

# Local Government Finances and Balanced Budgets in the COVID-19 Crisis

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## Abstract

Local governments are facing large losses in revenues and increased expenditures because of the COVID-19 crisis. We document a causal relationship between fiscal pressures induced by COVID-19 and the layoffs of state and local government workers. States that depend more on sales tax as a source of revenue laid off significantly more workers than other states. The CARES Act's provision of \$150 billion in aid to state and local governments ameliorated these effects. Exploiting a kink in the formula for allocation of funding across states, we estimate a state and local government employment multiplier for federal aid—each dollar of federal aid was used by states to support 49 cents of payrolls. State rainy day fund balances limit the sensitivity of employment to both revenue shocks, revealing that balanced budget requirements for state and local governments induce significant procyclicality into the provision of public services.

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# 1 Introduction

The onset of the COVID-19 pandemic quickly changed daily life in countries across the globe. Governments were forced to confront a massive public health crisis and the economic crisis caused by widespread lockdowns and dramatic shifts in consumption patterns. In the United States, state and local governments account for a large share of overall government service provision, especially those facing heightened demand or challenges during the pandemic. Unemployment benefits, education, public safety, and public health services for example are all organized, administered, and to a large extent funded at the state and local levels. While the federal government has been able to massively increase its spending to battle the health and economic crises, local governments are subject to balanced budget requirements that prevent such deficit spending. To make matters worse, the pandemic-induced demand for local government services coincides with a substantial decline in tax revenues. This paper how fiscal pressures on state and local governments affect their ability to respond to the crisis.

April 2020 saw record declines in employment, with the Bureau of Labor Statistics Current Employment Survey (CES) estimating a month-over-month loss of more than twenty million jobs. What is more surprising is that nearly one million of these jobs were in the public sector. Nearly all the lost public sector jobs came from state and local governments, there was essentially no change in federal employment over this period.

Why did local government employment contract so sharply? We show the capacity of local governments to withstand fiscal pressures induced by the pandemic is essential to understand their public policy response. Balanced budget requirements dictate that governments cannot use deficit borrowing to finance non-capital expenditures such as payrolls. If these requirements are binding, states in which revenues are more exposed to the pandemic-induced economic contraction should face greater fiscal pressure in the short term. Additionally, balanced budget requirements mean that the level of accumulated reserves, for states referred to as “rainy day funds,” is an important determinant of the short-run fiscal capacity of governments.

All of the U.S. States are constrained by balanced budget requirements.<sup>1</sup> The large municipal debt market generally funds capital expenditures, it is only *operating budgets* that are required to balance each budget cycle. The stringency of constitutional balanced budget provisions varies somewhat from state to state [Hou and Smith \(2010\)](#). However, statutes, strong budgetary norms, and limits on notional general obligation debt are broadly understood to effectively prevent state and local governments from running large and persistent operating deficits (see [National Conference of State Legislatures \(2010\)](#)).

Lost sales tax revenues, deferred tax payments, and lowered projections for income and property taxes have strained the finances of states, municipalities, and other local governments during the COVID-19 pandemic. These pressures are significant. As of July 1, 2020, twenty-six states were predicting fiscal year 2010 revenue shortfalls of more than ten percent. Budget analysts in Colorado, Wyoming, Hawaii, and New Mexico forecast funding gaps of over twenty percent of pre-pandemic budgets.<sup>2</sup>

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<sup>1</sup>Vermont is the exception to this rule; however its legislature consistently adopts a balanced budget by tradition.

<sup>2</sup>These figures are based on hand-collected budget reports released by forty states from April to June

The main contribution of this paper is to document the relationship between fiscal pressures on state and local governments and the contraction of state and local government employment in the first months of the pandemic. We measure governments' revenue sensitivity to the pandemic in two ways. First, lockdowns and stay at home orders lead to a sharp contraction in sales tax revenue. State and local governments vary in the composition of their tax base—Florida collects no income taxes and is thus heavily dependent on general merchandise and tourism sales taxes, while Delaware has no general sales tax. We construct a measure of state and local governments' sales tax dependence and find states with larger sales tax dependence saw a sharply larger contraction of public employment in April 2020. State and local governments deriving ten percentage points more of their revenues from sales taxes saw 2.6 percentage point higher unemployment among their government workers. A back-of-the-envelope aggregation exercise suggests that sales tax exposure alone can explain over 600,000 of the state and local government jobs lost in April, nearly two-thirds of the total observed declines.

We also study the effect of federal grants to state governments that were part of the 2020 CARES Act, the two trillion dollars stimulus package enacted by the federal government on March 27, 2020. A total of \$150bn of aid, through the Coronavirus Relief Fund, was awarded to states in proportion to their population, with the exception that smaller states received a minimum of \$1.25bn of aid regardless of their population. For the smallest states funding was equivalent to as much as 15 percent of annual state and local government revenues, and less than five percent of revenues for larger states which received funding proportional to their population. We exploit the kink in the policy design to instrument for the size of the CARES Act funding as a fraction of government revenues. States that received more funding made smaller cuts to public employment. Each marginal dollar of CARES funding supported roughly 49 cents of state and local government payroll during April. This magnitude of response is large—payroll accounts for only one third of state and local government expenditure on average.

These measures of fiscal pressure have the strongest explanatory power for layoffs measured in April 2020. Layoffs measured in the May CPS survey suggest the relationship between fiscal pressures and layoffs is roughly half the magnitude as in April. One interpretation of this finding is that both sales tax declines and federal aid were viewed by local governments as short term shocks. By May states had begun to lift lockdowns and reopen their economies, and a previously anticipated second round stimulus bill containing further federal aid to states had stalled in Congress.

Interestingly, this temporal pattern does not appear in the relationship between public sector employment and the size of a state's rainy-day fund before the pandemic. States with smaller rainy-day funds as a fraction of planned annual expenditure saw persistently lower public employment across April and May. While state governments expected sales tax revenue to recover and federal aid could cover short term expenditure induced by the pandemic, rainy day balances can be nature be used to offset persistent declines in revenue.

Further, states with smaller rainy-day funds had higher employment elasticities to both sales tax dependence and the size of the state's CARES Act aid. The magnitude of the elasticity of public employment to sales tax dependence is highest for states with small

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rainy-day fund balances. States with rainy day funds as a percent of annual expenditure in the lowest tercile have employment declines that are more than twice as sensitive to sales tax dependence and federal funding than states in the top tercile of reserves.

Together, these findings suggest that state and local governments adjusted employment in a manner consistent with a binding budget constraint. The fact that public employment declined in response to short term deficit pressures alone suggests either that local governments faced binding intertemporal resource constraints or that they expected permanent fiscal imbalances. However, the fact that states with the lowest funding reserves responded most aggressively to these fiscal pressures suggests balanced budget rules play a significant role in shaping local government policies.

Our findings have important implications for the role of fiscal policy and debt policy in government. As documented by [Baicker et al. \(2012\)](#), state and local governments are responsible for a growing share of public service provision in the United States. The fact that these governments cannot borrow to smooth revenue and expenditure shocks means that in the absence of sizable federal intervention or aggressive tax increases, a large amount of government service provision is necessarily procyclical. If state and local governments could borrow against future tax revenues they would likely not be forced to cut employment during events that give rise to increased demand for public services.

**Literature Review.** In our paper we investigate the real effects of state and local governments' budget and financing rule. In some of the earlier work on the topic, [Poterba \(1994, 1995a,b\)](#) shows that balanced budget rules at the levels of states impact their fiscal response to a change in revenue. Subsequent work by [Fatás and Mihov \(2006\)](#), [Hou and Smith \(2010\)](#) have re-emphasized the role of balanced budget requirements for fiscal policy more recently. [Alt and Lowry \(1994\)](#) also show how other institutional constraints, specifically divided state governments, make governments policy less responsive to revenue shocks. We contribute to the literature examining the impact of financing constraints of local government on their payroll, as public employment is a growing share of total expenditure of local governments. Moreover we examine the long-term effect of decreased tax revenues for employment, rather than single our focus on the contemporaneous impact.

The effect of a change in tax revenue on employment is closest to the work on local fiscal multipliers. [Clemens and Miran \(2012\)](#) use the methodology of [Poterba \(1994\)](#) to evaluate the effect of a Ricardian multiplier. [Chodorow-Reich \(2019\)](#) gives a thorough review of the literature, which focused on the 2008 crisis and the American Recovery and Reinvestment Act (e.g. [Chodorow-Reich et al. \(2012\)](#); [Wilson \(2012\)](#); [Shoag \(2013\)](#); [Suárez Serrato and Wingender \(2016\)](#)).

Last we add to a rapidly growing body of literature exploring the consequences of the coronavirus crisis. [Cajner et al. \(2020\)](#) and [Kahn et al. \(2020\)](#) both use private-sector data to trace out the real-time impact on private labor markets of the coronavirus crisis and the shutdowns. We find similar magnitudes of decline in private employment using the CPS. Other studies have used the CPS to draw out a fuller picture of the labor market: [Fairlie et al. \(2020\)](#) analyzes its impact on minority employment.

We also contribute to the emerging literature analyzing government policy response to the pandemic and its relation to financial institutions and constraints. [Granja et al. \(2020\)](#) and [Erel and Liebersohn \(2020\)](#) study the allocation of funding under the Paycheck

Protection Program.

## 2 Data

### 2.1 Employment in the Current Population Survey

We use data from the monthly files of the Current Population survey (CPS, see [Flood et al. \(2020\)](#)), which is the main source for the survey measure of unemployment from the Bureau of Labor Statistics. The CPS is a repeated cross-section of more than 130,000 people representative of the U.S. population as a whole.

We focus on the CPS monthly surveys from January to May of 2020. The March CPS data surveys households until March 14th, before most of the states began implementing social distancing measures or shutdown policies. Therefore we focus our attention on the April CPS survey, collected during the week of the 12th to the 18th of April, which will give a more complete picture of the impact on employment of the pandemic in the U.S. We also examine employment outcomes during the initial reopening of states in May and June.

### 2.2 State and Local Government Revenue and Expenditure

We use two surveys from the Census of Governments to shed light on the fiscal situation of state and local governments. To measure government expenditures, we use both the Annual Survey of Public Employment and Payroll files (ASPEP) and the ASSGF files from the Census of Governments. The ASPEP file reports payroll annually for each government function for states and local governments. We complement the ASPEP file with the ASSGF files which also reports salaries and wages. We present summary statistics of state and local government general and labor expenditures in Table 1.

We use different data sources for government revenues. The Quarterly Summary of State and Local Tax Revenue (QTAX) contains estimates of state and local government tax revenues. We find there is ample variation across states in the main sources of revenues, be it sales tax or income tax; revenues which respond differently to aggregate fluctuations. We complement the QTAX files with the Annual Survey of State Government Finances (ASSGF) files which survey all sources of revenues and expenditures from state and local government at an annual frequency.

Last we use the Fiscal Survey of the States from the National Association of Budget Officers (NASBO) to augment the Census of Governments with some specifics of the budgets of the states (see [Poterba \(1994\)](#)). Specifically, we use state level information about budget stabilization funds, also known as rainy day funds, which inform us about their level of fiscal reserves.

## 3 State and Local Governments in the United States

Taxation and public service provision in the United States occurs at three broad levels of government—federal, state, and local. State governments organize public activity not specifically delegated to the federal government in the Constitution. Among these are the right to raise taxes, regulation of property ownership, and the provision of education, health

and welfare services, public safety, and maintain state roads. State governments in turn delegate some authorities to local levels of government. Local governments are comprised of counties, cities and townships, other municipalities, and special districts. School districts for example are often technically not part of municipalities and comprise their own government with revenue collection authority. The presence and relative importance of different types of local governments varies regionally.

In 2017 Federal outlays totaled \$4.1 trillion. Of this, over \$700 billion was allocated to state and local governments. In terms of direct spending, state and local governments together are roughly the same size as the federal government. State and local government direct expenditures in 2017 were \$1.76 trillion and \$1.90 trillion, respectively. Full time equivalent employment at federal, state, and local levels of government was 2.1 million, 4.4 million, and 12.2 million employees, respectively. The share of overall public service provision provided by state and local governments has been increasing over time. From 1968 to 2017 state and local spending grew from 8% to 19% of GDP and from 30% to 52% of total government spending (Baicker et al., 2012).

We present summary statistics of state expenditures and payroll in Table 1. On average state and local government spend \$31.7 billions, amounting to 27% of their total expenditures. This translates into 326,000 employees on average across states, amounting to 11% of total employment. Note that the share of salaries and wages in local government is 37% on average significantly higher than for state government 13%, due to secondary education.

We argue in Section 4 below how the constraints on local government budgets during the COVID-19 crisis led states to lower their workforce. The BLS reports that there were 20.6 millions people who lost their job between February and April of 2020 in the private sector, and close to a million in the state and local government sector, 4.5% of the total job losses.

Taxation constitutes the main source of revenue for state and local governments, though there is variation in the composition of these revenues. We report summary statistics of tax revenues across state and local governments, and the volatility of tax revenues in Table 2. State governments rely on sales and individual income taxes, which account for almost 70% of revenues, while local governments, counties and municipalities, lean on property taxes. Even between states the composition of taxation is not uniform, as some states do not impose an income tax (e.g. Texas, Florida), or a sales tax (e.g. Delaware, Alaska).

Tax revenues are volatile and procyclical due to the cyclicity of the tax base. We find that there is ample variation across states and local governments in the time-series volatility of tax revenues. Table 2 shows that the average time-series volatility across states is 9.5% for the sales tax, and 17% for individual income tax —the average volatility of total tax revenue is 9%. The most dramatic short-run shock to revenue stemmed from sales taxes. For example as sales taxes represent more than 60% of total revenues for the state of Florida, sales tax receipts in April 2020 declined by \$700mn (a 21% year-on-year drop).<sup>3</sup> We show in Section 4 how states with different reliance on sales taxes have responded differently to

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<sup>3</sup>The state of New York also experienced the same 21% year-on-year drop in sales tax receipts, though only 18% of its revenues are from sales taxes. Sources for monthly tax receipts from the Department of Revenue for the State of Florida (<https://floridarevenue.com/taxes/Pages/distributions.aspx>, last accessed on June 5 2020) and from the Office of the New York State Comptroller (<https://www.osc.state.ny.us/finance/cash-basis> last accessed on June 5 2020).

the COVID-19 crisis.

## 4 Empirics

We now examine the response of state and local government spending to fiscal pressures and the extent to which these dynamics are affected by the balanced budget requirements. We begin by examining the short run response of government employment to the COVID-19 crisis in the Spring of 2020 in Section 4.1. In Section 4.2 we consider the external validity in our claims and expand our study to the period covering 1992 to 2018.

### 4.1 Effect of COVID-19 on Public Employment in the Spring of 2020

To prevent further spread of the Covid-19, state and local officials enacted shutdown policies across the U.S. with varying degrees of stringency (see Figure 1). These policies brought the economy to a halt leading to an immediate decline in state and local government revenues and uncertainty around when they would recover. We test whether this sudden income shortfall, coupled with the institutional constraints of balanced budget requirements, affected local government service provision in the short run.

The ideal experiment to test this relationship involves estimating the cross-sectional relation between government service provision and the extent to which their revenue is impacted by the COVID-19 crisis. Measuring each of these variables presents challenges. Comprehensive data on government expenditure and revenue at the state and local level is only available with a substantial lag, and there are many reasons other than the COVID-19 pandemic that expenditures and revenues covary.

To measure public service provision we use data on public sector employment from the CPS monthly survey, which becomes available several weeks after the survey is conducted. To overcome the endogeneity issues, we introduce two instruments for revenue that attempt to isolate plausibly exogenous variation in fiscal pressure attributable to the pandemic.

#### 4.1.1 Sales Tax Dependence

First, we capture the variation in short term revenue declines using an ex-ante measure of the share of government revenues derived from sales taxes. Declines in income tax receipts due to elevated unemployment is the traditional channel through which recessions reduce local government revenues. However, lockdowns and social distancing measures sharply decreased household consumption from which governments derive substantial revenue. As detailed in Section 2, states that rely strongly on sales tax have seen their revenue plummet.

While the CPS data allows us to distinguish between state government and local government workers, we cannot observe which local government employs a given municipal worker. Therefore, we aggregate state and local government workers together within a state and assemble a measure of sales tax revenue dependence that aggregates across all levels of government within a state. We assemble this measure using annual revenue data from 2018, the most recently available from the Census of Governments.

We consider employment response to this proxy for revenue shortfalls in the following

specification:

$$\Delta l_i = \alpha + \beta SalesTaxShare_i + \gamma X_i + \varepsilon_i,$$

where the dependent variable  $\Delta l_i$  represents the change in public sector employment in state  $i$ , the independent variable  $SalesTaxShare_i$  is the share of state and local revenues in state  $i$  derived from sales taxes, and  $X$  is a set of control variables. We consider several measures of the change in public sector employment based on the level or change in the unemployment rate among state and local government workers in a state.

There are difficulties associated with measuring unemployment during the coronavirus crisis. Some of the questions asked in the CPS survey are ambiguous regarding why a respondent is not at work, chiefly whether the respondent is staying at home because of economic conditions, or staying at home for health reasons. In the COVID-19 pandemic these are overlapping, and there may be misreporting. We consider different measures to draw a full picture of unemployment in the first months of 2020. Our main measure is the ratio of workers in an industry state pair who indicate they were absent from work because they were laid off to the total size of the labor force in that industry state pair.

We begin by examining the unconditional relationship between our measure of public sector unemployment and the share of revenue coming from sales tax. Figure 3 plots the April 2020 unemployment rate of state and local government workers against the aggregate sales tax share of revenue of governments in that state, and shows a clear positive relationship between sales tax dependence and public worker layoffs.

Multivariate regression analysis of this relationship is presented in Table 4. The first column includes no control variables. The coefficient of 0.42 on *SalesTaxShare* indicates that a state with a one percentage point higher share of revenue coming from sales taxes has a 0.42 percentage point higher April 2020 unemployment rate among public employees. Quantitatively, the standard deviation of the sales tax share in the cross-section of states is 5%; thus a one standard deviation increase in the sales tax share translates into a 2.1 percentage point higher unemployment rate for public employees in April 2020, from a base rate of 1.2% in February 2020.

The second column adds covariates that capture other likely determinants of local government unemployment—population size, the severity of the pandemic, and the private sector unemployment rate in the state. States with a higher COVID-19 death rate relative to infection rate laid off more public workers and the conditional elasticity of public sector layoffs to private sector layoffs is 0.18. Including these controls lowers the magnitude of the sensitivity of layoffs to revenue exposure to 0.26, though it remains strongly statistically significant.

In the third column, we include other major sources of government revenue, property taxes, income taxes, and intergovernmental transfers, and find none of these explain public worker layoffs conditional on sales tax dependence. The fourth column replaces the dependent variable with a measure of what fraction of public sector workers reported being moved from full-time to part-time hours. The coefficient estimate suggests exposed governments cut the hours of more employees than they laid off.

Table 5 explores the robustness of this relationship. The first column of Table 5 reproduces column 3 of Table 4. The second column reports the same specification with the



standard measure of unemployment rate. The third column reports a placebo specification with data from January 2020 instead of April 2020. We find no relationship between a state’s sales tax share of revenue and the two-month change in public sector layoffs to January 2020, before the risk of the pandemic was apparent. In the fourth column we report another placebo specification that looks at layoffs of federal government workers across states and find this is also not related to our proxy for revenue exposure to the pandemic.

#### 4.1.2 CARES Act Funding for State and Local Governments

We also explore the relationship between public sector layoffs and funding to state and local governments provided by the CARES Act. The CARES Act allocated \$150 billion dollars to state and local governments through the Coronavirus Relief Fund. The amount allocated to each state was proportional to the population of the state, subject to the constraint that no state received less than \$1.25 billion dollars from the program. Figure 4 shows the funding distributed to states as a function of their population.

Twenty-one states received the minimum \$1.25 billion in funding. Among these states, variation in state population translates directly into variation in the amount of funding received per capita. Assuming state and local government spending per capita is not related to population with the same functional form as seen in Figure 4 this variation can be exploited to estimate the causal effect of the federal grants on the layoffs of state and local governments employees.

Figure 5 shows that for states receiving the minimum level of federal aid, the funding as a fraction of total state and local government revenues is strongly negatively correlated with state population. Vermont’s \$1.25 billion of aid is roughly 15 percent of total state and local government revenues, while in New Mexico this figure is less than five percent. For the large states, which received CARES act funding proportional to population, federal aid as a fraction of total revenues is roughly constant.

We exploit this fact to construct an instrument for the size of the grant received in each state. Specifically, if state revenue collections per capita are roughly constant, then for small states the CARES act grant as a fraction of total revenue is proportional to the inverse population of the state. For large states receiving funding proportional to their population, the CARES grant as a fraction of total revenue is constant. Thus we instrument for CARES funding as a fraction of state and local government revenue with the interaction of an indicator for states receiving the minimum CARES act grant and the inverse of the state’s population.

We find that federal aid received through the CARES act significantly limited government employee layoffs in April of 2020. Table 6 reports the results of the regression analysis. Column 1 shows the ordinary least squares relationship between CARES Act funding share of state and local revenues and layoffs. Column 2 reports the first stage relationship between CARES funding and inverse population, which is highly significant with an  $F$ -statistic of 36.2 and an  $R^2$  of 89.2%. Column 3, 4, and 5 report the instrumental variables specification. A state that received larger federal aid by ten percent of annual revenues laid off 6.9 percentage points fewer state and local government employees. It is worth thinking here about the natural coefficient of this regression: if states were to increase their spending while keeping their budget allocations fixed, then the coefficient would be one, and express

direct proportionality. A coefficient below of 0.69, statistically and quantitatively different than one, suggests that states are reallocating funds from the CARES Act to other budget lines than payrolls.

### 4.1.3 Rainy Day Funds

These results together suggest that state and local governments that have significant exogenous shocks to their revenues laid off and reduced the hours of significantly more employees immediately following the broad lockdown that started in March 2020. Whether this is evidence of the balanced budget constraint of these governments binding depends on if these governments viewed their revenue exposure as transitory. A persistent decline in expected revenues could cause governments to quickly reduce spending even in the absence of a binding financing constraint.

To explore this possibility, we look at how sales tax dependence and the size of a state's rainy day fund affect their employment response. As described in Section 3, states maintain rainy day funds to ensure they can balance the budget in the event of unanticipated changes in revenues or expenditures that realize over the fiscal year. We only have data available for such rainy day funds for state governments, so we now focus on state government workers. Table 7 explores the ability of rainy day funds, as a fraction of 2020 budgeted state expenditures, to explain the cross-section of state employee layoffs. Alaska and Wyoming are significant outliers in rainy day fund balances at over 50% and 100% of annual expenditure, respectively, and are excluded from the analysis. Column 1 shows that the size of these reserve balances is a strong predictor of layoffs in April 2020. A rainy day fund larger by 10 percentage points of general fund expenditure is associated with a 2.9 percentage point lower change in the unemployment rate of state workers from February to April 2020. The second column shows this channel is independent of the effect of a state's dependence on sales tax revenue. The third column reports the employment sensitivity of states to revenue exposure by tercile of rainy day fund size as a percent of budgeted expenditure. Sensitivity to revenue exposure is highest among states with the lowest rainy day fund balances. This is consistent with the idea that states rainy day balances are a form of precautionary savings used to hedge against the inability to smooth revenue shocks with borrowing. States with higher rainy day fund balances effectively had a less binding financial constraint and were better able to smooth their spending.

Last we also examine the response of state employment to the CARES Act through the lens of balanced budget rules and states' reserve capacity. In column 4 of Table 6, we find that the states in the two lowest tercile of rainy day funds present an elasticity of employment to the CARES Act close to unity (0.95 and 1.05 for the lowest and second lowest tercile respectively). States with larger reserves, in the highest tercile, have an elasticity of 0.6, 40% smaller. As we emphasize in Section 4.1.2, a unit elasticity corresponds to an allocation of funds that is identical to the existing budget. States with higher reserves, i.e. with lower budget constraints, allocate funds from the CARES Act in a different way than their general budget. The 0.6 elasticity of employment to CARES funding suggests that unconstrained states are able to allocate the funds to other crucial budget lines such as health care services, and social nets programs.<sup>4</sup>

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<sup>4</sup>For the month of May of 2020, the State of California increased spending for Health and Human Services

#### 4.1.4 Longer Run Response

We also look at layoffs measured in May 2020, expressed now as a difference in the rate of workers reporting a layoff measured in May relative to the same measure in February. We find that by May the relationship between layoffs and sales tax dependence and CARES aid have reverted substantially. Interestingly, layoffs explained by differences in rainy day fund balances persisted into May. These findings suggest states may have been subject to two distinct shocks—a short term loss in sales tax revenue, and a more persistent negative economic shock that affects revenue more broadly. States that depend more on sales taxes for revenue were able to hire back their workers when it became clear shutdowns were ending. However, all states also internalized more persistent declines in revenues, and those with higher ability to smooth these revenue laid off fewer workers at the onset of the crisis.

## 4.2 Effect of Tax Decrease on Public Employment

While the events unfolding in the Spring of 2020 are remarkable, the response of states to a loss in revenue is not (see [Poterba \(1994\)](#)). We extend our analysis of the impact from local government finances to local public employment to the period spanning 1992 to 2018. Expanding the sample sheds light on how specific the Spring 2020 moment is, as we compare the magnitudes of our estimates. Moreover we find that the effect of a loss of tax revenues to employment is persistent, suggesting a long-lasting impact of the COVID-19 crisis on local governments.

To analyze state and local governments in the long run, we link both the financial files (ASSGF) and the payroll files (ASPEP) from the Census of Governments. In Table 8 we consider the effect of tax revenues on state and local governments employment. In column 1, we find that local private employment correlates positively with state and local tax revenues combined; a loss in revenue of 10% corresponds to a decrease of 1% in private employment, confirming the procyclical nature of local tax revenues. In columns 2, 3, and 5, we examine separately the effect of a local change in tax revenues on local employment — for both state and local first, then state only, and finally for local governments only. We find a negative effect of tax revenues on unemployment, echoing the results documented above for the Spring of 2020 in Tables 4 and 5. A 10% decline in local tax receipts correlates with a 1.4% decrease in local government employment, and a 10% decline in states’ tax receipts correlates with a 0.8% decline in state employment.

In column four, we zoom-in on state governments to investigate the role of balanced budget requirements, and the ability of local governments to run counter-cyclical fiscal policy. As described in Section 4.1.3 and in Table 7, we examine the role of rainy day funds in the larger sample. We form terciles at the state level for the level of rainy day funds as a fraction of total expenditures; we find that for states with low levels of savings the elasticity of state employment to tax revenues is 15% larger than for states with sufficient savings (in

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by 48 million dollars (a 470% increase), and their social services spending which include supplemental security income and other cash assistance programs, by 390 million dollars (a 180% increase). See the Statement of General Fund Cash Receipts and Disbursements of the California State Controller (<https://sco.ca.gov/Files-ARD/CASH/May2020StatementofGeneralFundCashReceiptsandDisbursements.pdf> ; last accessed July 14th 2020). California has the fourth largest rainy day fund of all states as a fraction of government expenditures.

the highest tercile). This result highlights the role played by the institutional rules imposing balanced budget for state governments, and highlights how constrained states have more cyclical public employment.

Last we go beyond the contemporaneous cross-sectional relations to evaluate the persistence of the effect of tax revenues on employment. In Table 9, we show how the effect of state and local government tax revenues on employment persist up to three years, suggesting that tax revenues play a role on public employment beyond their contemporaneous impact.

## 5 Conclusion

By the first week of April 2020, 40 states had enacted various forms of shelter-in-place policies and announced closing of non-essential businesses (see Figure 3 for a time-line of state policy with the evolution of the impact of Covid-19 in the U.S.). These policies had large impact local economies and on local government budgets. Our findings link the immediate fiscal impact of the pandemic to employment reductions at state and local governments. The pattern of employment contraction among these governments points to binding balanced budget constraints as an explanation this relationship. The inability of state and local governments to conduct significant deficit spending prevented them from borrowing to smooth the sharp declines in revenue and increases in expenditure brought by the pandemic. Governments that depend more on sales tax revenue saw sharper declines in employment than others. Replacement revenue was also valuable. States that received exogenously more federal funding from the 2020 CARES Act were able to preserve more public sector jobs. The size of a state’s rainy day fund also predicted job cuts. Particularly suggestive of a role for binding balanced budget constraints, the relationship between sales tax dependence and employment declines was strongest in states with the smallest rainy day fund balances.

While both households and corporations benefited from Federal fiscal policy early in the pandemic, state and local governments have raised concerns that they offer significantly more support than they have received. For households which were largely affected by a large rise in unemployment, fiscal policy responded to the magnitude of the shock providing unemployment insurance extension, mortgage forbearance, in the goal of dampening the shock of a stopped economy. No such stabilizer ensures that state and local governments, which are responsible for nearly half of total public expenditure, are able to continue providing essential public services when their revenues decline sharply. Subject to balanced budget requirements and without such funding measures, our evidence shows that local government service provision is in fact significantly procyclical.

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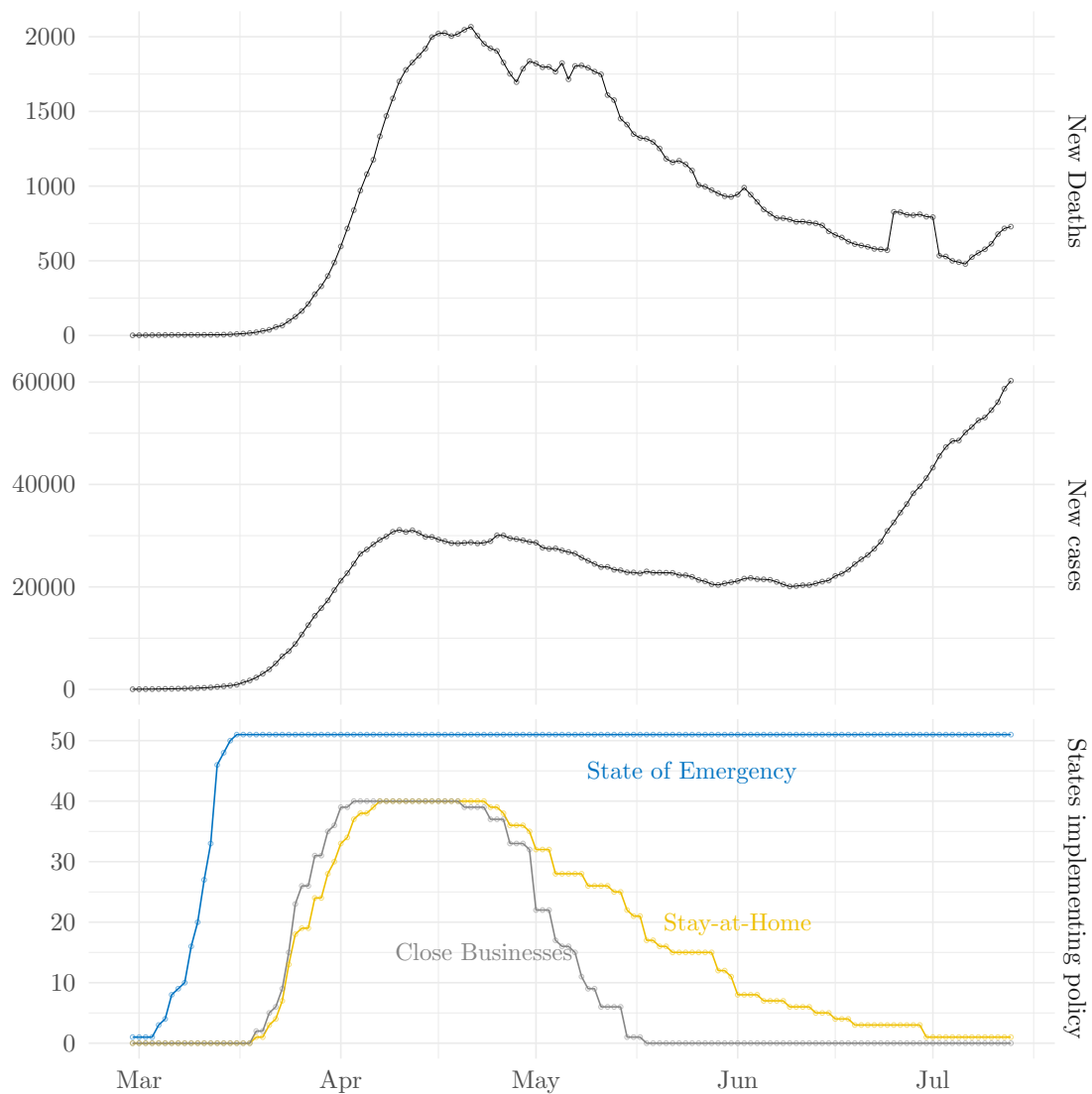
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## Figures

**Figure 1.**

Timeline of the Impact of Covid-19 in the U.S. and the Response of States.

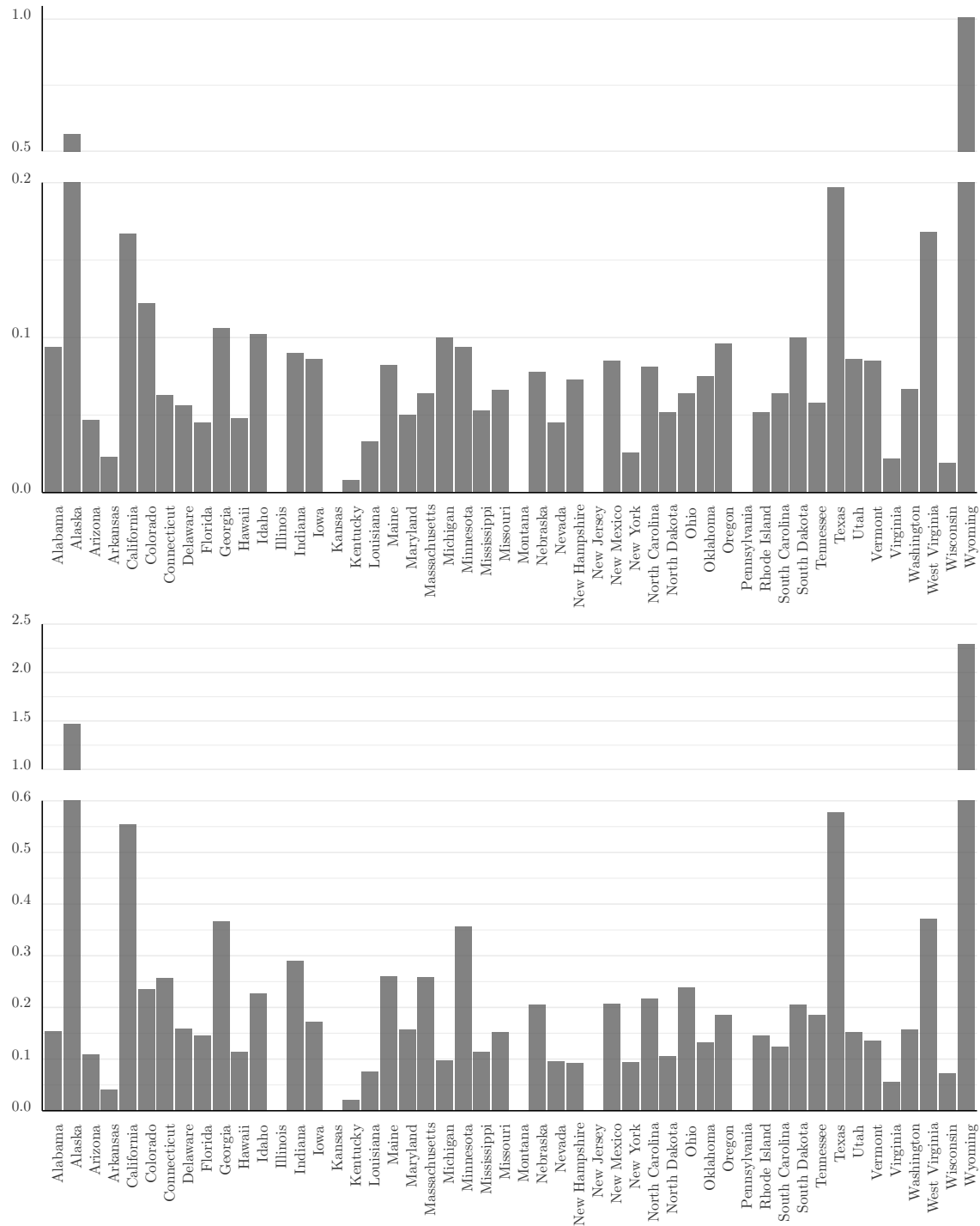
This figure represents the timeline of the impact of the Coronavirus across U.S. States. Panel A and B represent the number of new deaths and new cases across the U.S. from the Covid tracking project. Panel C. represents the number of U.S. States adopting policies in response to the coronavirus crisis: state of emergency, stay-at-home or shelter-at-home recommendations or a closing of businesses with data from [Raifman et al. \(2020\)](#).



**Figure 2.**

Rainy Day Funds across States in 2018.

Figure 2 represents the state of rainy day funds in 2018 as a fraction of total general expenditures (Panel A) and as a fraction of total payrolls (Panel B). Note the truncated axis for Wyoming and Alaska. The data is from the NASBO Fiscal Survey of the State for the year 2019 and from the Census of Governments 2018 ASPEP files for payrolls.

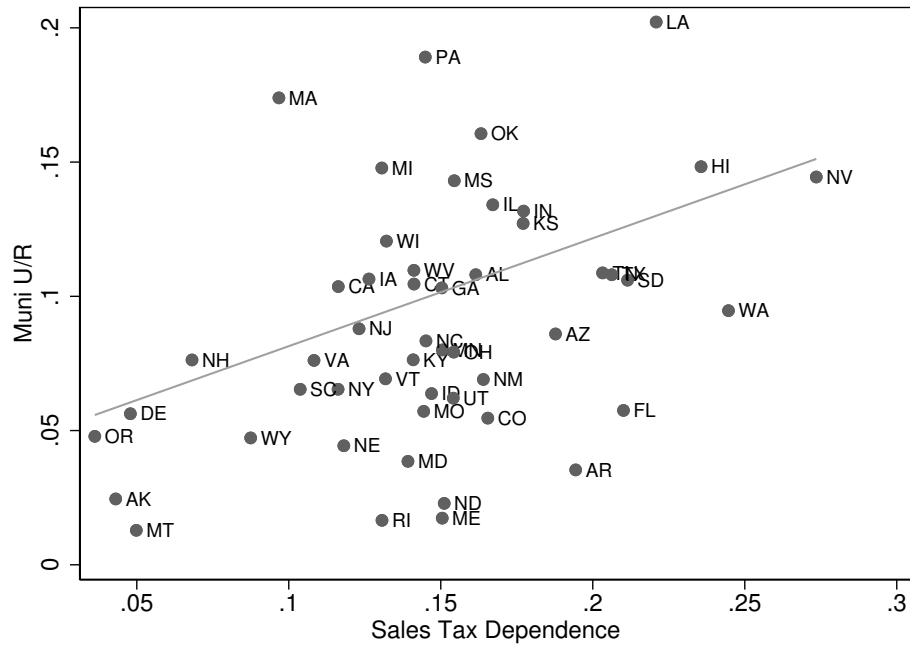




**Figure 3.**

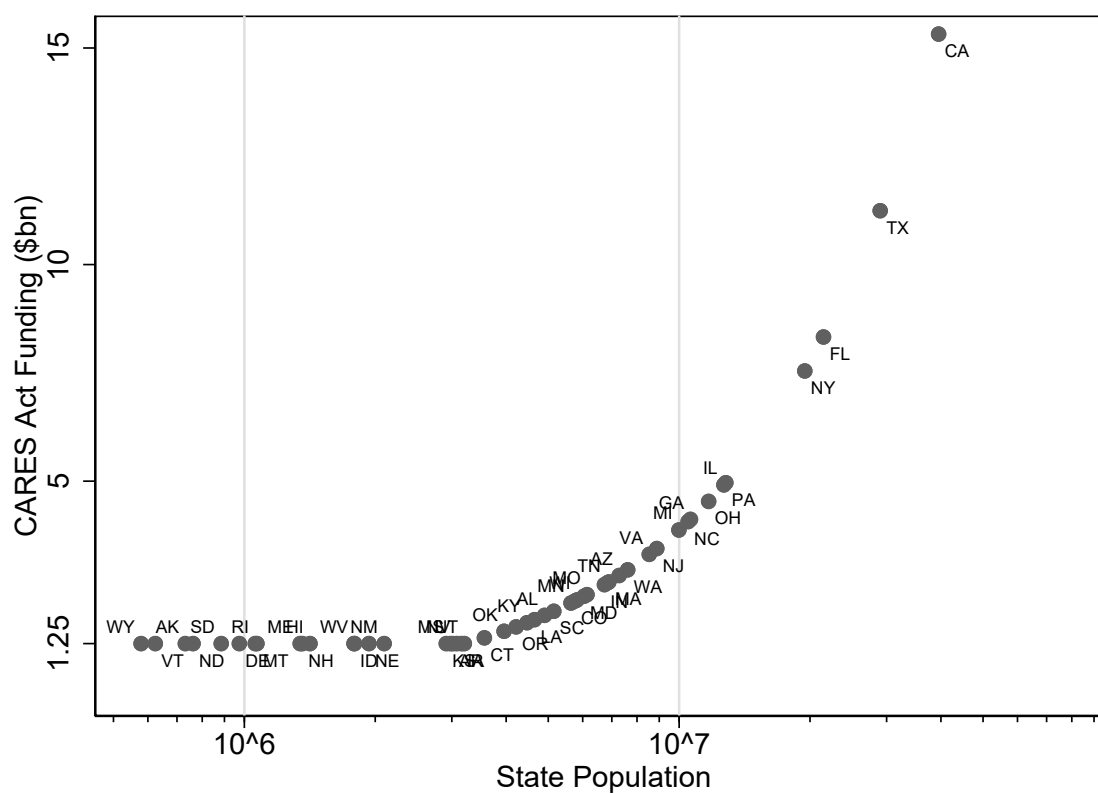
Local Government Unemployment: April 2020

Figure 3 shows the relationship between state and local governments' *Sales Tax Dependence* and the unemployment rate of state and local government workers in that state in April 2020. *Sales Tax Dependence* is defined as the fraction of state and local government revenues derived from sales taxes. The April 2020 unemployment rate among state and local government workers in a state is measured from the April 2020 CPS Survey as the (sampling weighted) fraction of respondents working for state and local governments in a state indicating they had been laid off.



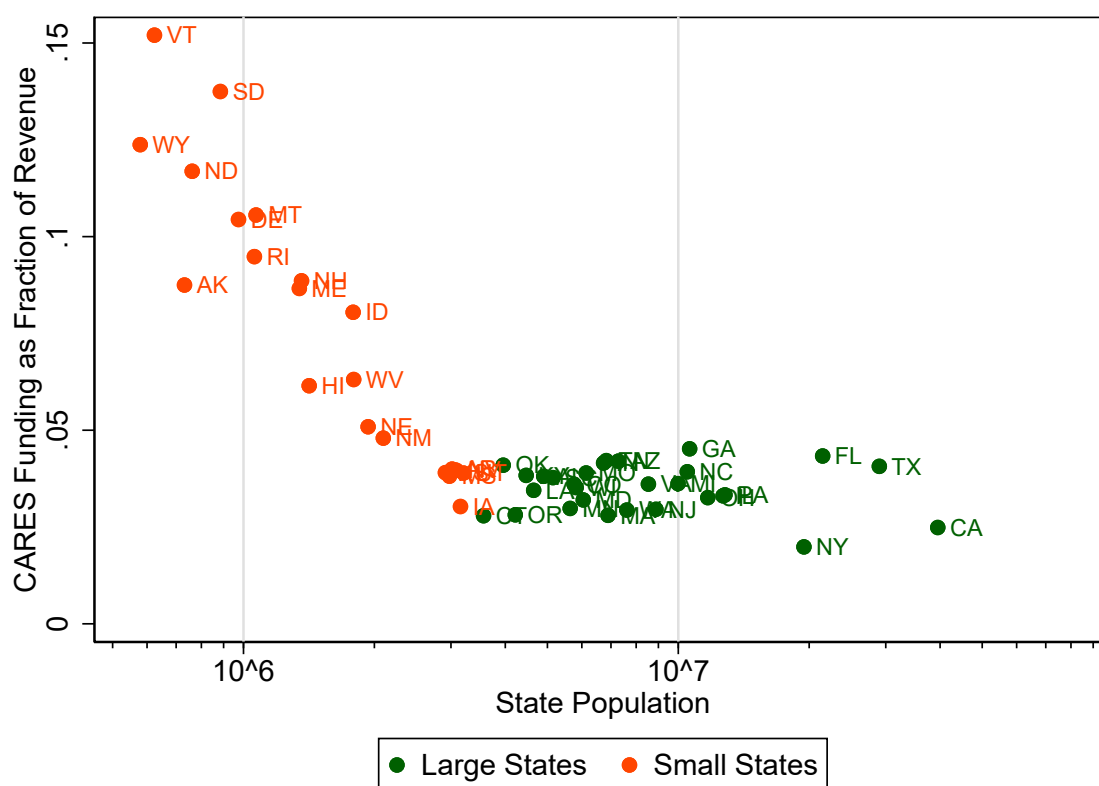
**Figure 4.**  
**CARES Funding and State Population.**

Figure 4 plots the CARES Act funding received by a state against state population, as measured from 2019 Census estimates. Small states received identical awards of \$1.25 billion, and larger states received funding proportional to their population. Population is on a log scale, causing the relationship to appear exponential.



**Figure 5.**  
 CARES Funding Exposure and State Population.

Figure 5 plots the CARES Act funding received by a state as a fraction of state and local government revenues in that state against state population, as measured from 2019 Census estimates. Small states, pictured in orange, received identical awards of \$1.25 billion while larger states, pictured in green, recieved awards proportional in size to their population. Population is on a log scale.



## Tables

**Table 1**  
State and Local Expenditures across States

	Panel A. State Governments				
	Average	Min	25th pct.	75th pct.	Max
Total Expenditures					
(in millions of dollars)	46,339	5,137	13,310	52,487	349,898
(per capita)	9,598	5,296	7,942	10,754	20,669
Salaries and Wages					
(in millions of dollars)	5,422	690	1,723	7,137	35,052
(per capita)	1,253	536	993	1,419	3,093
Share of total rev. (in %)	13	9.07	11.6	14.5	25.8
Public Employment					
Fulltime employees	108,166	14,725	39,678	145,811	540,350
Share of total employment (in %)	4.32	2.14	3.46	5.1	10.9
	Panel B. Local Governments				
	Average	Min	25th pct.	75th pct.	Max
Total Expenditures					
(in millions of dollars)	73,592	2,909	8,152	43,904	1,913,388
(per capita)	7,121	4,048	5,540	7,138	32,426
Salaries and Wages					
(in millions of dollars)	26,490	1,145	3,330	15,764	688,749
(per capita)	2,559	1,047	2,087	2,775	7,384
Share of total rev. (in %)	37.5	22.8	35	40.3	47.9
Public Employment					
Fulltime employees	240,480	16,888	61,536	253,846	1,445,299
Share of total employment (in %)	7.81	2.6	6.92	8.33	13.5
	Panel C. State & Local Governments				
	Average	Min	25th pct.	75th pct.	Max
Total Expenditures					
(in millions of dollars)	106,857	8,027	18,531	86,783	1,896,505
(per capita)	14,507	9,997	11,996	15,608	32,426
Salaries and Wages					
(in millions of dollars)	31,704	2,126	4,395	24,466	688,749
(per capita)	3,788	2,625	3,166	4,132	7,384
Share of total rev. (in %)	26.5	22	24.8	28.2	36.3
Public Employment					
Fulltime employees	326,485	39,642	93,868	360,672	1,872,571
Share of total employment (in %)	11.2	7.96	10.1	12.1	17.9

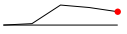
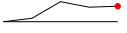
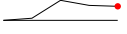
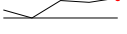
The table reports summary statistics of expenditures and payroll statistics for State and Local governments. Total expenditures and salaries and wages are from the ASSGF files from the Census of Governments in 2017 (the latest date where the data was available). Public employment is from the ASPEP 2018 files. The share of total employment is the ratio of government employees in 2018 to the number of employed from the BLS in 2018. Panel A. reports estimates for State governments. Panel B. reports estimates for local governments (county, municipal, township, school district, and other governments). Panel C. reports estimates for both state and local governments.

**Table 2**  
Tax Revenues by Population across States

	Panel A. State Governments				
	Average	Min	25th pct.	75th pct.	Max
Total Tax Revenues					
$\sigma(\Delta\text{tax})$	0.091	0.042	0.061	0.098	0.27
Sales Tax					
$\sigma(\Delta\text{tax})$	0.095	0.034	0.058	0.123	0.27
Share of total rev.	0.376	0.028	0.323	0.438	0.687
Indiv. Income Tax					
$\sigma(\Delta\text{tax})$	0.167	0.051	0.085	0.175	0.561
Share of total rev.	0.318	0	0.269	0.422	0.713
Corp. Income Tax					
$\sigma(\Delta\text{tax})$	0.533	0.129	0.242	0.537	1.89
Share of total rev.	0.059	0	0.044	0.064	0.251
Panel B. Local Governments					
Total Tax Revenues					
$\sigma(\Delta\text{tax})$	0.202	0.056	0.131	0.24	0.561
Property Tax					
$\sigma(\Delta\text{tax})$	0.203	0.067	0.127	0.251	0.546
Share of total rev.	0.617	0.202	0.429	0.823	0.981
Sales Tax					
$\sigma(\Delta\text{tax})$	0.237	0.037	0.126	0.265	0.991
Share of total rev.	0.177	0	0	0.286	0.67
Panel C. State & Local Governments					
Total Tax Revenues					
$\sigma(\Delta\text{tax})$	0.071	0.044	0.062	0.075	0.135
Property Tax					
$\sigma(\Delta\text{tax})$	0.144	0.051	0.093	0.16	0.423
Share of total rev.	0.277	0.128	0.233	0.319	0.569
Sales Tax					
$\sigma(\Delta\text{tax})$	0.066	0.028	0.049	0.074	0.188
Share of total rev.	0.226	0	0.173	0.283	0.491
Indiv. Income Tax					
$\sigma(\Delta\text{tax})$	0.086	0.045	0.065	0.094	0.221
Share of total rev.	0.199	0	0.167	0.27	0.384
Corp. Income Tax					
$\sigma(\Delta\text{tax})$	0.101	0.051	0.076	0.108	0.261
Share of total rev.	0.194	0	0.169	0.241	0.318

The table reports summary statistics of tax revenues per capita for State and Local governments. Panel A. reports estimates for State governments.  $\sigma(\Delta\text{tax})$  is the standard deviation of the year-on-year growth of taxes by categories across states. Estimates report the average, minimum, maximum, 25th and 75th percentile of the volatility of taxes across states and the same statistics of the average share of tax categories in total taxes. Data for Panel A are from the Census of Government QTAX files. Panel B. reports estimates for local governments (county, municipal and township governments). Statistics are the same as in Panel B and the data is from the Census of Government ASSGF files. Panel C. reports the same statistics for state and local government aggregated at the state level from the Census of Governments ASSGF files.

**Table 3**  
National Unemployment during the COVID-19 Crisis

	Feb.	Mar.	Apr.	May.	June.	
Private Sector Unemployment						
(in thousands of workers)	4,955	5,905	18,311	16,669	13,848	
(unemployment rate in %)	4.38	5.36	18	15.9	12.8	
State Government Unemployment						
(in thousands of workers)	78.5	172	625	475	501	
(unemployment rate in %)	1.09	2.5	8.77	6.69	7.34	
Local Government Unemployment						
(in thousands of workers)	132	245	1,204	933	883	
(unemployment rate in %)	1.27	2.42	12.6	9.52	9.83	
Federal Government Unemployment						
(in thousands of workers)	136	78.7	202	189	220	
(unemployment rate in %)	3.58	2.08	5.66	4.9	5.52	

We report the level of sectoral unemployment from Current Population Survey (CPS), for the four sectors of private, state, local and federal governments. Sectoral unemployment is defined as the number of individuals who are not currently employed and whose last primary job was in a given sector. The sectoral unemployment rate is the ratio of sectoral unemployment scaled by the total number of individuals whose current or last job was in a given sector. The last column summarizes the time series of employment in each sector.

**Table 4**  
Short Run Unemployment Response of State and Local Governments: April 2020

	(1) Δ Muni Laid Off	(2) Δ Muni Laid Off	(3) Δ Muni Laid Off	(4) Δ Part Time
Sales Tax Dependence	0.42*** (4.24)	0.26** (2.33)	0.28** (2.38)	0.45* (1.71)
Property Tax Dependence			-0.0060 (-0.052)	-0.16 (-0.60)
Intergov Dependence			-0.0071 (-0.042)	0.023 (0.066)
Income Tax Dependence			0.043 (0.33)	0.17 (0.74)
COVID Infection Rate		-0.048** (-2.05)	-0.048* (-1.88)	-0.073 (-1.20)
COVID Death Rate		2.20** (2.03)	2.20* (1.86)	3.22 (1.25)
Log Population		0.014** (2.44)	0.013* (2.00)	0.034*** (2.70)
Δ Private Laid Off		0.18** (2.14)	0.18** (2.08)	-0.085 (-0.50)
Constant	0.026* (1.70)	-0.18** (-2.25)	-0.18 (-1.58)	-0.44* (-2.00)
N	50	50	50	50
r2	0.20	0.37	0.37	0.31

*t* statistics in parentheses

\*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

This table reports analysis of the change from February to April 2020 in the fraction of state and local government workers who have laid off. The *Sales Tax Dependence* coefficients measure the conditional relationship between the sales tax revenue exposure of governments in a state and the change in the unemployment rate of state and local government workers. Column 2 controls for the COVID-19 infection and death rates in a state as of April 2020, state population, and the change in the layoff rate of private sector workers in the state. Column 3 adds measures of dependence on other major sources of government tax revenue. Column 4 replaces the dependent variable with a measure of the change in the fraction of workers who have been reduced to part time employment. t-statistics for heteroskedasticity-robust standard errors are reported in parenthesis.

**Table 5**  
Short Run Unemployment Response of State and Local Governments: Robustness

	(1) Δ Muni Laid Off	(2) Δ Muni U/R	(3) Δ Muni Laid Off	(4) Δ Federal Laid Off
Sales Tax Dependence	0.28** (2.38)	0.36** (2.51)	-0.030 (-1.35)	-0.14 (-0.74)
Property Tax Dependence	-0.0060 (-0.052)	0.0059 (0.037)	-0.0037 (-0.12)	0.068 (0.25)
Intergov Dependence	-0.0071 (-0.042)	0.011 (0.063)	-0.047 (-1.07)	-0.056 (-0.27)
Income Tax Dependence	0.043 (0.33)	0.11 (0.81)	0.0027 (0.14)	-0.31* (-1.81)
COVID Infection Rate	-0.048* (-1.88)	-0.042* (-1.80)	-0.00088 (-0.18)	0.011 (0.33)
COVID Death Rate	2.20* (1.86)	1.75* (1.79)	0.039 (0.18)	-1.04 (-0.90)
Log Population	0.013* (2.00)	0.018*** (2.71)	-0.00058 (-0.41)	-0.0036 (-0.42)
Δ Private Laid Off	0.18** (2.08)	0.16* (1.72)	-0.38 (-1.64)	0.28** (2.41)
Constant	-0.18 (-1.58)	-0.27** (-2.54)	0.025 (0.97)	0.11 (0.73)
N	50	50	50	50
r2	0.37	0.42	0.13	0.19

*t* statistics in parentheses

\*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

This table reports robustness analysis of the relationship between public sector employment and the revenue composition of state and local governments. Column 1 repeats the specification of Column 3 of Table 4. Column 2 replaces the dependent variable with the standard measure of the unemployment rate, the (sampling weighted) number of respondents in a geographic and sectoral category classified as unemployed relative to the total number of respondents in that category. Column 3 reports placebo results using as the dependent variable the change in the laid off fraction between November 2019 and January 2020. Column 4 reports placebo results using as the dependent variable the change from February to April 2020 in the laid off fraction of federal government workers in a given state. All variables are defined as in Table 4.



**Table 6**  
State and Local Government Layoffs and CARES Act Receipts

	(1) OLS	(2) FS	(3) IV	(4) IV	(5) IV
CARES Act Dependence	−0.63*** (−3.17)		−0.69*** (−3.93)		−0.52*** (−3.15)
Low Rainy Day # CARES Act Dependence				−0.95*** (−2.63)	
Med Rainy Day # CARES Act Dependence				−1.05*** (−2.91)	
High Rainy Day # CARES Act Dependence				−0.60*** (−2.88)	
Sales Tax Dependence					0.30*** (2.83)
Small State		−0.018** (−2.63)			
$Population^{-1} \times \text{Small State}$		74534.9*** (7.48)			
$Population^{-1} \times \text{Large State}$		−10727.6 (−0.51)			
COVID Infection Rate	−0.054** (−2.56)	−0.0074* (−1.82)	−0.055*** (−2.76)	−0.054*** (−2.64)	−0.040** (−2.13)
COVID Death Rate	2.60*** (2.88)	0.15 (0.79)	2.62*** (3.05)	2.51*** (2.80)	2.07** (2.41)
N	50	50	50	50	50
r <sup>2</sup>	0.26	0.89	0.26	0.29	0.36
F	5.29	36.2	6.72	3.55	9.55

*t* statistics in parentheses

\*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

This table reports analysis of the relationship between changes in state and local government employment and the amount of CARES Act funding received by a state. *CARES Act Dependence* is defined as the amount of money the state received from the CARES Act relative to the total state and local government revenue in that state in 2018. The first column reports ordinary least squares (OLS) regression results. The second column reports the first stage of instrumenting for *CARES Act Dependence* with an indicator for if a state received funding proportional to population (*Large State*) interacted with the inverse population of the state. Small states received a fixed dollar amount of funding and state population is strongly inversely proportional to *CARES Act Dependence*. Column 3 reports the specification instrumenting for *CARES Act Dependence* as described above. Column 4 instruments for CARES Act Dependence by rainy day fund terciles. Column 5 adds *Sales Tax Dependence* as an independent variable in the instrumental variables regression.

**Table 7**  
State Government Layoffs and Rainy Day Fund Balances

	(1) $\Delta$ State Laid Off	(2) $\Delta$ State Laid Off	(3) $\Delta$ State Laid Off	(4) s3_laidoff_frac_state
Rainy Day Fund Exposure	−0.29** (−2.32)	−0.28** (−2.34)		−0.28** (−2.43)
Sales Tax Dependence		0.21* (1.76)		−0.051 (−0.41)
Low Rainy Day # Sales Tax Share			0.33* (1.70)	
Med Rainy Day # Sales Tax Share			0.20 (1.65)	
High Rainy Day # Sales Tax Share			0.14 (1.22)	
N	48	48	48	48
r2	0.25	0.31	0.30	0.32

*t* statistics in parentheses

\*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

This table reports analysis of the employment dynamics of state and local government workers from February to April 2020. *Rainy Day Fund Exposure* denotes the size of a state's rainy day fund for FY2020 as a fraction of expenditures. The dependent variable is the same as defined in Table 4 except using only state government employees instead of state and local government employees in a state. *Low*, *Med*, and *High Rany Day* are indicators for terciles of rainy day funds as a fraction of annual state expenditures. All specifications control for *COVID Infection Rate*, *COVID Death Rate*, and log state population. All variables are defined as in Table 4.

**Table 8**  
Employment and Local Government Tax Revenues

	(1) Private Emp.	(2) State and Local Emp.	(3) State Emp.	(4) State Emp.	(5) Local Emp.
log State and Local Tax Revenue	0.097** (2.52)	0.073 (1.70)			
log State Tax Revenue			0.078*** (3.82)	0.068*** (3.89)	
log Local Tax Revenue					0.14* (2.05)
Low Rainy Day $\times$ log State Tax Revenue				0.0084** (2.28)	
Med Rainy Day $\times$ log State Tax Revenue				0.0069 (1.35)	
Constant	6.24*** (9.98)	10.7*** (15.4)	9.65*** (29.9)	9.82*** (35.5)	9.29*** (9.29)
N	1275	1275	1250	1091	1275
r2_within	0.011	0.0067	0.065	0.083	0.011

*t* statistics in parentheses

\*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

This table reports panel regression analysis of the relationship between public sector employment and state and local government tax revenues. The data is at the annual frequency by state, covering 1991 to 2017 (excluding 1995 due to data issues). Dependent variables are the natural log of the one-year-forward number of employment in the sector indicated in the column heading. The dependent variable in column 1 is the log number of private sector workers from the CPS. *State and Local Emp.*, *State Emp.*, and *Local Emp.* are log employment from the Annual Survey of Public Employment and Payroll (ASPEP). Terciles of rainy day fund balances are computed with respect to the full regression sample. Standard errors are clustered by state and year.

**Table 9**  
Persistence of Employment and Local Government Tax Revenues

Future Employment Horizon:	(1) 1 year	(2) 2 year	(3) 3 year	(4) 4 year
	Private Employment			
S&L Tax Revenue	0.097** (0.0385)	0.079** (0.0336)	0.056 (0.0389)	0.047 (0.0484)
	S&L Government Employment			
S&L Tax Revenue	0.073* (0.0428)	0.112*** (0.0391)	0.068 (0.0465)	0.007 (0.0694)
	State Government Employment			
State Tax Revenue	0.078*** (0.0203)	0.068*** (0.0173)	0.045*** (0.0137)	0.016 (0.0103)
	Local Government Employment			
Local Tax Revenue	0.135** (0.0663)	0.120* (0.069)	0.051 (0.0911)	0.023 (0.0718)

This table reports analysis of the relationship between log state and local government tax revenues and log public sector employment at various time horizons. Each reported coefficient is from a separate panel regression. The variables and sample are as defined in Table 7. Standard errors are clustered by state and year and are reported in parentheses.