State Fiscal Crises: States' Abilities to Withstand Recessions

David T. Mitchell and Dean Stansel

January 2015

MERCATUS WORKING PAPER

MERCATUS CENTER
George Mason University

3434 Washington Blvd., 4th Floor, Arlington, Virginia 22201
www.mercatus.org

David T. Mitchell and Dean Stansel. "State Fiscal Crises: States' Abilities to Withstand Recessions." Mercatus Working Paper, Mercatus Center at George Mason University, Arlington, VA, January 2015. http://mercatus.org/publication/state-fiscal-crises-states-abilities-withstand-recessions.

Abstract

During the most recent recession, many state governments faced substantial budget shortfalls. State politicians often blame the fiscal crises created by those shortfalls on factors largely outside their control, such as the declining economy or reductions in federal aid. Others have suggested that what state politicians themselves do, especially during expansionary years—whether they enact rapid spending increases, implement large tax cuts, increase the size of their rainy day funds, or take some combination of these actions—may be an important factor contributing to budget shortfalls during recessions. We examine these competing hypotheses and tend to find a positive relationship between spending growth (both current and lagged) and fiscal stress during recessions and a negative relationship between the size of rainy day funds and fiscal stress. We tend not to find a significant relationship between fiscal stress and either the unemployment rate or federal aid. That lack of a significant relationship supports the idea that politicians have greater control over the fate of the state's finances than they often claim. It also illustrates the importance of spending restraint and rainy day funds as strategies for minimizing fiscal stress.

JEL codes: H7, E6, D7

Keywords: fiscal stress, budget crises, budget shortfalls, government spending, rainy day fund, business cycles

Author Affiliation and Contact Information

David T. Mitchell
Associate Professor of Economics
Department of Economics, Finance, Insurance, and Risk Management
University of Central Arkansas
Co-director
Arkansas Center for Research in Economics

Dean Stansel
Associate Professor of Economics
Department of Economics and Finance, Lutgert College of Business
Florida Gulf Coast University
dstansel@fgcu.edu

State Fiscal Crises: States' Abilities to Withstand Recessions

David T. Mitchell and Dean Stansel

During recessions, many state governments see their revenues decline, not just grow more slowly. Most states face some sort of balanced budget requirement; thus, unless spending is cut proportionately, reductions in revenue ultimately produce budget shortfalls that must be eliminated. The resulting deficits are exacerbated by the fact that the demand for some state spending—for example, welfare programs, unemployment compensation, and so forth—is countercyclical in nature (meaning it increases during recessions).

During the most recent recession, budget shortfalls were as high as $19 billion in California in 2010. Such large shortfalls create an imperative to make substantial changes in state budgets on relatively short notice, which may lead to poor policy choices, including choices that are unpopular with voters. For example, Arizona sold several state buildings and leased them back. New Jersey canceled infrastructure projects that were funded mostly by the federal government and New York, because New Jersey did not have its share of the money to spend. Worse, Illinois issued IOUs.

We examine the determinants of these budget shortfalls to provide insight on ways to avoid them. Avoiding the consequences of budget shortfalls could lead to improved outcomes for individual taxpayers, which could hold both direct and indirect benefits for politicians as well.

As McNichol and Lav (2007, 1) write, "Some of the fiscal problems are due to economic conditions outside states' control. . . . In many states, however, these economic problems are being magnified by endemic budget weaknesses created by past state decisions about taxes and expenditures." Although those external factors affect the severity of state fiscal crises, we focus

on the factors over which state politicians have some control. An important distinction can be made regarding how state politicians respond to the faster revenue growth that occurs during economic expansions. They face three basic options for what to do with the extra revenue: (1) use it to increase spending by expanding existing programs or initiating new ones, (2) return it to the taxpayers through tax cuts, and (3) deposit it in a rainy day fund (RDF). A considerable volume of research has been conducted on state RDFs, but virtually none has been done on the other two factors. A substantial amount of research has also been conducted on fiscal stress in cities. We build on those related studies by incorporating a measure of "overspending" and by focusing on states rather than cities.

Our primary hypothesis is that states have more control over their financial fate than is often believed. States that increase spending faster and have smaller RDFs are likely to experience more fiscal stress. A competing hypothesis proposes that fiscal stress is determined by factors largely outside the control of state politicians. States with higher unemployment and less federal aid will experience more fiscal stress. Using state data from 1992 to 2009, we find evidence to support our primary hypothesis. We do not find evidence to support the competing hypothesis.

The next section discusses the previous literature in this area. Subsequent sections describe the econometric model and data used, discuss the results, and then provide concluding remarks.

Previous Literature

In the 1970s, there were high-profile fiscal crises in several large cities, including New York and Cleveland. These crises spawned a substantial volume of academic research into the causes and consequences of those fiscal difficulties. Since then, additional examples include Philadelphia (1990); Bridgeport, Connecticut (1991); Orange County, California (1994); Washington, DC

(1995); Miami (1996); Camden, New Jersey (1999); and Pittsburgh (2004) (Kimhi 2008, 634). During the current economic downturn city government finances have been in the news again, with bankruptcies in Jefferson County (Birmingham), Alabama; Stockton and San Bernardino, California; Detroit; and Harrisburg, Pennsylvania; among others. Although our focus here is state governments, the previous literature on local fiscal stress deserves brief attention.

Skidmore and Scorsone (2011) provide an excellent summary of that previous literature, so we restrict our attention here to only a few of the most recent works. As Skidmore and Scorsone (2011, 361) confirm, formulating an accurate measure of "fiscal stress" is a "challenging task." There is no consensus about how to do so. Many attempts at the local level have suffered from being too complicated (considering as many as 36 variables in one case) and from ignoring the diversity of voter preferences. Kloha, Weissert, and Kleine (2005) provide a more voluminous list of those shortcomings. The Citizens Research Council of Michigan (2000, 1) defines local fiscal distress as "an imbalance between the level of resources a unit of government has committed and potential available resources." Inman (1995, 378) says that a "fiscal crisis occurs when a city's potential to raise revenues is insufficient to cover the city's legally required expenditures." As Kloha, Weissert, and Kleine note, the concept may also have a long-term aspect, but the Citizens Research Council of Michigan's definition seems to capture succinctly the definition used in this examination of state fiscal stress.

Taking a different approach, Kloha, Weissert, and Kleine (2005, 314) deliberately focus on both short-term and long-term difficulties in defining "fiscal distress" as "a failure to meet standards in the areas of operating position, debt, and community needs and resources over successive years." They note that local fiscal stress is commonly attributed to four primary causes: "population and job market shifts, governmental growth, interest group demands, and poor management" (314). They

develop a 10-point scale of fiscal stress for Michigan cities and find that it is better at predicting future fiscal crises than the system currently used by Michigan's state government.[1] It "consistently identified governments in trouble before their [state] review teams were appointed" (320).

More recently, Skidmore and Scorsone (2011) examine fiscal stress in cities in Michigan, which they attributed to three factors: Michigan's shrinking manufacturing base, reductions in state revenue sharing, and property tax limitation laws. Their measure of fiscal stress focuses exclusively on external causes; it is the difference between an index of the cost of government services and an index of government revenue. They find that fiscal stress tends to be negatively associated with spending in the following four categories: general government, public works, parks and recreation, and capital expenditures. Spending on services such as public safety tends not to be significantly related to fiscal stress. Because their measure of fiscal stress ignores internal causes, such as poor past budgetary decisions, it is particularly inappropriate for our purposes. Rather, the latter internal causes are our primary area of interest.

The issue of how to define fiscal stress differs little at the state level. As Gold (1992) points out, "There is no generally accepted indicator of fiscal stress" (p. 34). However, one commonly used measure is the year-end balance (in general funds and RDFs) as a percentage of spending.[2] Five percent is the level generally considered to be the minimum required to cushion against revenue shortfalls during recessions. Gold finds that 33 states had balances below 5 percent of spending in fiscal year 1991. The average balance of 1.5 percent that year was the

[1] The nine indicators Kloha, Weissert, and Kleine (2005) use are (1) population growth, (2) real taxable value growth, (3) large real taxable value decrease, (4) general fund expenditures as a percentage of taxable value, (5) general fund operating deficit, (6) prior general fund operating deficits, (7) size of general fund balance, (8) fund deficits in current or previous year, and (9) general long-term debt as a percentage of taxable value. Each takes a value of 0 or 1, except prior general fund operating deficits, which can be 0, 1, or 2.

[2] One problem with this measure is that it can be manipulated with deceptive accounting mechanisms.

lowest since 1983. Regarding the implication of our major hypothesis, Gold concedes that "excessive spending did play an important role in some states, but it is far from the major source of state fiscal problems" (pp. 45–46).

Examining state budgets during the 1990–1991 recession, Poterba (1994) finds that in fiscal year 1991, 22 states had lower-than-expected revenues, and 20 states faced higher-than-expected spending demands. The latter situation relates largely to the countercyclical nature of welfare spending. Furthermore, for several years in a row, total year-end balances (in all 50 states) as a percentage of annual expenditures had fallen below 5 percent. Poterba identifies the primary causes of state fiscal stress at that time as the recession-induced slower revenue growth, a reduction in federal grants to state and local governments, and increases in demand for state spending (due to increases in the elderly share of the population and increases in the prison population resulting from reforms such as mandatory sentencing laws). He formulates a measure of that fiscal stress that accounts for both the reduction in available revenues and the increase in spending demands. Although his focus is on the effects of that fiscal stress rather than on the cause, his measure deserves further attention and will be discussed in the next section.

Poterba's findings suggest that fiscal institutions (such as balanced budget requirements and tax and expenditure limitations) and political factors (such as having a governor and a legislative majority from different parties) are important determinants of how state governments respond to fiscal stress. Alt and Lowry (1994) find similar effects for a different—and longer—period. Rodden (2003) provides an overview of the literature on those and other institutions that can affect state spending. Campbell, Finney, and Mitchell (2007) find that party dominance matters in a nonlinear manner, and Escaleras and Calcagno (2009) find that the type of term limit is important for spending as well.

Sobel and Holcombe (1996) examine an additional fiscal institution: state rainy day (or budget stabilization) funds. RDFs are a relatively new phenomenon, most having been adopted since the 1980–1982 recessions. The number of states with RDFs expanded from 12 in 1982 to 44 by 1994. Sobel and Holcombe's focus is on how this new institution relates to fiscal stress. They measure fiscal stress during the 1990–1991 recession as the sum of discretionary revenue increases and the amount by which expenditure growth fell below average (measured as a percentage of 1988 spending) and find that it is not significantly associated with the presence of a rainy day fund. However, it is negatively associated with the presence of an RDF with a mandatory deposit requirement.

The need to raise taxes to close budget deficits is an important indicator of fiscal stress. Indeed, discretionary revenue increases are one of the two variables that Sobel and Holcombe use in their measure of fiscal stress. Blackley and DeBoer (1993) examine the determinants of discretionary revenue increases (one of the two components of the Sobel-Holcombe fiscal stress measure) during the recession of fiscal years 1991 and 1992. They find that such tax hikes during the recession (which are themselves an indicator of fiscal stress) are positively associated with both the increase in state spending and the increase in state employee compensation during the previous expansion in the 1980s. That finding supports the hypothesis that states that increase spending more during expansions will face more fiscal stress during the next recession. Similarly, using the Sobel-Holcombe fiscal stress measure, Stansel and Mitchell (2008) find that faster increases in spending in the expansion preceding the 2001 recession are associated with greater levels of fiscal stress during that recession. They also examine rainy day funds and find that neither the mere presence of an RDF nor its size has a significant relationship with fiscal stress, although having an RDF with a strong withdrawal rule is negatively associated with fiscal stress.

Overcommitting resources by overspending is cited as a major problem by Blackley and DeBoer (1993); *The Economist* (1991, 2001); Edwards, Moore, and Kerpen (2003); Moore (1991); and Stansel and Mitchell (2008). Moreover, it is cited as at least a minor problem by Gold (1992) and Lauth (1993).

In contrast, McNichol and Carey (2002) dispute the claims of overspending, and Johnson (2002) blames the fiscal crises on the state tax cuts passed during the 1990s. Gramlich (1991) argues that the rapid increase in health care costs has led to fiscal stress. Political commentators such as columnist David Broder (2002) claim that reductions in federal aid are to blame. This paper builds on that previous literature exploring the relationship between government spending and fiscal stress by examining more recent data, including additional relevant control variables, and by using a more appropriate econometric model.

Econometric Model and Data

We estimate fiscal stress as a function of the growth in real per capita state spending and the size of the state budget stabilization fund (or rainy day fund), also in real per capita terms, as well as analyzing unemployment, union membership, Medicaid spending growth, gross state product, federal grants, and state and period dummy variables. The state dummies are included to control for time-invariant omitted variables bias. The period dummies are included to control for national shocks, which might affect aggregate stress in any period but are not otherwise captured by the explanatory variables. In choosing our independent variables, we focus on the competing hypotheses already within the literature: overspending, loss of federal grants in aid, and health care spending growth. Moreover, panel data require a large number of observations; that simple

specification helps maximize the degrees of freedom. In summary, the stress model central to this paper is as follows:[3]

$$(1)\quad \textit{Fiscal Stress}_{it} = \beta_0 + \beta_1 \textit{Expenditure Growth}_{i,t} + \beta_2 \textit{Expenditure Growth}_{i,t-k} + \beta_3 \textit{Medicaid Spending Growth}_{i,t} + \beta_4 \textit{Personal Income}_{i,t} + \beta_5 \textit{Personal Income}_{i,t-k} + \beta_6 \textit{Budget Stabilization Fund}_{i,t-1} + \beta_7 \textit{Recession}_{i,t} + \beta_8 \textit{Corporate Income Tax}_{i,t} + \beta_9 \textit{Unemployment}_{i,t} + \beta_{10} \textit{Union Membership}_{i,t} + \beta_{11} \textit{Federal Grants}_{i,t} + \alpha_i + \eta_t + u_{it},$$

where $\textit{Expenditure Growth}_{i,t-k}$ is the spending growth variable lagged between 1 and k times; i represents each state and t represents each year; α_i are state dummies; η_t are time dummies; and u_{it} is the error term. Trend spending is the average percentage change in spending for each of the previous five years. We use trend spending because trend spending shows the expected amount of public services to be provided by each state (Berne and Schramm 1986). Unemployment is the U-3 unemployment rate from the Bureau of Labor Statistics. Budget stabilization is the real per capita amount of money in the rainy day fund (budget stabilization fund). Personal income is the real per capita personal income in each state. Union membership is the percentage of the workforce that holds union membership. Federal grants are the real per capita value of federal grants and aid to the states from the federal government.

Our model is derived from the previous literature, specifically from Sobel and Holcombe (1996) and Stansel and Mitchell (2008), but we have incorporated some additional measures (see table 1, page 22). Following Levinson (1998) and Gonzalez and Levinson (2003), we include a variable for corporate income tax revenue to account for the idea that a state's reliance on the corporate income tax could increase fiscal stress because corporate tax revenues are more volatile than other tax revenues. A dummy variable for whether or not the state was in a recession is also

[3] We used the xtoverid in Stata (Schaffer and Stillman 2011) to differentiate between the within estimation technique (fixed effects) and the random effects technique. Xtoverid allows us to consider cluster and robust standard errors. This is the method suggested by Wooldridge (2002, 290–91).

included. We include a control variable for Medicaid spending growth because Medicaid is an important driver of budget pressures in the states.[4] We examine both unemployment and changes in unemployment, following the idea that a move to 7 percent unemployment could differ, depending on the direction of the move. We also lag several variables. Alaska and Wyoming are omitted because their low population and dependence on natural resource extraction taxes made them statistically different from the other states (using Cook's *D*). Results are similar, though with weaker explanatory power, when those two states are included.

Definition of Fiscal Stress

Our primary measure of fiscal stress follows the one used originally by Sobel and Holcombe (1996) and in subsequent work by Douglas and Gaddie (2002) and Stansel and Mitchell (2008). The idea is that states experiencing fiscal stress will be required to reduce spending below trend growth rates and to raise taxes. Thus, Sobel and Holcombe define *fiscal stress* as the amount by which spending falls short of trend spending plus tax increases. The spending shortfall accounts for the slower growth of spending that recessionary revenue slowdowns necessitate, and the tax increase accounts for the attempts to bring in new revenue to offset that slower revenue growth. More specifically, fiscal stress is defined as the sum of the following two factors, measured in real per capita terms (2010 dollars): (1) expected general fund expenditure[5] minus actual general fund expenditure and (2) discretionary tax increases.

(2) fiscal stress = (expected expenditure − actual expenditure) + tax increases.

[4] Results with real Medicaid spending adjusted for population instead of Medicaid spending growth are available from the authors.

[5] This figure is based on the trend in each state over the previous five years. Expected general fund expenditures for each state for each year were calculated by using the "trend" formula in Microsoft Excel, which, according to the program, "returns numbers in a linear trend matching known data points, using the least squares method."

As an example, consider California in 2009. On the basis of the trend in California over the previous five years, real per capita general fund spending was expected to be $3,032.67 in 2009. Actual per capita general fund spending was only $2,500.74, or $531.93 below trend. The state enacted tax increases of $69.35 per capita. Hence, its fiscal stress was $601.28.

Table 2 (page 24) lists the most stressed states. Note that our measure does not reflect states' use of off-budget spending. Nor does it account for states that issue IOUs or sell assets.

Figures 1 and 2 show the cyclicality of fiscal stress as well as the differences in stress across states. Figure 1 (page 25) shows fiscal stress across the 1992–2009 period for each state (listed in alphabetical order). The figure indicates that most states see stress during recessions but that some states have limited stress throughout the entire period. It also shows that a state that felt much fiscal stress in one recession may experience limited fiscal stress in a different recession.

Figure 2 (page 26) shows the same data but with all states on the same graph. A wavelike pattern shows that stress increases during recessions and decreases during economic expansions. Moreover, the figure indicates that the fact that one state is experiencing fiscal stress does not mean that all states are. Summary statistics for the dependent variable are in table 3 (page 26).

Alternative Measure of Fiscal Stress

Poterba (1994) provides an alternative measure of fiscal stress, the "unexpected deficit shock," which is equal to the "unexpected expenditure shock" minus the "unexpected revenue shock." *Spending shock* is calculated as actual spending minus midyear spending changes (enacted after the passage of the budget in an effort to eliminate a budget deficit) minus the spending forecast

done at the beginning of the year. *Revenue shock* is defined as actual revenues minus midyear revenue changes minus the revenue forecast.

(3) Poterba's measure = unexpected deficit shock = unexpected expenditure shock − unexpected revenue shock
unexpected deficit shock = (actual spending − midyear spending changes – beginning-of-year spending forecast) − (actual revenue − midyear revenue changes – beginning-of-year revenue forecast)

Conceptually, Poterba's measure is similar to that used by Sobel and Holcombe (1996); however, the correlation between the two variables is low. When we ran a simple fixed-effects model using our measure as a dependent variable and Poterba's measure as the independent variable (with year effects as well) for 48 states over 16 years, we obtained an overall adjusted R^2 of 0.0476. Table 8 (later in this report) shows the results with Poterba's measure of fiscal stress. That model shows less explanatory power than Sobel and Holcombe's model as measured by the F-statistic and adjusted R^2, so we focus on the other measure (Sobel and Holcombe 1996).

The government finance data are for the state general fund. They can be found in a semiannual publication available from the National Association of State Budget Officers.[6] The sources of the other data are listed in table 1. We examine data from 1992 to the present. By examining a longer period than most previous work, we are better able to account for the political commitments and expectations made by legislatures to constituents and special interest groups. Making those promises credible is important to legislators who wish to be reelected (Crain and Tollison 1993; Weingast 1990).

[6] Unless otherwise indicated, the state finance data in this paper come from the National Association of State Budget Officers' semiannual publication *Fiscal Survey of the States*. The spending data come from Appendix table A-1 in the fall editions. The discretionary tax increase data come from the table in each fall edition titled "Enacted Revenue Actions by Type of Revenue and Net Increase or Decrease."

Methods

A variety of techniques can be used to estimate equation 1. Each of those techniques has its own difficulties and assumptions. We follow Angrist and Pischke (2008, 245–46) and show more than one methodology so that readers can see the robustness of the results and weigh the results themselves. We begin with a fixed-effects within-estimator estimation, allow our within estimation to have an autoregressive (AR) process, and finish with lagged dependent variables (Arellano and Bond 1991).

To address the possibility that the data contained an AR process, we explored several panel techniques that deal with that problem. We were also open to the possibility of lagged dependent variables having an effect on stress, because it made intuitive sense that this year's stress would be related to last year's stress. A referee suggested that we try using a first-difference estimator.

Arellano and Bond (1991) provide an estimation technique that corrects for the bias introduced by the lagged endogenous variable, but it also permits a certain degree of endogeneity in the other regressors. That generalized method of moments estimator first-differences each variable to eliminate the state-specific effects and uses all possible lagged values of each of the variables as instruments. The disadvantage to the method is that it makes several strong assumptions, including the assumption that the lagged values are strong instruments.

Our dynamic model incorporates the effect of fiscal stress in previous years on current fiscal stress, which suggests the following model:

$$\begin{aligned}(4)\quad \textit{Fiscal Stress}_{it} = {} & \beta_0 + \beta_1 \textit{Fiscal Stress}_{i,t-k} + \beta_2 \textit{Expenditure Growth}_{i,t} + \\ & \beta_3 \textit{Expenditure Growth}_{i,t-k} + \beta_4 \textit{Medicaid Spending Growth}_{i,t-k} + \beta_5 \textit{Personal Income}_{i,t} + \\ & \beta_6 \textit{Budget Stabilization Fund}_{i,t} + \beta_7 \textit{Recession}_{i,t} + \beta_8 \textit{Corporate Income Tax}_{i,t} + \\ & \beta_9 \textit{Federal Grants}_{i,t} + \beta_{10} \textit{Unemployment}_{i,t} + \beta_{11} \textit{Union Membership}_{i,t} + \alpha_i + \eta_t + u_{it},\end{aligned}$$

where $\textit{Fiscal Stress}_{i,t-k}$ is the dependent variable lagged between 1 and k times.

Results

Table 4 (page 27) presents the estimates for the fixed effects within estimator model. The first two models are within estimators, and the third model is a within estimator where several variables are first-differenced. The estimates for those models are the results of the theory-based model in equation 1. For reasons explained in the next section, this model dominates models with a more explicit time component, including lagged dependent variables.

Expenditure growth and lagged expenditure growth are important across a wide variety of models. First and second lags have the expected positive sign, suggesting that expenditure growth is positively associated with fiscal stress. Current-year expenditure growth has a negative sign and may suggest that when the current year's expenditure growth is increasing, fiscal stress is decreasing because of revenue growth. A recession dummy and the budget stabilization fund are statistically significant across models. As expected, unemployment and recessions are positively associated with fiscal stress, whereas revenue in the budget stabilization fund is negatively associated with fiscal stress. Personal income, union membership, and Medicaid spending growth are not statistically significant factors in those models. Union membership is not statistically significant in any of our models.

Utilizing a variety of other approaches, Medicaid growth and personal income were consistently insignificant (e.g., whether or not we used robust estimators, whether we used first differences or lagged values, whether or not we used the Swamy-Arora estimator of the variance components). The budget stabilization fund variable was not always statistically significant, though it was almost statistically significant in most cases where it failed. For the sake of brevity, those results are not reported herein but are available from the authors upon request.

To address the possibility that there was an autoregressive component to the error term, we ran a series of models with fixed effects within estimation with an AR(1) disturbance. We ran several different specifications with different lags and differences, as well as a model substituting Medicaid growth for Medicaid spending. Those models tended to show the same statistically significant variables, but the signs would change from specification to specification. That outcome indicated that panel data with an AR(1) component were not the correct specification. Table 5 (page 28) presents three of those models.

An alternative panel estimation technique is to use first-difference models. In this case, differencing takes care of any potential serial correlation. Table 6 (page 29) presents results from those models. In this case, increases to the trend spending growth rates and increases to the unemployment rate are associated with more stress but are not statistically significant. Only personal income and the recession variable are found to have a statistically significant relationship with fiscal stress, both negative.

Dynamic Models

Finally, we wanted to use dynamic panel data techniques with lags of the dependent variable. Intuitively, it makes sense that this year's fiscal stress would be related to last year's fiscal stress, as in equation 4. Lagged dependent variables can be added to panel data in several ways, though they all perform better when the number of cross-sectional observations is bigger than the number of time observations. A well-known version is Arellano and Bond (1991).

We found that the Arellano-Bond method was quite robust with different methods of robust standard errors. Suppressing the constant term, using already-differenced exogenous variables, and using a one-step versus a two-step estimator did not seriously affect the basic

results. The same variables were significant, though at different levels, and the coefficients did not change by more than 20 percent. Following Roodman (2006) and Cameron and Trivedi (2010), the generalized method of moments was used instead of differences. We used two-step robust because that approach dealt with heteroskedasticity and arbitrary patterns of autocorrelation within individuals. The three dynamic models are shown in table 7 (page 30).

Most lags of fiscal stress were significant across those models. Surprisingly, however, more fiscal stress in the past is associated with less fiscal stress in the current period. That outcome could perhaps be explained by the fact that recessions tend to have short durations, so high fiscal stress in one year is likely to be followed by low fiscal stress in the next year or two. With that technique, current expenditure growth is significant across models and is associated with less fiscal stress (presumably because more expenditures are due to more revenues). One-year lags of expenditure growth are also significant but have the predicted positive coefficient. This finding matches the results in the fixed-effects model. Past spending growth was consistently found to be positively associated with current fiscal stress, which supports our hypothesis. Corporate income tax as a share of state revenues was statistically insignificant with small coefficients in all the dynamic specifications.

Poterba's Model

Poterba (1994) provides an alternative measure of fiscal stress. We believe the Sobel-Holcombe measure is superior, but we use the Poterba measure to test for the robustness of our results. Table 8 (page 31) shows the fixed-effects results using that measure. We find statistically significant coefficients for expenditure growth and one-year lagged expenditure growth, with negative signs for the former and positive for the latter, but the coefficients are smaller and of

lower statistical significance compared with the previous results. Although we used the same range of other specifications that we used with our primary fiscal stress measure, the results did not differ markedly from those in table 8, so they are not included herein for brevity's sake. (They are available from the authors upon request.) Year effects are not shown.

Conclusion

The recent—and ongoing—economic downturn has had disparate effects across states. States such as California and Illinois have had huge budget gaps year after year, whereas other states such as Texas have fared much better. We examined nearly 20 years of data under a wide variety of model specifications. Using the two techniques that were most robust to changes in the model, we find that spending growth was positively related to fiscal stress. The size of the budget stabilization fund is negatively associated with fiscal stress. Unionization rates, Medicaid spending, Medicaid growth, and federal grants and aid to the states all tend to be statistically insignificant and have small coefficients. Overall, our results support our hypotheses that the relationship between spending growth and fiscal stress is positive and the relationship between the size of rainy day funds and fiscal stress is negative. This fact has relevance for contemporary public policy issues. It supports the idea that wise stewardship of budgetary resources, in the form of a rainy day fund when the economy is expanding, is an important strategy for minimizing fiscal stress when the business cycle turns downward.

References

Alt, James E., and Robert C. Lowry. 1994. "Divided Government, Fiscal Institutions, and Budget Deficits: Evidence from the States." *American Political Science Review* 88 (4): 811–28.

Angrist, Joshua D., and Jörn-Steffen Pischke. 2008. *Mostly Harmless Econometrics: An Empiricist's Companion*. Princeton, NJ: Princeton University Press.

Arellano, Manuel, and Stephen Bond. 1991. "Some Tests of Specification for Panel Data: Monte Carlo Evidence and an Application to Employment Equations." *Review of Economic Studies* 58 (2): 277–97.

Berne, Robert, and Richard Schramm. 1986. *The Financial Analysis of Governments*. Englewood Cliffs, NJ: Prentice-Hall.

Blackley, Paul R., and Larry DeBoer. 1993. "Explaining State Government Discretionary Revenue Increases in Fiscal Years 1991 and 1992." *National Tax Journal* 46 (1): 1–12.

Broder, David. 2002. "States in Fiscal Crisis." *Washington Post*, May 22, 2002, A37.

Cameron, A. Colin, and Pravin K. Trivedi. 2010. *Microeconometrics Using Stata: Revised*. College Station, TX: Stata Press.

Campbell, Noel D., R. Zachary Finney, and David T. Mitchell. 2007. "Hunting the Whale: More Evidence on State Government Leviathans." *Southern Economic Journal* 74 (2): 566–80.

Citizens Research Council of Michigan. 2000. Avoiding Local Government Financial Crisis: The Role of State Oversight. *CRC Memorandum*, no. 1053, July. http://www.crcmich.org /PUBLICAT/2000s/2000/memo1053.pdf.

Crain, W. Mark, and Robert D. Tollison. 1993. "Time Inconsistency and Fiscal Policy: Empirical Analysis of U.S. States, 1969–89." *Journal of Public Economics* 51 (2): 153–59.

Douglas, James W., and Ronald Keith Gaddie. 2002. "State Rainy Day Funds and Fiscal Crises: Rainy Day Funds and the 1990–1991 Recession Revisited." *Public Budgeting and Finance* 22 (1): 19–30.

The Economist. 1991. "The Tax-and-Spend States Get Their Come-Uppance." June 22, 25–26.

———. 2001. "Red Ink Rising." August 9.

Edwards, Chris, Stephen Moore, and Phil Kerpen. 2003. "States Face Fiscal Crunch after 1990s Spending Surge." Briefing Paper 80, Cato Institute, Washington, DC, February 12, 2003.

Escaleras, Monica P., and Peter T. Calcagno. 2009. "Does the Gubernatorial Term Limit Type Affect State Government Expenditures?" *Public Finance Review* 37 (5): 572–95.

Gold, Steven D. 1992. "The Federal Role in State Fiscal Stress." *Publius* 22 (3): 33–47.

Gonzalez, Christian, and Arik Levinson. 2003. "State Rainy Day Funds and the State Budget Crisis of 2002–?" *State Tax Notes*, August 11, 441.

Gramlich, Edward M. 1991. "The 1991 State and Local Fiscal Crisis." *Brookings Papers on Economic Activity* 2: 249–73.

Hirsch, Barry T., David A. Macpherson, and Wayne G. Vroman. 2001. "Estimates of Union Density by State." *Monthly Labor Review* 1247 (July): 51–55.

Inman, Robert. 1995. "How to Have a Fiscal Crisis: Lessons from Philadelphia." *American Economic Review* 85 (2): 378–83.

Johnson, Nicholas. 2002. "The State Tax Cuts of the 1990s, the Current Revenue Crisis, and Implications for State Revenues." Center on Budget and Policy Priorities, Washington, DC, November 18, 2002.

Kimhi, Omer. 2008. "Reviving Cities: Legal Remedies to Municipal Financial Crises." *Boston University Law Review* 88 (3): 633–84.

Kloha, Philip, Carol S. Weissert, and Robert Kleine. 2005. "Developing and Testing a Composite Model to Predict Local Fiscal Distress." *Public Administration Review* 65 (3): 313–23.

Lauth, Thomas P. 2003. "Budgeting during a Recession Phase of the Business Cycle: The Georgia Experience." *Public Budgeting and Finance* 23 (2): 26–38.

Levinson, Arik. 1998. "Balanced Budgets and Business Cycles: Evidence from the States." *National Tax Journal* 51 (4): 715–32.

McNichol, Elizabeth C., and Kevin Carey. 2002. "Did States Overspend during the 1990s?" Center on Budget and Policy Priorities, Washington, DC, October 15.

McNichol, Elizabeth C., and Iris Lav. 2007. "13 States Face Total Budget Shortfall of at Least $23 Billion in 2009; 11 Others Expect Budget Problems: Economy, Past Fiscal Decisions Are Largely to Blame," Center on Budget and Policy Priorities, Washington, DC, December 18, 2007.

Moore, Stephen. 1991. "State Spending Spurge: The Real Story behind the Fiscal Crisis in State Government." *Cato Policy Analysis*, no. 152 (May). Washington, DC: Cato Institute.

National Association of State Budget Officers. Various issues. *Fiscal Survey of the States*. Washington, DC.

National Bureau of Economic Research. 2012. US Business Cycle Expansions and Contractions. http://www.nber.org/cycles.html.

Poterba, James M. 1994. "State Responses to Fiscal Crises: The Effects of Budgetary Institutions and Politics." *Journal of Political Economy* 102 (4): 799–821.

Rodden, Jonathan. 2003. “Reviving Leviathan: Fiscal Federalism and the Growth of Government.” *International Organization* 57 (4): 695–730.

Roodman, David. 2006. “How to Do xtabond2: An Introduction to ‘Difference’ and ‘System’ GMM in Stata.” Working Paper 103, Center for Global Development, Washington, DC.

Schaffer, Mark E., and Steven Stillman. 2011. “XTOVERID: Stata Module to Calculate Tests of Overidentifying Restrictions after Xtreg, Xtivreg, Xtivreg2, Xthtaylor.” Statistical Software Components, Boston College Department of Economics.

Skidmore, Mark, and Eric Scorsone. 2011. “Causes and Consequences of Fiscal Stress in Michigan Cities.” *Regional Science and Urban Economics* 41 (1): 360–71.

Sobel, Russell S., and Randall G. Holcombe. 1996. “The Impact of State Rainy Day Funds in Easing State Fiscal Crises during the 1990–1991 Recession.” *Public Budgeting and Finance* 16 (3): 28–48.

Stansel, Dean, and David T. Mitchell. 2008. “State Fiscal Crises: Are Rapid Spending Increases to Blame?” *Cato Journal* 28 (3): 435–48.

US Census Bureau. Various years. *Statistical Abstract of the United States*. Washington, DC: Government Printing Office.

Weingast, Barry R. 1990. “The Role of Credible Commitments in State Finance.” *Public Choice* 66 (1): 89–97.

Wooldridge, Jeffrey M. 2002. *Econometric Analysis of Cross Section and Panel Data*. Boston: Massachusetts Institute of Technology.

Table 1. Variable Names, Definitions, and Data Sources

Variable, 1992–2009	Notes	Source	Link
Our measure of fiscal stress		Created or replicated	
Poterba's measure of fiscal stress	Poterba (1994)	Replicated using NASBO data	http://www.nasbo.org/publications-data/fiscal-survey-of-the-states
Percentage of corporate income tax	Percentage of total tax revenue that comes from corporate income; follows Levinson (1998)	Census Bureau	http://www.census.gov/govs/statetax/historical_data.html
Consumer price index	Annual average, all urban consumers; US city average, all items	BLS	http://www.bls.gov/cpi/
Unemployment	Percentage	BLS	http://www.bls.gov/lau/
Union	Percentage of employed	Hirsch, Macpherson, and Vroman 2001	http://www.unionstats.com
Budget stabilization funds (rainy day funds)	Real 2010 dollars; adjusted for state population by dividing by the number of people in the particular state	NASBO, *Fiscal Survey of States*	http://www.nasbo.org/publications-data/fiscal-survey-of-the-states
Federal grants and aid to states	Real 2010 dollars (in millions); adjusted for state population	Census Bureau	https://www.census.gov/compendia/statab/cats/state_local_govt_finances_employment/federal_aid_to_state_and_local_governments.html

continued on next page

Variable, 1992–2009	Notes	Source	Link
Recession	Dummy variable for the concurrence of a recession as measured by NBER	NBER	http://www.nber.org/cycles.html
Personal income	Real 2010 dollars per capita	BEA	http://www.bea.gov/regional/index.htm
Average spending change	In percentages; the average of the percentage increase or decrease in spending by each state each year	Calculated from NASBO, *Fiscal Survey of States*	http://www.nasbo.org/publications-data/fiscal-survey-of-the-states
Medicaid spending	Real 2010 dollars (in millions), adjusted for population	Centers for Medicaid and Medicare Services	http://www.cms.gov/Research-Statistics-Data-and-Systems/Statistics-Trends-and-Reports/NationalHealthExpendData/NationalHealthAccountsStateHealthAccountsResidence.html
Medicaid spending growth	Percentage		
Population	In millions	Census Bureau	https://www.census.gov/popest/data/intercensal/state/state2010.html
Discretionary tax increases	Tax increases and decreases during the fiscal year	NASBO, *Fiscal Survey of States*	http://www.nasbo.org/publications-data/fiscal-survey-of-the-states

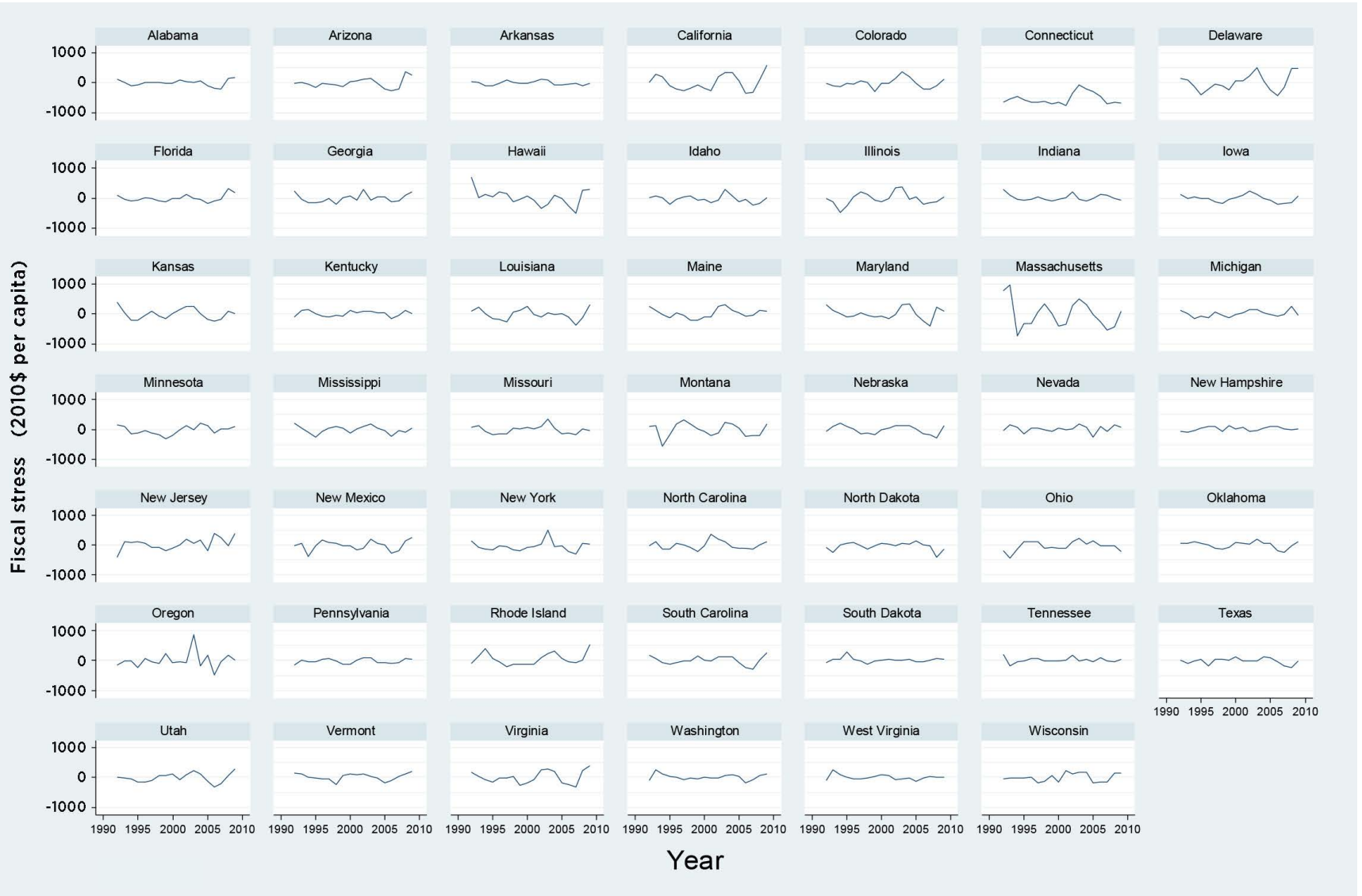
Note: BEA = Bureau of Economic Analysis; BLS = Bureau of Labor Statistics; NASBO = National Association of State Budget Officers; NBER = National Bureau of Economic Research.

Table 2. Top 10 Fiscally Stressed States, 1992–2009

State	Year	Fiscal stress
Massachusetts	1993	$964.39
Oregon	2003	$855.56
Massachusetts	1992	$782.99
Hawaii	1992	$700.87
California	2009	$601.28
Rhode Island	2009	$522.23
Delaware	2003	$509.99
Massachusetts	2003	$504.14
New York	2003	$493.38
Delaware	2008	$483.33

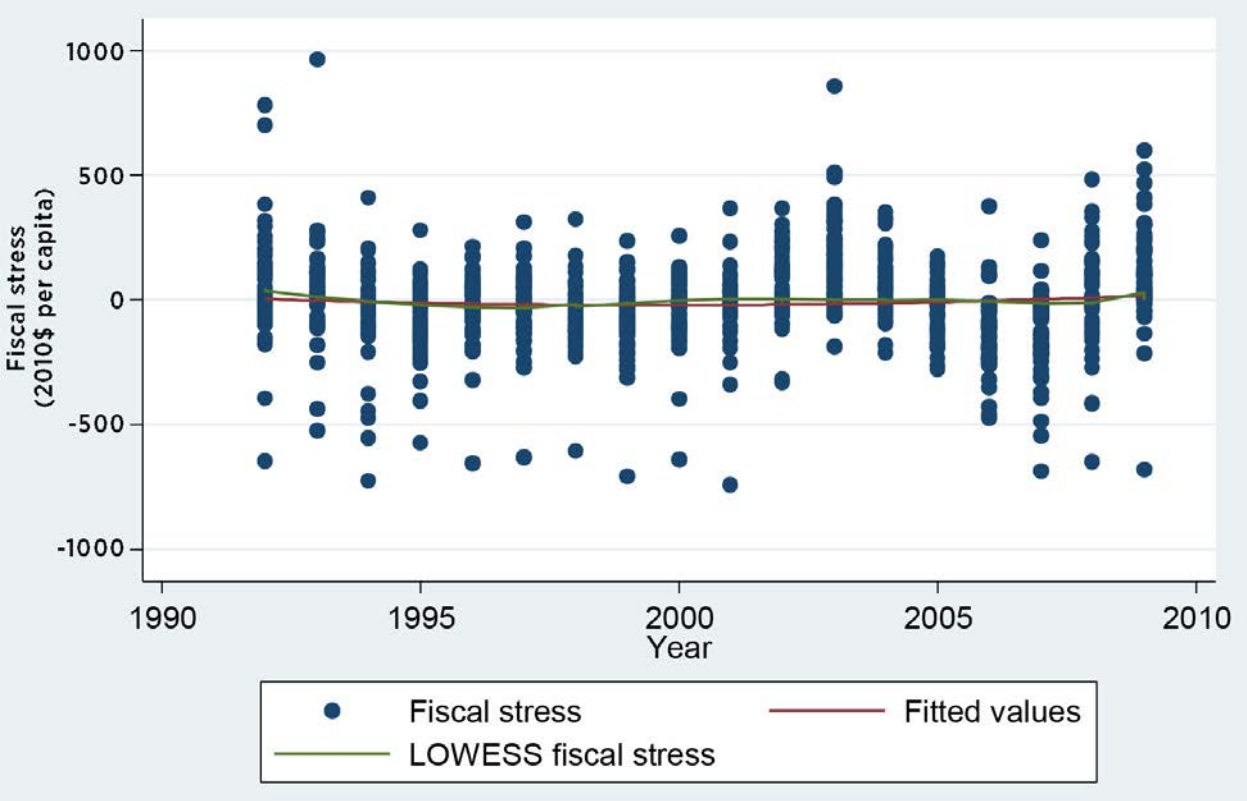
Note: *Fiscal stress* is defined as expected real per capita general fund spending minus actual per capita general fund spending plus discretionary tax increases.

Figure 1. Fiscal Stress over Time for 48 States



Note: *Fiscal stress* is defined as expected real per capita general fund spending minus actual per capita general fund spending plus discretionary tax increases.

Figure 2. Fiscal Stress over Time for 48 States Plotted Together with LOWESS and Fitted Lines



Note: *Fiscal stress* is defined as expected real per capita general fund spending minus actual per capita general fund spending plus discretionary tax increases. LOWESS = locally weighted polynomial regression.

Table 3. Summary Statistics for Dependent Variable Fiscal Stress Using the Sobel-Holcombe Measure

Variable	Mean	Std. Dev.	Min.	Max.	Observations
Fiscal stress					
Overall	−9.1833	201.230	−1,593.33	1,523.90	*N* = 864
Between		79.037	−530.24	50.55	*n* = 48
Within		185.390	−1,578.40	1,538.84	*T* = 18

Table 4. Fixed Effects within Estimator Regression

Dependent variable = fiscal stress Fiscal stress = (expected spending) − (actual spending) + new taxes			
	(1) Full	(2) Compact	(3) Differences
Expenditure Growth	−72.67 (84.70)	−88.88 (83.28)	344.30*** (45.72)
Medicaid_Growth	−25.93 (103.50)		
Personal_Income	−0.0204 (0.0129)	−0.0235 (0.0121)	0.0112 (0.00658)
BSF	−0.269** (0.0947)	−0.287*** (0.0921)	−0.282*** (0.0942)
Recession	93.70 (51.90)	117.30* (46.79)	32.91*** (63.80)
Corporate Tax	−133.80 (122.60)	−135.40 (125.00)	−138.10 (126.00)
Federal Grants	0.00525 (0.0131)		
Unemployment	8.619 (8.611)		
Union	−1.033 (4.149)		
L.Expenditure Growth	144.80 (98.82)	147.90 (96.76)	
L2.Expenditure Growth	283.30** (83.72)	284.40** (82.98)	
D.Expenditure Growth			−713.30*** (1,197.20)
D2.Expenditure Growth			283.30** (83.22)
L.Personal_Income	−0.0218 (0.0122)	−0.0228 (0.0118)	
L2.Personal_Income	0.0546*** (0.0136)	0.0574*** (0.0131)	
D.Personal_Income			−0.0904*** (0.0222)
D2.Personal_Income			0.0567*** (0.0129)
Observations	768	768	768
R^2 (within)	0.3970	0.3957	0.3956
R^2 (between)	0.0862	0.0750	0.0684
R^2 (overall)	0.1872	0.1936	0.1904
F	19.96	19.30	17.06

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

Note: Table shows fixed-effects models (within regression). Group variable state (Federal Information Processing Standard code) standard errors are in parentheses. Standard errors are adjusted for 48 clusters. Alaska and Wyoming are omitted. Year effects are not shown. Observations = 768. BSF = budget stabilization fund.

Table 5. Fixed-Effects Regression with AR(1) Disturbances

Model Comparison—Omitting Alaska and Wyoming—Using AR(1) Disturbance			
Dependent variable = fiscal stress			
	(1) fullAR	(2) compactAR	(3) diffAR
Expenditure Growth	−52.63 (62.61)	46.94 (62.53)	400.20*** (69.82)
Medicaid_Growth	−30.14 (73.87)	−25.50 (73.82)	−30.14 (73.87)
Personal_Income	−0.0297** (0.00927)	−0.0295** (0.00926)	0.00376 (0.00744)
BSF	−0.270** (0.0931)	−0.266** (0.0930)	−0.270** (0.0931)
Recession	86.04 (47.91)	86.50 (76.30)	86.04 (47.90)
Corporate Tax	135.10 (103.40)		135.10 (103.40)
Unemployment Rate	21.38* (8.690)		21.38* 8.690
Union	5.154 (5.838)		5.154 (5.838)
L.Expenditure Growth	48.02 (62.57)	57.26 (62.28)	
L2.Expenditure Growth	299.60*** (58.66)	298.60*** (58.47)	
D.Expenditure Growth			−647.20*** (112.70)
D2.Expenditure Growth			299.60*** (58.66)
L.Personal_Income	−0.0115 (0.0114)	−0.0121 (0.0114)	
L2.Personal_Income	0.0449*** (0.0103)	0.0461*** (0.0103)	
D.Personal_Income			−0.0784*** (0.0163)
D2.Personal_Income			0.0449*** (0.0103)
Observations	720	720	720
R^2 (within)	0.3586	0.3566	0.3586
R^2 (between)	0.000	0.008	0.000
R^2 (overall)	0.1589	0.2821	0.1691
F	13.89	14.97	13.89

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

Note: Table shows fixed-effects models (within regression), AR(1) process. Group variable state (Federal Information Processing Standard code) standard errors are in parentheses. Standard errors are adjusted for 48 clusters. Alaska and Wyoming are omitted. Year effects are not shown. BSF = budget stabilization fund.

Table 6. Fixed-Effects First-Differences Models Comparing Medicaid Spending with Medicaid Spending Growth

FD Model Comparing Medicaid and Medicaid Growth		
	(1)	(2)
D.Expend_Growth Rate	94.67	90.96
	(124.7)	(126.0)
D.Unemploy	3.034	2.605
	(11.24)	(11.17)
D.Union	7.874	8.098
	(7.189)	(7.016)
D.Medicaid_Tot	−0.000235	
	(0.000312)	
D.Medicaid_Growth		−9.659
		(92.16)
D.Personal_Income	−0.0380***	−0.0380***
	(0.0100)	(0.00987)
D.BSF	−0.162	−0.162
	(0.134)	(0.131)
D.Recession	−45.18*	−45.36*
	(17.34)	(17.39)
D.Corp Tax	−127.00	−130.40
	(106.00)	(106.40)
D.FedGrants	0.00537	0.00552
	(0.00836)	(0.00864)
Observations	816	816
R^2 (within)	0.1880	0.1872
R^2 (between)	0	0
R^2 (overall)	0.1856	0.1852
F	10.33	9.31
ll	−5358.7	−5358.9

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

Note: Table shows fixed-effects models (first-difference regression). Group variable state (Federal Information Processing Standard code) standard errors are in parentheses. Standard errors are adjusted for 48 clusters. Alaska and Wyoming are omitted. Year effects are not shown. BSF = budget stabilization fund.

Table 7. Dynamic Panel Data Estimation (Xtabond)

Arellano-Bond dynamic panel-data estimation			
Group variable: fips			
Time variable: year			
GMM-Type (L2/.) fiscal stress			
Two-step results			
WC-Robust Std. Error			
Fiscal Stress	Model 1 4 lags Coeff.	Model 2 3 lags Coeff.	Model 3 Compact Coeff.
Fiscal Stress			
L1.	−0.3841	−0.1131	−0.1138175
L2.	−0.3380***	−0.1863***	−0.2040584**
L3.	−0.4814***	−0.3450***	−0.3116657***
L4.	−0.4071*		
Expenditure Growth			
–.	−4,079.2780***	−2,590.4120**	−2762.658***
L1.	2,319.6870***	3,478.2300***	3175.589*
L2.	1,697.1020	964.4645	
Unemploy	8.3286	22.6761	38.71988
Union	18.6560	−1.9073	
Medicaid growth	50.6311	96.0935	
BSF	0.4034	−0.0735	0.0369216
Fed. grants aid	−0.0153	−0.0194	−0.00910195
Recession	9.8934**	−22.5438	−136.755
Corporate tax	−150.5000	−118.8000	
_cons	(omitted)	(omitted)	
Wald Chi Square	3,652.05	3,656.21	1277.01
# of instruments	153	157	154
# of observations	624	672	672
# of groups	48	48	48
Obs. per group	13	14	14

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

Note: Year effects are not shown. BSF = budget stabilization fund.

Table 8. Poterba's Measure of Fiscal Stress, Alaska and Wyoming Omitted

Fiscal stress = unexpected deficit shock = (unexpected expenditure shock) − (unexpected revenue shock)			
	(1) Full Model	(2) Compact Model	(3) Differences Model
Expend_Growth Rate	−459.8* (180.2)	−417.4* (168.8)	−248.8* (106.2)
Unemploy	−22.22 (14.34)		
Union	−11.2 (8.094)		
Medicaid_Growth	217 (127)		
Personal_Income	−0.00514 (0.0153)	−0.000791 (0.0173)	0.0217 (0.0113)
BSF	−0.0398 (0.182)	−0.0126 (1.90)	−0.0126 (1.90)
Recession	39.84 (101.5)	−48.38 (71.75)	−270.9* (110.0)
Fedgrants	−0.0208 (0.0146)		
Corporate Tax	56.09 (108.4)		
L.Expend_Growth Rate	220.2* (84.81)	195.5* (85.07)	
L2.Expend_Growth Rate	−20.30 (68.34)	−26.91 (67.69)	
D.Expend_Growth Rate			−141.7 (133.1)
D2.Expend_Growth Rate			−26.91 (67.69)
L.Personal Income	0.00318 (0.0164)	0.00669 (0.0153)	
L2.Personal Income	0.0239 (0.0146)	0.0158 (0.0124)	
D.Personal Income			−0.0383* (0.0184)
D2.Personal Income			0.0158 (0.0124)
Observations	768	768	768
R^2 (within)	0.0632	0.0550	0.0550
R^2 (between)	0.0001	0.0035	0.0035
R^2 (overall)	0.0167	0.0077	0.0077
F	13.86	6.04	6.04
ll	−5280.1	−5283.4	−5283.4

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

Note: Standard errors are in parentheses. BSF = budget stabilization fund.