aid p.c. (thsd USD)	391.6	357.3	149.8	84.85	141.6*	34.26
	(344.2)	(267.0)	(188.6)	(109.4)	(76.00)	(288.5)
Δ Real GDP p.c. '18-'19	7509.9**	4806.7*	4632.5*	1133.9	-359.4	2703.2
	(3460.1)	(2907.4)	(2414.1)	(858.6)	(667.3)	(3868.9)
Constant	3228.5***	850.4	681.6	302.2	-149.9	2378.1***
	(937.1)	(744.0)	(537.2)	(272.8)	(248.6)	(694.4)
R^2	0.225	0.151	0.147	0.079	0.101	0.025
Dependent Variable Mean 2019	5890	4202	2234	1828	285	1687
Model	IV	IV	IV	IV	IV	IV
Observations	45	45	44	45	31	45

Table A.11: Pandemic Aid and Other Primary Government Expenditure Outcomes (Cumulative Per Capita), 2022

Notes: The table estimates two stage least square specifications of the following form. First stage: $Aid_i = \gamma_0 + \gamma_1 \text{Repr. p.c.}_i + \gamma_2' X_i + \epsilon_i$. Second stage: $\Delta Y_{i,t,t+1} = \beta_0 + \beta_1 \widehat{Aid}_i + \beta_2' X_i + u_i$. Nevada and California have not published their FY 2022 CAFR. Alaska, North Dakota, and Wyoming are omitted due to the large severance tax share in their revenue composition. Outcome variables are measured as cumulative per capita changes. That is, we use the cumulative change in FY 2020-2022 in excess of those in FY 2019 in the numerator. The outcome variables are expressed as USD per capita. All other expenditure represents healthcare, educational, public safety, and miscellaneous expenses. Functional expenses is the sum of healthcare, educational, and public safety expenses. *,**, *** indicates significance at the 0.1, 0.05, 0.01 level, respectively. Standard errors are robust to heteroskedasticity.

	$\Delta_{'19-'22}$ Total Exp.		$\Delta_{'19-'22}$ Gen Gov't Exp.		$\Delta_{'19-'22}$ All Other Exp.	
	(1)	(2)	(3)	(4)	(5)	(6)
Aid p.c. (thsd USD)	771.3	868.0***	432.1**	354.3**	339.3	513.6
	(650.9)	(317.4)	(186.0)	(169.3)	(508.1)	(441.6)
Δ Real GDP p.c. '18-'19	4312.9	9839.6**	-1549.8	564.5	5862.7	9275.2**
	(5121.8)	(4934.1)	(1191.8)	(1349.2)	(4634.2)	(4504.9)
Constant	3247.8**	2008.1**	-534.1	-480.5	3781.9***	2488.7**
	(1592.3)	(969.3)	(467.4)	(492.3)	(1351.8)	(1261.9)
R^2	0.172	0.542	0.245	0.027	0.120	0.389
Dependent Variable Mean 2019	6346	6269	432	405	5914	5864
Model	IV	IV	IV	IV	IV	IV
Subsample	Tight FC	Loose FC	Tight FC	Loose FC	Tight FC	Loose FC
Observations	22	23	22	23	22	23

Table A.12: Pandemic Aid and Primary Government Expenditure Outcomes Sub-sample Analysis, 2022

Notes: The table estimates two stage least square specifications of the following form. First stage: $Aid_i = \gamma_0 + \gamma_1 \text{Repr. p.c.}_i + \gamma_2' X_i + \epsilon_i$. Second stage: $\Delta Y_{i,t,t+1} = \beta_0 + \beta_1 \widehat{Aid}_i + \beta_2' X_i + u_i$. Nevada and California have not published their FY 2022 CAFR. Alaska, North Dakota, and Wyoming are omitted due to the large severance tax share in their revenue composition. Outcome variables are measured as cumulative per capita changes. That is, we use the cumulative change in FY 2020-2022 in excess of those in FY 2019 in the numerator. The outcome variables are expressed as USD per capita. General government expenditures consists of the non-healthcare, non-educational functions of government. This includes the legislative branch, the staff of the state's executive, and the budget of various general purpose governmental departments like the finance division, the department of revenue, and other miscellaneous administrative divisions. All other expenditure represents healthcare, educational, public safety, and miscellaneous expenses. Total expenses are the sum of all other expenditure, general government expenses, and infrastructure expenses. The sub-sample "Tight FC" is refers to those states for which the expenditure limitation (TEL) index is larger than the median value; and "Loose FC" to the remaining states. We use the TEL index as of 2015 from Kallen (2017). *,**, *** indicates significance at the 0.1, 0.05, 0.01 level, respectively. Standard errors are robust to heteroskedasticity.