The Determinants of the Severity of State Fiscal Crises

DAVID T. MITCHELL AND DEAN STANSEL

During the most recent recession, many state governments faced substantial budget shortfalls. Those shortfalls are often blamed on external factors like the declining economy or reductions in federal aid. What politicians themselves do, especially during expansionary years—whether they enact spending increases, implement tax cuts, increase the size of their rainy day funds, or some combination thereof—is typically given less attention. We examine those factors and find that fiscal stress tends to be positively associated with spending growth, negatively associated with the size of rainy day funds, and not statistically significantly associated with the unemployment rate or federal aid.

INTRODUCTION

During recessions, many state governments see their revenues *decline*, not just grow more slowly. As most states face some sort of balanced budget requirement, unless spending is cut proportionately, those reductions in revenue ultimately produce budget shortfalls that must be eliminated. Those deficits are exacerbated by the fact that the demand for some state spending— e.g., welfare programs, unemployment compensation, etc.—is countercyclical in nature (increases during recessions). In the most recent recession, those 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 mostly funded 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 seek to examine the determinants of these

David T. Mitchell is at Department of Economics, Finance, and Insurance & Risk Management, College of Business, University of Central Arkansas, 201 Donaghey Ave., COB 211, Conway AR 72035, ph: 501-450-3109. He can be reached at *dmitchell@uca.edu*.

Dean Stansel is at O'Neil Center for Global Markets and Freedom, Cox School of Business, Southern Methodist University, Dallas, TX 75275, ph: 214-768-3492. He can be reached at *dstansel@smu.edu*.

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

As McNichol and Lav (2007:1) put it "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." While those external factors do impact the severity of state fiscal crises, we focus on the factors over which state politicians have some control. There is an important distinction to be made regarding how state politicians respond to the faster revenue growth that occurs during economic expansions. They face three basic options as to what to do with the extra revenue: (1) use it to increase spending on existing programs[1] or to initiate new programs; (2) return the extra revenue to the taxpayers through tax cuts; and/or (3) deposit the extra revenue in a rainy day fund. There has been a considerable volume of research on state rainy day funds, but much less on the other two factors. We build on that literature by incorporating a measure of spending growth.

> **APPLICATIONS FOR PRACTICE**
> - We find that state fiscal stress is positively associated with prior spending growth, so to minimize fiscal stress during bad times, state governments should resist the urge to rapidly expand spending during good times.
> - We find that state fiscal stress is negatively associated with the size of rainy day funds. Therefore, in order to minimize fiscal stress during recessions, when revenues are flowing in faster than expected during economic expansions, state governments should use that windfall to expand the size of their rainy day funds, rather than to expand the size of their budget.
> - Politicians often blame external factors like higher unemployment rates or reduced federal aid for fiscal stress during recessions. We find no evidence that they make much of a difference. Our evidence suggests that politicians and policy-makers themselves have more influence over their fiscal condition during recessions than is often understood.

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 rainy day funds are likely to experience more fiscal stress in the future. A competing hypothesis is that fiscal stress is determined by factors largely outside the control of state politicians. States that have higher unemployment and receive less federal aid will experience more fiscal stress. Using state data from 1992–2009, we find evidence to support our primary hypothesis. We do not find evidence to support the competing hypothesis.

The next section provides a discussion of the previous literature in this area. Following that we describe our econometric model and data, discuss our results, then provide concluding remarks.

PREVIOUS LITERATURE

In the 1970s, there were high-profile fiscal crises in large cities including New York and Cleveland. Those crises spawned a substantial volume of academic research into the causes and

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1. Some spending increases are largely out of the control of politicians due to a variety of factors.

consequences of those fiscal difficulties. Since then, additional examples include Philadelphia (1990), Bridgeport (1991), Orange County (1994), Washington D.C. (1995), Miami (1996), Camden (1999), and Pittsburgh (2004) (Kimhi 2008:634). In the current economic downturn, city government finances are in the news again, with bankruptcies in Jefferson County (Birmingham), Alabama; Stockton and San Bernardino, California; Detroit, Michigan; and Harrisburg, Pennsylvania, among others. While our focus here is state governments, the implications of this work have relevance to local governments as well.

Defining fiscal stress is not without difficulty. As Gold (1992) points out, "there is no generally accepted indicator of fiscal stress." However, one commonly used measure is the year-end balance (in both general funds and rainy day funds) 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 found that 33 states had balances below five percent of spending in fiscal year 1991. The average balance of 1.5 percent that year was the 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."

While that five percent figure is widely cited as the "optimal" size of a state's rainy day fund, as Joyce (2001) argued, it is an oversimplification. States' needs can vary widely based on the volatility of their economies and tax systems. Sobel and Holcombe (1996) found that in some cases states would have needed a fund as large as 30 percent of their budget in order to avoid spending cuts or tax hikes during the 1991 recession. However, rainy day funds of that size can cause problems of their own (e.g., political opposition to their existence, political pressure to raid them for nonemergency needs, etc.). An entire issue of this journal (spring 2010) was devoted entirely to case studies of the varying experiences of six states during the most recent recession. Conant (2010) provides an overview that highlights how different those states experiences were.

Examining state budgets during the 1990–91 recession, Poterba (1994) found that in fiscal year 1991, 22 states had lower than expected revenues and 20 states faced higher than expected spending demands. The latter relates largely to the counter-cyclical nature of welfare spending. Furthermore, for several years in a row, total year-end balances (in all 50 states) as a percent of annual expenditures had fallen below five percent. Poterba identified 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 due to reforms like mandatory sentencing laws). He formulated a measure of that fiscal stress, which accounted for both the reduction in available revenues and the increase in spending demands. While his focus was on the effects of that fiscal stress, rather than the cause, his measure deserves further attention, and will be discussed in the next section.

Sobel and Holcombe (1996) examined state rainy day funds (RDFs). RDFs (sometimes called budget stabilization funds) are a relatively new phenomenon, most being adopted since the 1980–82 recessions. The number of states that have them expanded from 12 in 1982 to 44 by

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

1994. Sobel and Holcombe's focus was on how that new institution relates to fiscal stress. They measured fiscal stress during the 1990–91 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 found that it was not significantly associated with the presence of a rainy day fund. However, it was 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 Sobel and Holcombe use in their measure of fiscal stress. Blackley and DeBoer (1993) examined the determinants of those discretionary revenue increases during the recessionary years of fiscal 1991 and 1992. They found that such tax hikes during the recession (which are themselves an indicator of fiscal stress) were positively associated with both the increase in state spending and the increase in state employee compensation during the *previous* 1980s expansion. This supports our 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 (2006) found that faster increases in spending in the expansion preceding the 2001 recession were associated with greater levels of fiscal stress during that recession. They also examined rainy day funds and found that neither the mere presence of an RDF nor its size had a significant relationship with fiscal stress, although having an RDF with a strong withdrawal rule was negatively associated with fiscal stress.

Overcommitting resources by overspending is cited as a major problem by Blackley and DeBoer (1993), Stansel and Mitchell (2008); The Economist (1991, 2001); Moore (1991); and Edwards, Moore, and Kerpen (2003) and at least a minor problem by Gold (1992) and Lauth (2003). 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 leads to fiscal stress. Political commentators such as columnist Broder (2002) claim that reductions in federal aid are to blame. In this paper, we build on that previous literature on fiscal stress by examining more recent data and a longer time period, testing a broader range of hypotheses, including additional relevant control variables, and using a more appropriate econometric model.

ECONOMETRIC MODEL AND DATA

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/or 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 expenditures[3] minus actual general fund expenditures[4] and (2) discretionary tax increases.

$$\text{fiscal stress} = (\text{expected expenditure} - \text{actual expenditure}) + \text{tax increases.} \qquad (1)$$

As an example, consider California in 2009. Based on 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 general fund spending was only $2,500.74 per capita, or $531.93 below trend. It enacted tax increases of $69.35 per capita. Hence, its Fiscal Stress was $601.28. Table 1 provides a list of the 10 highest levels of fiscal stress. Note that our measure does not reflect states' usage of off-budget spending. Nor does our measure 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 shows fiscal stress across the 1992–2009 time period for each individual state (listed in alphabetical order). The vertical midpoint in each represents zero fiscal stress. It is possible to see that most states see stress during recessions but that some states have limited stress throughout the entire time period (e.g., New Hampshire and Texas). You can also see that a state

TABLE 1
Top Ten 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

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3. 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 Excel, which "returns numbers in a linear trend matching known data points, using the least squares method." We use trend spending because it shows the amount of public services expected to be provided by each state (Berne and Schramm 1986).

4. Since what we're seeking to investigate is the choices made by politicians, we chose to focus only on that spending over which they have some control (general fund). As they have little to no control over how much federal funding they receive, we felt that including it would provide an inferior measure. At the suggestion of an anonymous reviewer, we also have a separate fiscal stress variable in which total spending is used instead of general fund spending.

FIGURE 1
**Fiscal Stress Over Time for 48 States**

Graphs by state

that felt much fiscal stress in one recession may experience limited fiscal stress in a different recession. (For example, Massachusetts experienced a high level of stress during the 1991–92 recession, but much less stress during the most recent recession.) Figure 2 shows the same data but with all states on the same graph. There is a wave like pattern showing that stress increases during recessions and decreases during economic expansions. We can also see that just because one state is experiencing fiscal stress does not mean that all states are. (In 2006 and 2007, only a few states had positive values for fiscal stress.) Summary statistics for our dependent variable are in Table 2.

Alternative Measure of Fiscal Stress

Poterba (1994) provided 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 mid-year spending changes (enacted after the passage of the budget in order to eliminate a budget deficit) minus the spending forecast done at the beginning of the year. Revenue shock is defined as actual revenues minus mid-year revenue changes minus the revenue forecast.

FIGURE 2

Fiscal Stress Over Time for 48 States Plotted Together with Lowess* and Fitted Lines
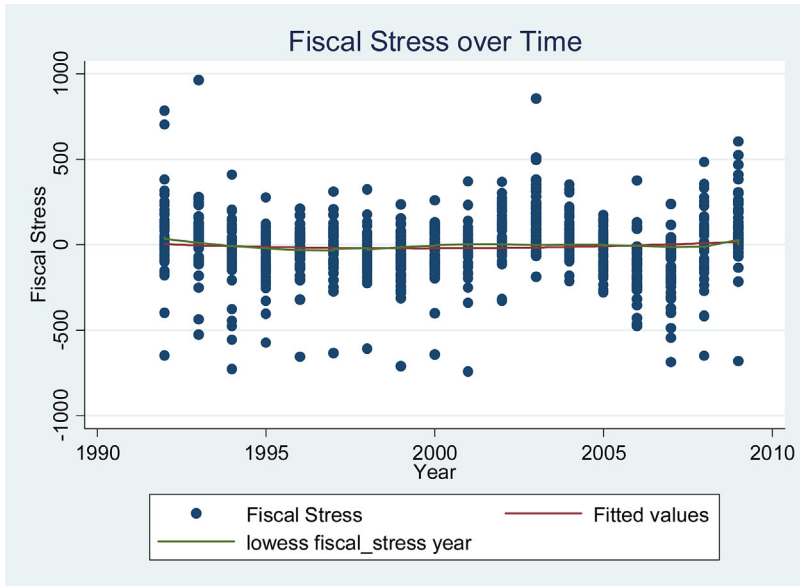
*Lowess—locally weighted polynomial regression.

$$\text{Poterba's measure} = \text{unexpected deficit shock} = -\text{unexpected expenditure shock}$$
$$-\text{unexpected revenue shock} = (\text{actual spending} - \text{mid-year spending changes}$$
$$-\text{beginning of the year spending forecast}) - (\text{actual revenue} - \text{mid-revenue changes}$$
$$-\text{beginning of year revenue forecast}). \qquad (2)$$

Poterba used this measure to investigate the *effects* of fiscal stress. The Sobel and Holcombe (1996) measure was designed to investigate the *causes* of fiscal stress. We believe that it provides a closer match to the phenomenon we seek to investigate, but we also utilize the Poterba measure to test for the robustness of our results. It should be noted that the correlation between the two

TABLE 2

Summary Statistics for Fiscal Stress (Sobel and Holcombe Measure)

Variable		Mean	Std. dev.	Min	Max	Observations
Fiscal stress	Overall	−9.18	201.23	−1,593.33	1,523.90	$N = 864$
	Between		79.04	−530.24	50.55	$n = 48$
	Within		185.39	−1,578.40	1,538.84	$T = 18$

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.

Model

We estimate fiscal stress as a function of the growth in real per capita state spending[5] and the size of the state rainy day fund (RDF) at the end of the previous fiscal year also in real per capita terms, as well as unemployment, federal grants, Medicaid spending growth, a dummy variable for the existence of a recession, corporate income tax share of revenue, union density, personal income, 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: excessive spending growth, insufficient rainy day funds, high unemployment, loss of federal grants in aid, and rapid healthcare spending growth. To summarize, the stress model central to this paper is:[6]

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\begin{aligned}
FiscalStress_{it} = {} & \beta_0 + \beta_1 ExpenditureGrowth_{i,t} + \beta_2 ExpenditureGrowth_{i,t-k} \\
& + \beta_3 Rainy\ DayFund_{i,t-1} + \beta_4 Unemployment_{i,t} \\
& + \beta_5 Federal\ Grants_{i,t} - \beta_6 Medicaid\ Spending\ Growth_{i,t} + \beta_7 Recession_{i,t} \\
& + \beta_8 Corporate\ Income\ Tax_{i,t} + \beta_9 Union\ Density_{i,t} \\
& + \beta_{10} Personal\ Income_{i,t} + \beta_{11} Personal\ Income_{i,t-k} + \alpha_i + \eta_t + u_{it} \qquad (3)
\end{aligned}
$$

where $Expenditure\ Growth_{i,t-k,}$ is the spending growth variable lagged between one 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.[7] *Rainy Day Fund* is the real per capita amount of money in the rainy day fund at the end of the fiscal year (lagged by one year to represent the amount available at the beginning of the current year). *Unemployment* is the U3 unemployment rate from the Bureau of Labor Statistics. *Federal Grants* is the real per capita value of federal grants in aid to the states from the federal government. *Medicaid Spending Growth* is the percentage change in real per capita Medicaid spending. *Recession* is a dummy variable for the occurrence of a national recession.

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5. As noted previously, we focus here on general fund spending, since that is the primary area over which state politicians have control.

6. We used the xtoverid command 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, pp. 290–291).

7. Unless otherwise indicated, the state finance data in this article come from the National Association of State Budget Officers' semi-annual (fall and spring) publication *Fiscal Survey of the States*. It reflects the state general fund only. 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 entitled "Enacted Revenue Actions by Type of Revenue and Net Increase or Decrease."

Corporate Income Tax is the percent of tax revenue that comes from the corporate income tax. *Union Density* is the percentage of employees who are union members. *Personal Income* is the real per capita personal income in each state. See Table 3 for data sources.

We examine data from 1992 to the present. By examining a longer time 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 these promises credible is important to legislators who wish to be reelected (Weingast 1990; Crain and Tollison 1993).

Our model is based upon the previous literature, specifically Sobel and Holcombe (1996) and Stansel and Mitchell (2008), but we have incorporated some additional measures. Following Levinson (1998) we included 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 was also included. We added a control variable for Medicaid spending growth because it is an important driver of budget pressures in the states.[8] We included both the unemployment rate and changes in unemployment following the idea that a move to seven 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 we include these two states.

Econometric Methods

There are a variety of techniques that can be used to estimate our main model in equation (3). Each of these techniques has its own difficulties and assumptions. We follow Angrist and Pischke (2008, pp. 245–246) and test more than one methodology. Though we test our hypotheses with multiple techniques, we believe that fixed effects within-estimator estimation is the appropriate technique for our questions using this data. This technique allows us to control for both state- and year-specific features of the data. Fixed effects within-estimator estimation also allows us to create coefficients that are broadly applicable but still treats different states differently. It is called within estimator because it uses only the variation within each cross-sectional unit. The advantage of having one coefficient for all states instead of 50 different coefficients[9] is that we can focus on how changes for each state affect fiscal stress. For example, many people think that California is a location with many desirable amenities. That fact might affect the tax and expenditure ability of California's elected officials. However, those locational amenities do not change from 1992 to 1993 or any other year, so that is differenced away with this technique. The part that remains is what changed year to year in California and in the other states. Any time

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8. Results with real Medicaid spending adjusted for population instead of Medicaid Spending Growth are available from the authors.

9. We actually use 48 states because we omit Alaska and Wyoming because they were outliers and a larger share of their stress seems to come from fluctuations in energy prices beyond their control.

TABLE 3
Variable Names, Definitions, and Data Sources

Variable	Notes	Source	Link
Fiscal stress	Sobel and Holcombe (1996)	Authors' calculations using NASBO data	http://www.nasbo.org/publications-data/fiscal-survey-of-the-states
Poterba's measure of fiscal stress	Poterba (1994)	Authors' calculations using NASBO data	http://www.nasbo.org/publications-data/fiscal-survey-of-the-states
Expenditure growth	The annual percentage increase (or decrease) in general fund expenditure	Authors' calculations using NASBO data	http://www.nasbo.org/publications-data/fiscal-survey-of-the-states
Rainy day fund	Real 2010 dollars per capita	Authors' calculations using NASBO data	http://www.nasbo.org/publications-data/fiscal-survey-of-the-states
Unemployment	Percentage, U3 measure	BLS	http://www.bls.gov/lau/
Federal grants and aid to states	Real 2010 dollars per capita	*Statistical Abstract of the United States*	https://www.census.gov/compendia/statab/cats/state_local_govt_finances_employ ment/federal_aid_to_state_and_l ocal_governments.html
Medicaid spending	Real 2010 dollars (in millions) adjusted for population	Centers for Medicaid and Medicare Services	http://www.cms.gov/Research-Statis tics-Data-and-Systems/Statistics-T rends-and-Reports/NationalHealth ExpendData/ NationalHealthAccountsStateHea lthAccountsResidence.html
Medicaid spending growth	In percentage terms	Calculated from above	
Recession	Dummy variable for the occurrence of a national recession as measured by NBER (2012)	NBER	http://www.nber.org/cycles.html

(continued)

TABLE 3 (Continued)

Variable	Notes	Source	Link
Corporate income tax	Corporate income tax as % of tax revenue (follows Levinson, 1998)	Census Bureau (1990)	http://www.census.gov/govs/ statetax/historical_data.html
Union density	Percentage of employed	Hirsch et al. (2001)	www.unionstats.com
Personal income	Real 2010 dollars per capita	BEA	http://www.bea.gov/regional/index. htm
Population	In millions of people	Census Bureau (1990)	https://www.census.gov/popest/data/ intercensal/state/state2010.html
Consumer price index (CPI)	Annual average, all urban consumers, US city average, all items	BLS	http://www.bls.gov/cpi/

invariant effects such as the specific difference between states are swept away. The problem of omitted variables that are time invariant is thereby avoided.[10] We also found that it was robust to a wide variety of specifications.

As a test of our analysis we use additional techniques. Because there might be an important dynamic component to our data, we also rerun our tests with an autoregressive process (AR1) and then again with lagged dependent variables following Arellano and Bond (1991) and Blundell and Bond (1998). We tested several ways of using both the AR models and the lagged-dependent models. While the results are similar across models, the AR models introduce bias into the coefficients and the lagged dependent models make several strong assumptions including the assumption that the lagged values are strong instruments. For the sake of brevity, these results are not reported herein.[11]

RESULTS

Table 4 presents the estimates for the fixed effects within estimator model. The first model includes our full set of control variables. The second model omits the control variables that were highly insignificant. In the third model, our expenditure growth and personal income models are first differenced instead of lagged. The estimates for these models are the results from our theory-based model in equation (3). 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 size of the rainy day fund are statistically significant across models. As expected, unemployment and recessions are positively associated with fiscal stress while revenue in the rainy day fund is negatively associated with fiscal stress. Personal income, union membership, and Medicaid spending growth are not statistically significant factors in these models. Union membership is not statistically significant in any of our models. Regardless of approach, Medicaid growth, and personal income were consistently insignificant.

In Table 5, we analyze the relationship between fiscal stress and both the level and growth of Medicaid spending.[12] Just as in Table 4 we find that Medicaid spending growth has no

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10. We use within estimator estimation with mean differencing instead of first differencing. Meaning that we ran $(Y_{it} - Y\text{bar})$ on $(X_{it} - X\text{bar})$ as opposed to $(Y_{it} - Y_{i,t-1})$ on $(X_{it} - X_{i,t-1})$. That lets us avoid problems with omitted variables as long as those omitted variables are time consistent. The tradeoff is that we do not have individual state level coefficients. However, the results are consistent estimators of β. More importantly, we find that they give us strong robust generalizable results.

11. The results and Stata code are available from the authors upon request.

12. An anonymous referee suggested that since Medicaid spending is largely out of the control of policymakers, we ought to be focusing more attention on it. We include Table 5 to address that concern.

TABLE 4
Fixed Effects Within Estimator Regression

D.V. = Fiscal Stress, Fiscal Stress = (Expected Spending) − (Actual Spending) + New Taxes

	(1)		(2)		(3)	
Expenditure growth	−72.67	(84.70)	−88.88	(83.28)	344.3***	(45.72)
L.Expenditure growth	144.8	(98.82)	147.9	(96.76)		
L2.Expenditure growth	283.3**	(83.72)	284.4**	(82.98)		
D.Expenditure growth		(0.00)			−713.3***	(119.72)
D2.Expenditure growth		(0.00)			283.3**	(83.22)
Rainy day fund	−0.269**	(0.09)	−0.287***	(0.09)	−0.282***	(0.09)
Unemployment rate	8.619	(8.61)				
Federal grants	0.0053	(0.01)				
Medicaid growth	−25.93	(103.50)				
Recession	93.7	(51.90)	117.3*	(46.79)	32.91***	(63.80)
Corporate tax	−133.8	(122.60)	−135.4	(125.00)	−138.1	(126.00)
Union density	−1.033	(4.15)				
Personal income	−0.020	(0.01)	-0.024	(0.01)	0.011	(0.01)
L.Personal income	−0.0218	(0.01)	−0.0228	(0.01)		
L2.Personal income	0.0546***	(0.01)	0.0574***	(0.01)		
D.Personal income					−0.0904***	(0.02)
D2.Personal income					0.0567***	(0.01)
Observations	768		768		768	
R^2 (overall)	0.187		0.194		0.190	
R^2 (within)	0.397		0.396		0.396	
R^2 (between)	0.086		0.075		0.068	
F	19.96		19.3		17.06	

Fixed effects models (within regression). Group variable state (FIPS). Standard errors in parentheses. Standard errors adjusted for 48 clusters. Alaska and Wyoming omitted. Year effects not shown. $^*P < 0.05$, $^{**}P < 0.01$, $^{***}P < 0.001$.

statistically significant relationship with fiscal stress. The level of Medicaid spending is also found not to be a significant predictor of fiscal stress. Again we use not only our preferred within-estimator (model 1) but we also show the results from first differencing the data (in models 2 and 3). Two of the three coefficients on our spending growth variable show the predicted positive sign, though the relationship is not statistically significant.

Alternate Models

As a robustness check, we ran two sets of different regressions. In the first set of additional regressions we ran a series of models that allow for the data to have an autoregressive process. Using these autoregressive specification, we tended to get the same statistically significant variables, which confirmed the results from our fixed effects models. However, we did note that

TABLE 5
Comparing Total Medicaid Spending and Medicaid Growth Rates

D.V. Fiscal stress	(1)	(2)	(3)
Expend_growth rate	−86.4		
	(1.03)		
RL_personal_income	−0.0227		
	(1.89)		
Rainy day fund	−0.286**		
	(3.08)		
Recession	124.8*		
	(2.68)		
Corporate tax	−133.3		
	(1.07)		
Medicaid_tot	0.0000256		
	(0.08)		
D.Expend_growth rate		90.96	94.67
		(0.73)	(0.75)
D.RL_personal_income		−0.0380***	0.0380***
		(3.80)	(3.85)
D.Unemployment		3.034	2.605
		(0.27)	(0.23)
D.Union		7.874	8.098
		(1.10)	(1.15)
D.Medicaid_total		−0.000235	
		(0.76)	
D.Medicaid_growth			−9.659
			(0.10)
D.Rainy day fund		−0.162	−0.162
		(1.21)	(1.24)
D.Recession		−45.18*	−45.36*
		(2.61)	(2.61)
D.Corporate tax		−127.0	−130.4
		(1.20)	(1.23)
Observations	768	816	816
R^2 (within)	0.395	0.188	0.187
R^2 (between)	0.06	0.0	0.0
R^2 (overall)	0.195	0.186	0.185
F	17.69	10.33	9.308
ll	−4793.0	−5358.7	−5358.9

T statistics in parentheses. $^*P < 0.05$, $^{**}P < 0.01$, $^{***}P < 0.001$. Group variable state (FIPS). Standard errors adjusted for 48 clusters. Alaska and Wyoming omitted. Year effects not shown.

that the signs of our coefficients changed when we moved from lagged variables to additional differencing when we specified our models with an AR(1) processes. This may indicate that panel data with an AR(1) component is not the correct specification, which helps to confirm the correctness of our basic model.[13]

In the second set of additional regressions, we tried the Arellano and Bond (1991) and Blundell and Bond (1998) methods. Again these were quite robust with different specifications.[14] These models incorporate lags of the dependent variable so that fiscal stress last year is a predictor of this year's fiscal stress. Most lags of fiscal stress were significant across these models. The results of the dynamic regressions confirmed the results of our work with fixed effects.[15] These lagged dependent variable techniques, however, have serious assumptions and can be prone to instability.

Poterba Measure

Poterba (1994) provided an alternative measure of fiscal stress. It is not strongly correlated with the Sobel–Holcombe measure—which we believe better captures the phenomenon in which we are interested—but we utilize the Poterba measure to test for robustness. Table 6 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 to the previous results. When we used the same range of other specifications as were employed with our primary fiscal stress measure, the results did not differ markedly from those in Table 6, so they are not included herein for brevity's sake. (They are available from the authors upon request.)

Additional Robustness Checks

Because our focus is on the choices made by politicians, we have used general fund spending data for all of our spending variables and the fiscal stress measure. State general funds represent the portion of the budget over which politicians have the most control.[16] They do not include federal funds, the amount of which is almost completely out of state politicians control, and the spending of which is often subject to federal mandates and other restrictions. We instead included federal grants as a separate independent variable since it can be a

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13. Results and Stata code are available upon request.

14. Different methods of creating 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 impact the basic results. Following Roodman (2006), we prefer GMM instead of differences, and we used two-step robust because that dealt with heteroskedasticity and arbitrary patterns of autocorrelation within individuals.

15. Results and Stata code are available upon request.

16. The National Association of State Budget Officers, from which we get our spending data, says of the general fund data that "Although not the totality of state spending, these funds are used to finance most broad-based state services and are the most important elements in determining the fiscal health of the states."

TABLE 6
Poterba's Measure of Fiscal Stress

	(1) Full		(2) Compact		(3) Differences	
Expenditure growth	−459.8*	(180.20)	−417.4*	(168.80)	−248.8*	(106.20)
L.Expenditure growth	220.2*	(84.81)	195.5*	(85.07)		
L2.Expenditure growth	−20.3	(68.34)	−26.91	(67.69)		
D.Expenditure growth					−141.7	(133.10)
D2.Expenditure growth					−26.91	(67.69)
Rainy day fund	−0.0398	(0.18)	−0.0126	(1.90)	−0.0126	(1.90)
Unemployment rate	−22.22	(14.34)				
Federal grants	−0.0208	(0.01)				
Medicaid growth	217	(127.00)				
Recession	39.84	(101.50)	−48.38	(71.75)	−270.9*	(110.00)
Corporate tax	56.09	(108.40)				
Union density	−11.2	(8.09)				
Personal income	−0.00514	(0.02)	−0.000791	(0.02)	0.0217	(0.01)
L.Personal income	0.00318	(0.02)	0.00669	(0.02)		
L2.Personal income	0.0239	(0.01)	0.0158	(0.01)		
D.Personal income					−0.0383*	(0.02)
D2.Personal income					0.0158	(0.01)
Observations	768		768		768	
R^2 (overall)	0.0167		0.0077		0.0077	
R^2 (within)	0.0632		0.055		0.055	
R^2 (between)	0.0001		0.0035		0.0035	
F	13.86		6.04		6.04	
ll	−5280.1		−5283.4		−5283.4	

Fixed effects models (within regression). Group variable state (FIPS). Standard errors in parentheses. Standard errors adjusted for 48 clusters. Alaska and Wyoming omitted. Year effects not shown. $^*P < 0.05$, $^{**}P < 0.01$, $^{***}P < 0.001$.

determinant of fiscal stress. To test for robustness, we performed all of the same econometric tests discussed above using an alternative calculation of fiscal stress that used total spending instead of general fund spending. We find that when we include federal funds as part of state spending (and recalculate the fiscal stress variable accordingly) instead of as an independent variable we get much weaker results. Federal grants can reduce fiscal stress, but they also add noise to the model. When we reran the regressions with this new version of fiscal stress, the various measures of spending growth rates are no longer statistically significant but personal income, lagged personal income, and differenced personal income remain significant. Moreover our overall R^2 falls to .07.[17]

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17. For the sake of brevity, we have not included those results in the paper. They are available from the authors upon request.

CONCLUSION

The most recent economic downturn, like all recessions, had disparate impacts across states. States like California and Illinois had huge budget gaps year after year, while other states like Texas tended to fare 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 found that spending growth tended to be positively and statistically significantly related to fiscal stress. The size of the rainy day fund tended to be negatively and statistically significantly associated with fiscal stress. Unemployment rates, federal grants, Medicaid spending, Medicaid growth, corporate income tax share, and union density all tended to be statistically insignificant and have small coefficients. Overall, our results provide support for our hypotheses that there is a positive relationship between spending growth and fiscal stress and a negative relationship between the size of rainy day funds and fiscal stress. This has relevance for contemporary public policy issues. It provides at least limited support for the idea that wise stewardship of budgetary resources when the economy is expanding is an important strategy for minimizing fiscal stress when the business cycle turns downward. The lesson for policymakers is that when times are good and the revenue coffers are flush, restraining the impulse to expand spending and building up reserves for the next rainy day is a strategy that is likely to pay substantial dividends when the next recession hits. The choices that government officials make have a much larger effect than is often acknowledged.

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