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Clemens, Jeffrey

University of California at San Diego

16 January 2013

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*Address: University of California at San Diego, Jeffrey Clemens, Economics Department, 9500 Gilman Drive #0508, La Jolla, CA 92093-0508, USA. Telephone: 1-509-570-2690. E-mail: *clemens.jeffrey@gmail.com*. Harvard University. I am grateful to Raj Chetty, Martin Feldstein, Edward Glaeser, Joshua Gottlieb, Byron Lutz, David Merriman, James Poterba, Kim Reuben, Stan Veuger, the Lincoln Institute of Land Policy, participants at the Harvard labor/public economics lunch, and participants in a session on state and local governments at the NTA's 2009 meetings in Denver, CO, and especially to David Cutler and Lawrence Katz. All errors are my own.

State Fiscal Adjustment During Times of Stress:

Possible Causes of the Severity and Composition of Budget Cuts

Abstract

Efforts to maintain balanced budgets lead to substantial pro-cyclicality in states' capital investments, transfers to local governments, and spending in areas like education and transportation. Reliance on volatile revenue sources predicts relatively severe volatility in these expenditures. States with strict balanced budget requirements must restore fiscal balance faster than those without, leading to rescissions during years in which they face unexpected shocks. I find that these rescissions occur disproportionately in areas with readily deferred projects. Evidence points to the relative strength of public sector union groups as a driver of variation in the composition of mid-year rescissions across states.

1 Introduction

This paper investigates patterns in discretionary spending by state governments over the business cycle.[1] Discretionary spending encompasses the main components of state budgets that do not behave as automatic stabilizers. It includes spending on infrastructure and capital equipment, the financing of government service provision, and transfers to local governments (e.g., for education). In response to economic downturns, discretionary spending does not automatically fall like own-source revenues or rise like payouts through unemployment insurance and low-income entitlement programs. Instead, the level of discretionary spending is set by the annual

[1] A moderate degree of pro-cyclicality in total and capital spending has previously been documented in work by Sorensen, Wu, and Yosha (2001) and Fatás and Mihov (2006), but the distinction between discretionary spending and mandatory entitlement programs does not appear to have been pursued.

(or, in some states, biennial) appropriations choices of state legislatures. Given the behavior of automatic stabilizers, balanced budget requirements will constrain this spending to move pro-cyclically unless states save significantly during economic expansions.[2]

I find that discretionary spending exhibits a high degree of pro-cyclicality. On average across U.S. states from 1960 to 2006, a $1 deviation in income from trend predicts an 8 cent deviation in discretionary spending from trend. These fluctuations imply a spending elasticity of -0.8 with respect to the size of a state's economy.

As noted in previous work (Clemens and Miran, 2012), it is difficult to rationalize this pro-cyclical spending on infrastructure, equipment, and service provision as serving a welfare-enhancing purpose. The consumption of public services, for example, would generate greater utility if these services flowed smoothly. Similarly, if capital expenditures must be conducted with any cyclical orientation at all, they would ideally be reserved for downturns as a source of "shovel ready" projects. Infrastructure and equipment will also tend to be more expensive during booms, when construction wages and prices more generally will be high due to high demand, than during recessions.[3]

My analysis focuses on the predictors of cross-state differences in three features

[2]Consistent with recent work by Grembi, Nannicini, and Troiano (2011), balanced budget rules operate as highly relevant constraints on deficit running by sub-national governments.

[3]This paper focuses on the development of facts describing the pro-cyclicality of states' expenditures, leaving the task of quantifying the costs of this behavior for future work. Recent work on the fiscal policy multipliers associated with sub-national government spending, including papers by Clemens and Miran (2012), Shoag (2010), Chodorow-Reich, Feiveson, Liscow, and Woolston (2012), Serrato and Wingender (2010), and Wilson (2012) can be viewed as efforts to quantify the effect of the relevant types of spending on the macro economy.

of states' discretionary spending: the degree of its pro-cyclicality, the pace of adjustments at the beginning of downturns, and the composition of the adjustments at both the beginnings of downturns and over the full course of the business cycle. I show first that pro-cyclicality is a significant feature of nearly all major technical (e.g, capital, current, and intergovernmental) and functional (e.g., education, health, and transportation) categories of spending. Spending on health, which can in practice be closely tied to safety-net spending, is a notable exception. Spending in all other categories adjusts roughly in proportion to the size of the economy; the elasticity of spending with respect to the size of a state's economy tends to be close to 1.[4]

I next identify two empirically important predictors of volatility in discretionary spending. Tax revenues exhibit greater pro-cyclicality than other state government revenue sources, with the personal income tax exhibiting greater volatility than other forms of tax revenue (Follette, Kusko, and Lutz, 2009). I show that reliance on relatively volatile revenue sources translates into greater pro-cyclicality in discretionary spending.[5] This result holds strongly for capital, current, and intergovernmental expenditures and has significant economic implications. The estimates imply that states in the first quartile of reliance on taxation have discretionary spending that is half as volatile as those in the top quartile.

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[4]The parameter estimated is similar in spirit to the "policy elasticity" parameter estimated in two papers by Fatas and Mihov (Fatás and Mihov, 2003, 2006), who study fiscal policy both across countries and across US states.

[5]Over a sample extending from 1978 to 1994, Sorensen, Wu, and Yosha (2001) found relatively little evidence that differences in states' tax bases predicted differences in the cyclicality of total state spending. Their exercise difference from the exercise conducted here in several ways: it covered a briefer sample period, focused on total state spending rather than discretionary spending, and focused on differences in the composition of states' tax revenues rather than on tax revenues as a share of total state revenues.

The length of state budgetary cycles emerges as a predictor of the volatility of discretionary capital spending. Capital expenditures exhibit almost no cyclicality in states with both biennial budgetary and biennial legislative cycles. In other states, capital expenditures exhibit even greater volatility than other categories of spending. Longer budgetary and legislative cycles may help states smooth their infrastructure investments and equipment purchases. State differences in a second fiscal institution of interest, namely the stringency of their balanced budget requirements, has little power for predicting the pro-cyclicality of spending over the full course of the business cycle.

I next move to an investigation of the mid-year budget cuts made by states at the beginnings of recessions. Poterba (1994) shows that, consistent with compliance with their strict balanced budget requirements, states with restrictions on the maintenance (i.e., the "carrying over") of short-term, general obligation debt enact substantial mid-year budget cuts (or budgetary rescissions) in the face of unexpected fiscal shocks. Clemens and Miran (2012) extend Poterba's results and show that the fiscal shocks of interest occur just as states' economies turn down from their expansionary peaks.

I begin this phase of the analysis by estimating the extent to which claimed budget cuts translate into reductions in observed levels of spending. While states do, on average, appear to enact cuts as claimed, the estimated relationship between budget cuts and total discretionary spending lacks precision. The lack of power likely reflects the moderate size of the relevant fiscal shocks and measurement error inherent in their construction. It may also reflect significant variation in the extent to which

states reduce their budgets as claimed.

I then investigate the composition of the realized reductions in spending. Realized cuts are disproportionately concentrated in categories that are relatively deferrable (e.g., capital expenditures and spending in categories like Utilities, which is dominated by spending associated with the maintenance of public transit systems, power plants, and water infrastructure). Conditional on having to make mid-year rescissions, states attempt to limit disruptions to the flow of public services.

Finally, I investigate the extent to which interest groups influence different aspects of the budget cutting process. I find evidence that when relatively strong public-sector unions are associated with a category of spending, that category largely avoids mid-year budgetary rescissions.[6] I find no evidence that strong unions reduce the total quantity of budget cuts enacted. Rather, the relative strength of union groups drives the distribution of a fixed quantity of rescissions. Avoided mid-year rescissions do not extend into the next year's appropriations cycle. At the beginnings of recessions, unions thus appear to exert more significant influence over mid-year budget cuts (which take place outside of the usual appropriations process) than over appropriations. The results are suggestive regarding the relative influence of unions over governors (who play significant roles in the process of allocating rescissions) and legislatures.

The paper proceeds as follows. In the next section I investigate the degree of spending pro-cyclicality across states and budgetary categories from 1960 to 2006.

[6]The result is quite consistent with recent work by Feiveson (2011), who finds that unions played an important role in driving the use of windfall funds associated with the federal revenue sharing program run from 1972 to 1986.

In section 3 I present a strategy for investigating the composition of the mid-year rescissions induced by strict balanced budget requirements. In section 4 I describe the data used to construct the variables of interest for this portion of the analysis. In section 5 I present the results and in section 6 I conclude.

2 The Cyclicality of Discretionary Spending

In this section I examine the relationship between de-trended, state-level personal income and discretionary spending by state governments. The personal income data come from the Regional Accounts of the Bureau of Economic Analysis (BEA), while the spending data come from the Census Bureau's *Annual Survey of State Government Finances* (ASSGF). After converting all series into real dollars per capita, I take residuals from regressions of the following form:

$$\begin{aligned} Z_{s,t} = \beta_{0,s}\delta_s + \beta_{1,s}\delta_s \times trend_t + \beta_{2,s}\delta_s \times trend_t^2 \\ + \beta_{3,s}\delta_s \times trend_t^3 + \beta_{4,s}\delta_s \times trend_t^4 + \epsilon_{s,t}^Z. \end{aligned} \tag{1}$$

$Z_{s,t}$ is either personal income or a category of government spending (expressed in either levels or logs with observations at the level of state fiscal years), δ_s is a state-specific indicator variable, *trend* is set equal to 1 for the first year of the sample, and the $\epsilon_{s,t}$ are the desired residuals. The sample runs from 1960 to 2006 and includes all states but Alaska. Summary statistics for the various categories of spending can be found in Table 1.

Table 1: Summary Statistics for Fiscal Variables: 1960-2006

Variable	Mean	Std. Dev.
Economic Variables ($ per capita)		
Personal Income	23659	6475
Technical Budgetary Categories ($ per capita)		
Total Non Welfare Expenditures	2101	781
Non-Welfare Capital	337	152
Non-Welfare Current	1003	498
Intergovernmental Grants	818	395
Direct Spending in Major Functional Categories ($ per capita)		
Education	484	241
Health and Hospitals	183	97
Highways	299	139
Other	375	274
Features of Fiscal Landscape		
Total Tax Share of Revenues	0.56	0.06
Personal Income Tax Share of Revenues	0.13	0.08
Biennial Budgetary and Legislative Cycle	0.21	0.41
Weak Balanced Budget Requirements	0.27	0.44

Note: The table contains summary statistics for state-level economic and fiscal variables expressed from 1960 to 2006 for all US states but Alaska. Personal income data come from the Bureaa of Economic Analysis while the fiscal variables come from that Annual Survey of State Government Finances. Data on state budgeting cycles come from Snell (2010). Data on state balanced budget requirements come from ACIR (1987). Total Non Welfare Direct Expenditures is constructed as the sum of Capital, Current, and Intergovernmental expenditures net of capital and current expenditures on public welfare programs. Capital and Current spending similarly net out public welfare spending. The Other category is the residual of Total Non Welfare Direct Expenditures minus spending on Education, Health and Hospitals, and Highways. Direct spending in the major functional categories sums to the total of the Capital and Current expenditures presented above. Direct state spending on education consists almost exclusively of higher education, as elementary and secondary education are financed through intergovernmental grants. Other consists primarily of expenses related to government administration.

I examine the relationship between de-trended income and the de-trended spending variables. This involves regressions of the form

$$\epsilon^G_{s,t} = \beta_0 + \beta_1 \epsilon^I_{s,t} + \mu_{s,t} \tag{2}$$

as well as regressions of the form

$$\epsilon^G_{s,t} - \epsilon^G_{s,t-j} = \gamma_0 + \gamma_j [\epsilon^I_{s,t} - \epsilon^I_{s,t-j}] + \mu_{s,t} \tag{3}$$

with $j = 1, 2,$ or 3. β_1 is an estimate of the extent to which discretionary spending takes a pro-cyclical stance over the full course of the business cycle. Estimates of γ_j reveal the timing with which spending responds to changes in income. Estimates using levels provide a sense for the absolute size of states' cyclical adjustments. Estimates using logs provide evidence regarding the elasticity of expenditures with respect to the size of the economy.

Figures 1 and 2 provide graphical evidence, previously reported by Clemens and Miran (2012), on the cyclicality of states' discretionary spending. Both figures involve residuals from estimates of equation (1) for personal income and for the aggregate of spending outside of public welfare programs. Figure 1 plots the means (taken across states) of these residuals in each year from 1960 to 2006. Figure 2 displays each state-by-year observation for the series of residuals in scatter plot form. The timing of the cyclical adjustments in state spending (as illustrated in Figure 1) is consistent with what one would expect due to balanced budget requirements. Spending tracks the business cycle with a lag of one to two years. The best-fit line in Figure 2 implies

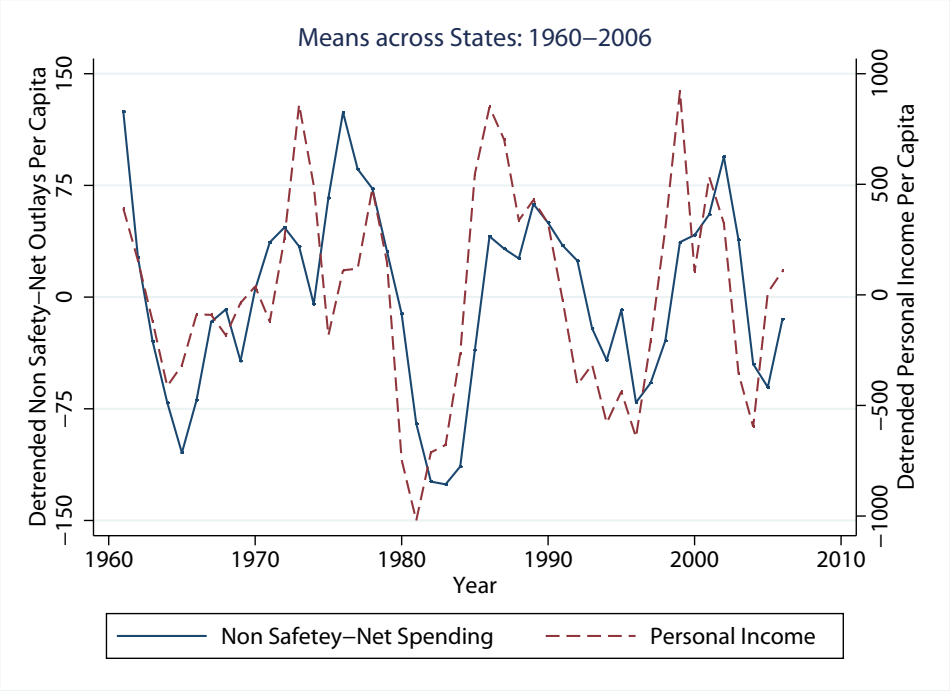

Figure 1: **De-trended Non Safety-Net Outlays and Personal Income: Means Across States (1960-2006).** The figure plots the unweighted means (across states) of de-trended personal income and state government spending outside of insurance trusts and safety-net programs on a per capita basis. Detrending was conducted using state-specific quartic polynomials. Personal income data come from the Bureau of Economic Analysis (BEA) and state government spending data come from the Census of Governments (COG). This figure was originally published in Clemens and Miran (2012).

that when personal income is $1 below trend, discretionary spending tends to be 7.8 cents below trend (with a standard error of 1.7 cents). These fluctuations imply a spending elasticity of -0.8 with respect to the size of a state's economy.

Table 2 displays estimates of equations (2) and (3) across the major budgetary categories. These include technical categories, where Non Welfare Capital, Non Welfare Current, and Intergovernmental expenditures sum to Total Non Public Welfare

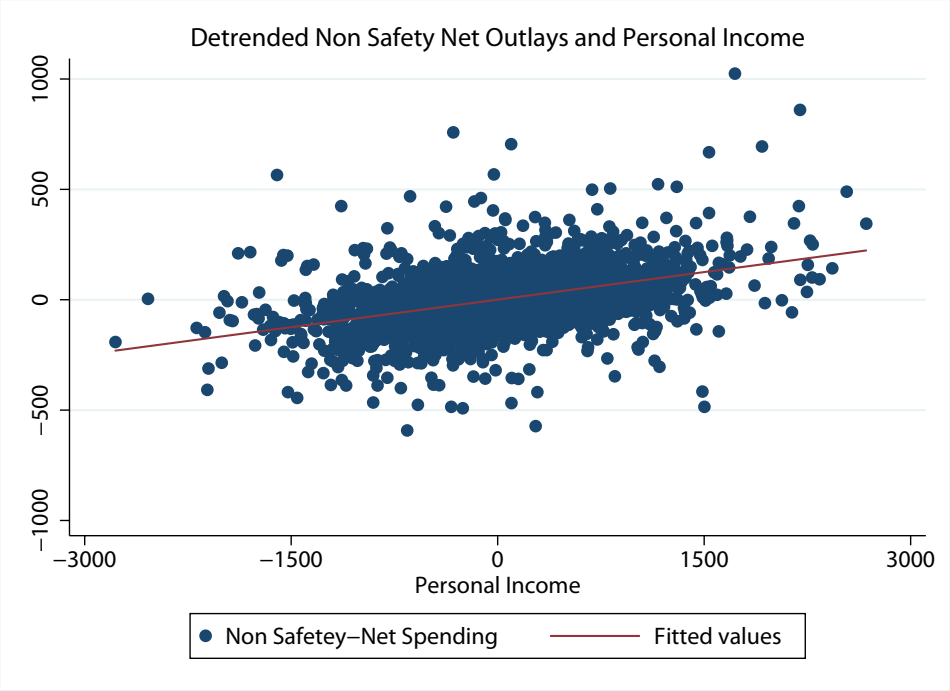

Figure 2: **De-trended Non Safety-Net Outlays and Personal Income (1960-2006).** The figure plots state-year observations of de-trended personal income and state government spending outside of insurance trusts and safety-net programs on a per capita basis. The best-fit line has a slope of 0.078 (standard error of 0.017). Detrending was conducted using state-specific quartic polynomials. Personal income data come from the BEA and state government spending data come from the COG. This figure was originally published in Clemens and Miran (2012).

expenditures, and functional categories, where Education, Health, Highways, and Other sum to the total of Non Welfare Capital and Non Welfare Current expenditures. The results in Panel A were estimated with all variables expressed in real dollars per capita. The first row shows that when state income is one dollar below trend, total non welfare spending tends to be 7.8 cents below trend, with capital expenditures 2.1 cents below trend, current expenditures 2 cents below trend, and intergovernmental expenditures 2.4 cents below trend. Expenditures on education

and highways move pro-cyclically, while spending on health does not have a strong cyclical orientation in either direction.

The second row of results, which displays estimates involving first differences of the de-trended income and spending series, provides a sense for how quickly cyclical adjustments take place. The aggregate of discretionary spending falls by roughly 4 cents for each dollar decline in income relative to trend. Declines in current and intergovernmental expenditures quickly track the business cycle, while the decline in capital expenditures is relatively small during the initial year in which income declines. The third row of results displays estimates using three-year differences of the de-trended income and spending series. Almost all of the pro-cyclicality apparent in the initial row of results is apparent in the three-year differences.[7]

The results in Panel B involve regressions of the same form as those in Panel A, but with variables expresses in logs. These estimates capture the elasticity of spending with respect to the size of the economy. The results show which spending categories fluctuate to greater or lesser degrees over the course of the business cycle. Although adjustments in capital spending do not take place as rapidly as adjustments in other categories, capital spending emerges as having the most pro-cyclical stance over the full course of the business cycle. Consistent with this finding, capital-intensive spending on highways exhibits greater pro-cyclicality than other functional categories.

[7]The presentation of one and three year differences allows for comparison with results presented by Sorensen, Wu, and Yosha (2001). Estimates regarding the cyclicality of capital expenditures are some of the only directly comparable results, and the results are quite similar (see Sorenson, Wu and Yosha's Table 7). The significant difference between our estimates for the cyclicality of total expenditures reflects my focus on spending outside of mandatory entitlement programs, which fluctuate counter-cyclically.

Table 2: Relationship Between De-trended Personal Income and Major Expenditure Categories: 1960-2006

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
		Technical Categories				Functional Categories		
Spending Category:	Total Non Public Welfare	Capital	Current	Intergov	Education	Health	Highways	Other
Panel A: Levels				Dependent Variable: $\varepsilon^G_{s,t}$				
$\varepsilon^I_{s,t}$	0.0773***	0.0207**	0.0323***	0.0244***	0.0145***	0.00296	0.0109**	0.0246***
	(0.0171)	(0.00879)	(0.00718)	(0.00515)	(0.00403)	(0.00188)	(0.00417)	(0.00716)
				Dependent Variable: $\varepsilon^G_{s,t} - \varepsilon^G_{s,t-j}$				
$\varepsilon^I_{s,t} - \varepsilon^I_{s,t-1}$	0.0407***	0.00470	0.0179***	0.0191***	0.00867***	0.00193*	0.00133	0.0107***
	(0.0109)	(0.00497)	(0.00478)	(0.00349)	(0.00290)	(0.00112)	(0.00319)	(0.00351)
$\varepsilon^I_{s,t} - \varepsilon^I_{s,t-3}$	0.0711***	0.0149**	0.0295***	0.0267***	0.0131***	0.00213	0.00960***	0.0195***
	(0.0134)	(0.00642)	(0.00566)	(0.00421)	(0.00328)	(0.00143)	(0.00315)	(0.00517)
Panel B: Logs				Dependent Variable: $\varepsilon^G_{s,t}$				
$\varepsilon^I_{s,t}$	0.802***	1.361***	0.663***	0.794***	0.762***	0.312	1.137***	0.756***
	(0.172)	(0.391)	(0.135)	(0.172)	(0.184)	(0.187)	(0.350)	(0.222)
				Dependent Variable: $\varepsilon^G_{s,t} - \varepsilon^G_{s,t-j}$				
$\varepsilon^I_{s,t} - \varepsilon^I_{s,t-1}$	0.373***	0.173	0.369***	0.551***	0.420***	0.116	0.155	0.225
	(0.137)	(0.250)	(0.105)	(0.121)	(0.147)	(0.108)	(0.248)	(0.137)
$\varepsilon^I_{s,t} - \varepsilon^I_{s,t-3}$	0.766***	0.982***	0.663***	0.841***	0.724***	0.254*	0.952***	0.785***
	(0.149)	(0.307)	(0.118)	(0.145)	(0.170)	(0.147)	(0.270)	(0.210)

Note: ***, **, and * indicate statistical significance at the .01, .05, and .10 levels respectively. Standard errors, calculated allowing for arbitrary correlation at the state level, are in parentheses beneath each point estimate. Each cell contains the result from a separate regression. The sample includes all states but Alaska for the years 1960-2006. The de-trended variables $\varepsilon^G_{s,t}$ and $\varepsilon^I_{s,t}$ are constructed analogously, where $\varepsilon^G_{s,t}$ is constructed as the residual of government spending (in a particular category) in state s and year t from a regression that predicts spending using state-specific quartic trends. The fiscal variables are as described in the note to Table 1 and the text. The de-trended variables were expressed in real per capita terms prior to de-trending for the specifications presented in Panel A. The variables were additionally expressed in logs prior to de-trending for the results in Panel B.

Tables 3 and 4 explore the extent to which differences in states' fiscal institutions predict differences in the cyclicality of their discretionary spending. Table 3 focuses on the relationship between cyclicality and the use of taxation as a source of revenue. Tax revenues are more volatile than other sources of state government revenue, which are dominated by intergovernmental revenues, a variety of charges (including student tuition payments) and user fees, and revenues generated from states' natural resources. Among the important sources of state tax revenue, personal income taxes are more volatile than sales taxes. The results in Tables 3 involve estimates of the following forms:

$$\epsilon^G_{s,t} = \beta_0 + \beta_1 \epsilon^I_{s,t} + \beta_2 TaxShare_s \epsilon^I_{s,t} + \mu_{s,t} \tag{4}$$

and

$$\epsilon^G_{s,t} - \epsilon^G_{s,t-j} = \gamma_0 + \gamma_{1,j}[\epsilon^I_{s,t} - \epsilon^I_{s,t-j}] + \gamma_{2,j} TaxShare_s [\epsilon^I_{s,t} - \epsilon^I_{s,t-j}] + \mu_{s,t} \tag{5}$$

where for each state s, the tax share variable is calculated as

$$TaxShare_s = \sum_t \frac{Taxes_{s,t}}{Revenues_{s,t}} - \sum_t \sum_s \frac{Taxes_{s,t}}{Revenues_{s,t}}. \tag{6}$$

Subtraction of the global mean allows the coefficient β_1 to be interpreted as an estimate of the degree of cyclicality for a state with the mean level of reliance on taxation. When constructed using all taxes as a share of revenue, $TaxShare_s$ has a mean of 0.0 and a standard deviation of 0.06. When constructed using personal income taxes as a share of revenue, it has a mean of 0.0 and a standard deviation of 0.08.

Table 3: Relative Reliance on Taxation and the Degree of Pro-Cyclicality across Expenditure Categories: 1960-2006

Spending Category:	(1) Total Non Public Welfare	(2) Capital	(3) Current	(4) Intergov	(5) Total Non Public Welfare	(6) Capital	(7) Current	(8) Intergov
	Tax Variable: Ave.Total Tax Share$_s$ - Global Ave. [mean = 0.0, sd = 0.06]				*Tax Variable: Ave. Income Tax Share$_s$ - Global Ave.* [mean = 0.0, sd = 0.08]			
Logs	Dependent Variable: $\varepsilon^G_{s,t}$							
$\varepsilon^I_{s,t}$	0.944***	1.616***	0.771***	0.935***	0.852***	1.446***	0.696***	0.847***
	(0.104)	(0.295)	(0.0759)	(0.123)	(0.129)	(0.334)	(0.103)	(0.138)
$\varepsilon^I_{s,t}$ *TaxShare$_s$	6.506***	11.62***	4.944***	6.432***	4.625***	7.767**	3.041**	4.783**
	(1.528)	(3.725)	(1.278)	(1.895)	(1.512)	(3.173)	(1.375)	(1.857)
	Dependent Variable: $\varepsilon^G_{s,t} - \varepsilon^G_{s,t-j}$							
$\varepsilon^I_{s,t} - \varepsilon^I_{s,t-1}$	0.536***	0.421***	0.492***	0.680***	0.449***	0.339*	0.411***	0.610***
	(0.0607)	(0.155)	(0.0526)	(0.0767)	(0.0914)	(0.177)	(0.0770)	(0.0910)
$[\varepsilon^I_{s,t} - \varepsilon^I_{s,t-1}]$*TaxShare$_s$	4.489***	6.819***	3.365***	3.562***	3.089***	6.734***	1.696*	2.390*
	(0.675)	(1.727)	(0.560)	(1.186)	(0.976)	(1.699)	(0.908)	(1.290)
$\varepsilon^I_{s,t} - \varepsilon^I_{s,t-3}$	0.877***	1.162***	0.747***	0.945***	0.820***	1.079***	0.699***	0.888***
	(0.0848)	(0.206)	(0.0715)	(0.0989)	(0.109)	(0.244)	(0.0890)	(0.117)
$[\varepsilon^I_{s,t} - \varepsilon^I_{s,t-3}]$*TaxShare$_s$	4.893***	7.903**	3.704***	4.562***	3.752***	6.820***	2.507**	3.255**
	(1.249)	(3.057)	(1.046)	(1.312)	(1.163)	(2.488)	(1.099)	(1.254)

Note: ***, **, and * indicate statistical significance at the .01, .05, and .10 levels respectively. Standard errors, calculated allowing for arbitrary correlation at the state level, are in parentheses beneath each point estimate. The sample includes all states but Alaska for the years 1960-2006. The de-trended variables $\varepsilon^G_{s,t}$ and $\varepsilon^I_{s,t}$ are constructed as described in the note to Table 2. The tax share variable for each state is constructed by first taking the mean of tax revenues as a share of total revenues for the full sample, then subtracting the global mean of the tax share for all states. The subtraction of the global mean yields tax share variables with means of 0. The total tax share variable has a standard deviation of roughly 0.06 while the income tax share variable has a standard deviation of roughly 0.08. The table presents three sets of regressions, each involving two rows of coefficients, one for the main effect of the relevant income variable and the other containing an interaction between the income variable and the tax share variable.

State reliance on taxation strongly predicts the degree of pro-cyclicality in discretionary spending. The magnitude of the differences in cyclicality across high and low tax states is substantial. Estimates of equations (4) and (5) appear in Table 3. They imply that states in the first quartile of reliance on taxation tend to have spending about half as volatile as those in the top quartile. At the extremes, states at the bottom of the tax-reliance distribution exhibit one sixth of the cyclicality of the most tax-reliant states. These differences in the cyclicality of expenditures almost perfectly match the associated differences in the cyclicality of revenues across states (results not shown). The relatively severe pro-cyclicality of spending in tax-reliant states pervades across capital, current, and intergovernmental expenditures.[8]

Results in Table 4 expand on equations (4) and (5) by allowing two measures of states' fiscal institutions to mediate the cyclicality of state expenditures (in addition to reliance on taxation). The first fiscal institution is the length of the budgetary cycle. While a slim majority of states budget and legislate on an annual basis, others do so once every two years. Some states budget biennially while legislating annually and others both legislate and budget on two year cycles (Snell, 2010). The specifications reported in Table 4 include an interaction between deviations in income from trend and an indicator for states that both budget and legislate biennially.[9] States also vary

[8]One implication of this finding relates to the tendency of taxation to be more progressive than alternative sources of revenue. Progressive taxation provides a form of social insurance at a point in time. When states fail to save for recessions, however, it also results in relatively severe fiscal stress, requiring cuts to discretionary programs. If these cuts extend to the social safety net, the choice of revenue instruments may involve a trade-off between point-in-time progressivity and the performance of social insurance programs over the course of the business cycle.

[9]States that budget biennially and legislate annually ultimately exhibit the same cyclical patterns as states the budget on an annual basis (results not shown). The frequency of state budgeting and legislative sessions is not constant over time. I acquired information on changes in these frequen-

Table 4: Association Between Three Fiscal Institutions and the Degree of Pro-Cyclicality across Expenditure Categories: 1960-2006

	(1)	(2)	(3)	(4)
Spending Category:	Total Non Public Welfare	Capital	Current	Intergov
Logs	Dependent Variable: $\varepsilon^{G}_{s,t}$			
$\varepsilon^{I}_{s,t}$	0.960***	1.806***	0.735***	0.965***
	(0.154)	(0.395)	(0.116)	(0.180)
$\varepsilon^{I}_{s,t}$ *TaxShare$_s$	5.763***	8.106**	4.734***	7.234***
[mean = 0.00, sd = 0.06]	(1.673)	(3.087)	(1.395)	(2.424)
$\varepsilon^{I}_{s,t}$ *Biennial$_{s,t}$	-0.277	-1.512***	-0.00801	0.221
	(0.231)	(0.452)	(0.219)	(0.268)
$\varepsilon^{I}_{s,t}$ *WeakRules$_s$	0.150	0.468	0.127	-0.257
	(0.247)	(0.609)	(0.174)	(0.400)
	Dependent Variable: $\varepsilon^{G}_{s,t} - \varepsilon^{G}_{s,t-j}$			
$\varepsilon^{I}_{s,t} - \varepsilon^{I}_{s,t-1}$	0.557***	0.516**	0.450***	0.686***
	(0.0907)	(0.214)	(0.0820)	(0.120)
$[\varepsilon^{I}_{s,t} - \varepsilon^{I}_{s,t-1}]$*TaxShare$_s$	4.189***	5.289***	3.000***	4.247**
[mean = 0.00, sd = 0.06]	(0.660)	(1.946)	(0.597)	(1.982)
$[\varepsilon^{I}_{s,t} - \varepsilon^{I}_{s,t-1}]$*Biennial$_{s,t}$	-0.100	-0.495*	-0.0165	0.146
	(0.107)	(0.255)	(0.107)	(0.235)
$[\varepsilon^{I}_{s,t} - \varepsilon^{I}_{s,t-1}]$*WeakRules$_s$	0.0302	0.176	0.177	-0.179
	(0.149)	(0.435)	(0.106)	(0.345)
$\varepsilon^{I}_{s,t} - \varepsilon^{I}_{s,t-3}$	0.873***	1.239***	0.740***	0.893***
	(0.117)	(0.266)	(0.0935)	(0.150)
$[\varepsilon^{I}_{s,t} - \varepsilon^{I}_{s,t-3}]$*TaxShare$_s$	4.068***	5.162**	3.371***	4.637**
[mean = 0.00, sd = 0.06]	(1.245)	(2.545)	(1.113)	(1.868)
$[\varepsilon^{I}_{s,t} - \varepsilon^{I}_{s,t-3}]$*Biennial$_{s,t}$	-0.230	-0.924**	-0.0837	0.112
	(0.199)	(0.364)	(0.213)	(0.243)
$[\varepsilon^{I}_{s,t} - \varepsilon^{I}_{s,t-3}]$*WeakRules$_s$	0.208	0.503	0.0946	0.0878
	(0.213)	(0.477)	(0.176)	(0.326)

Note: ***, **, and * indicate statistical significance at the .01, .05, and .10 levels respectively. Standard errors, calculated allowing for arbitrary correlation at the state level, are in parentheses beneath each point estimate. The sample includes all states but Alaska for the years 1960-2006. The de-trended variables $\varepsilon^{G}_{s,t}$ and $\varepsilon^{I}_{s,t}$, as well as the tax share variable, are constructed as described in the note to Table 2. *Biennial* is an indicator for states that are operating on biennial budgetary and legislative cycles, with the data taken from Snell (2010). *WeakRules* is an indicator for a state with weak balanced budget requirements as reported by ACIR (1987). The table presents three sets of regressions, each involving four rows of coefficients, one for the main effect of the relevant income variable and the others containing separate interaction between the income variable and the tax share variable, the indicator for biennial cycles, and the indicator for weak balanced budget rules.

in terms of the stringency of their balanced budget requirements. The specifications in Table 4 include an interaction between deviations in income from trend and an indicator for states with relatively weak budget rules. I hold off on a detailed explanation of the budget rule variable until the following sections, where these rules take center stage.

The results show that reliance on taxation is far more predictive of the cyclicality of discretionary spending than the fiscal institutions. Biennial budgeting emerges as an important predictor of the cyclicality of capital, but not other, expenditures. States that budget and legislate biennially have a-cyclical capital expenditures while states that either budget or legislate annually exhibit substantial pro-cyclicality. Smooth budgeting of capital projects thus appears to be facilitated by budgeting over a relatively long time horizon.

Budget rules do not strongly predict the cyclicality of spending over the full course of the business cycle. The next section shows that budget rules do play a role in shaping how fast states respond to the unexpected shocks that occur at the beginnings of recessions. The results in Table 4 are driven by the fact that states with weak budget rules also expose themselves to large shocks through extensive reliance on personal income taxation.[10]

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cies from Snell (2010), which is available through the website for the National Conference of State Legislators: http://www.ncsl.org/default.aspx?tabid=12658.

[10]States with weak budget rules appear to have moderately *more* pro-cyclical expenditures than states with strict rules in specifications that do not include the interaction between deviations in income from trend and the measures of states' reliance on tax revenues (results not shown). This result highlights why, although many of the results in this section are highly suggestive and point to important effects of state' fiscal choices, I avoid interpreting the coefficients as unbiased estimates of causal relationships.

3 Estimating the Composition of Mid-Year Rescissions

The previous section focused on the adjustments made by states over the full course of the business cycle. In this section my focus shifts towards the budget cuts made by states at the beginnings of economic downturns. The analysis decomposes the mid-year budget cuts made by states with relatively strict balanced budget requirements when they are faced with unexpected fiscal shocks. An interesting feature of these budget cuts is that they take place outside of the normal appropriations process. While state legislatures dominate the normal appropriations process, state governors take a leading role in shaping mid-year rescissions in response to revenue shortfalls (Snell, 2010).

I use a measure of fiscal shocks ($Defshock_{s,t}$), popularized by Poterba (1994), which has two key features.[11] First, it is driven by deviations in actual revenues and expenditures from their forecasts. Second, it accounts for the mid-year actions taken by states to narrow emerging deficits. The deficit shock experienced by a state is the difference between the shocks to its expenditures and revenues ($Deficit\ Shock_t = Expenditure\ Shock_t - Revenue\ Shock_t$.), which are constructed as described below:

$$Expenditure\ Shock_t = Outlay_{CL,t} - \mathbf{E}_{t-1}(Outlay_{s,t})$$
$$Revenue\ Shock_t = Revenue_{CL,t} - \mathbf{E}_{t-1}(Revenue_{s,t})$$

The terms involving expectations are outlay and revenue forecasts, where the forecast is made at the end of the previous fiscal year. $Outlay_{CL,t}$ and $Revenue_{CL,t}$ are

[11] The discussion in the remainder of this sub-section quotes liberally from joint work with Stephen Miran (Clemens and Miran, 2012).

the constant-law levels of outlays and revenues; they are what would prevail in the absence of mid-year adjustments to the budget. The difference between these terms provides a true measure of expenditure and revenue shocks.[12] One cannot directly observe constant-law outlays and revenues. However, they can be recovered by subtracting mid-year changes (denoted as $\triangle Outlays_t$ and $\triangle Revenue_t$) from the final outlay and revenue realizations for the fiscal year ($Outlays_t$ and $Revenue_t$).

When states experience adverse fiscal shocks, they respond by enacting mid-year budget cuts and tax increases. States with strict balanced budget requirements (to be defined in detail in the following section) enact significantly more rescissions than other states (Poterba, 1994; Clemens and Miran, 2012). I investigate the extent to which this rule-induced differential in rescissions translates into observably lower levels of expenditures, with further analysis of the composition of the cuts that are made. This translates into the two-stage estimation strategy outlined below:[13]

[12]The use of constant-law measures is crucial because mid-year adjustments to outlays and revenues will tend to undo the appearance of fiscal shocks. Were mid-year adjustments to be complete, for example, realized deficits would always equal zero when states enter the fiscal year expecting the budget to balance.

[13]Poterba clarifies an important point regarding what might look like a simultaneity problem in the first-stage regressions due to the appearance of $\triangle Outlays_{s,t}$ in the construction of the deficit shock (1994, pp. 809-810). In fact, a true simultaneity problem would result from failing to subtract $\triangle Outlays_{s,t}$. As Poterba notes, if one did not subtract $\triangle Outlays_{s,t}$, the resulting measure of the shock would equal the true measure of the shock plus $\triangle Outlays_{s,t}$. Hence regressing $\triangle Outlays_{s,t}$ on this incorrect measure would amount to regressing it on itself plus a random variable. Subtracting $\triangle Outlays_{s,t}$ yields an estimate of the true shock and eliminates the simultaneity problem. That said, it should be noted that classical measurement error in $\triangle Outlays_{s,t}$ would tend to bias the coefficient on the deficit shock towards 1 under these circumstances rather than towards 0 as in the usual case.

$$\begin{aligned}\widehat{\triangle Outlays}_{s,t} = {} & \beta_1 weakBBR_s \times Defshock_{s,t} \times 1_{Defshock>0} \\ & + \beta_2 weakBBR_s \times Defshock_{s,t} \times 1_{Defshock\leq 0} \\ & + \beta_3 Defshock_{s,t} \times 1_{Defshock>0} + \beta_4 Defshock_{s,t} \times 1_{Defshock\leq 0} \\ & + \beta_{5,s} \times \delta_s + \beta_{6,t} \times \delta_t + \beta_{7,s} \times trend_t \times \delta_s \end{aligned} \tag{7}$$

$$\begin{aligned} G_{s,t} = {} & \gamma_1 \widehat{\triangle Outlays}_{s,t} \\ & + \gamma_2 Defshock_{s,t} \times 1_{Defshock>0} + \gamma_3 Defshock_{s,t} \times 1_{Defshock\leq 0} \\ & + \gamma_{4,s} \times \delta_s + \gamma_{5,t} \times \delta_t + \gamma_{6,s} \times trend_t \times \delta_s + \epsilon_{s,t}. \end{aligned} \tag{8}$$

Since the budget rules only bind when deficit shocks are positive (i.e., adverse), I always incorporate the deficit shocks by introducing separate variables for their positive and negative values; failure to do so would constitute a misspecification of the model. In these equations, $G_{s,t}$ measures state government expenditures for state s during fiscal year t in a set of budgetary categories similar to, but slightly more detailed than, that analyzed in section 2.[14] $\triangle Outlays_{s,t}$ is the within-fiscal-year spending adjustment (or rescission), $weakBBR_s$ is an indicator equal to one if a state has weak balanced budget rules, and $Defshock_{s,t}$ is the measure of deficit shocks. The δ_s and δ_t terms represent state and year dummy variables. The specification is designed so that the primary coefficient of interest, γ_1, has the following interpreta-

[14]Summary statistics for these categories of spending from 1988-2004 can be found in Table 6.

tion: in a given spending category G, there are γ_1 cents in budget cuts for each total dollar in reported mid-year rescissions.

After investigating the composition of budget cuts across the full set of states in the sample, I expand the specification to investigate the possibility that public-sector unions drive variation in the composition of budget cuts across states. I do this through a straightforward modification to the specification described by equations (7) and (8). The modification involves interacting the deficit shock variables (both the main effects and the interactions with the indicator for weak budget rules) and $\triangle Outlays_{s,t}$ with an indicator for the presence of a strong union associated with a particular spending category. These specifications involve two first-stage regressions, one for predicting the main effect of $\triangle Outlays_{s,t}$ and the second for predicting the interaction between $\triangle Outlays_{s,t}$ and the union indicator. I describe the construction of the union variable in the following section.

4 Data

The binding constraint for constructing the measure of deficit shocks is the availability of data on mid-year rescissions and tax increases, which begins in 1988. I have constructed these shocks for the years 1988 through 2004. Several state-year observations are missing due to unreported or otherwise problematic data on one of the inputs required for constructing the shocks.

The sample of states builds up from the base of 27 annually budgeting states used by Poterba (1994). As Poterba notes, the annually budgeting states are the

states for which strict balanced budget requirements have the clearest implications. I have found that states with biennial budgetary cycles and annual legislative cycles respond similarly to fiscal shocks as states with annual budgetary cycles.[15] Consequently, I expand the sample to include such states, excluding only states with both biennial budgetary and biennial legislative cycles on the basis of their budgeting systems. The sample thus includes 40 states, which can be found in Table 5.

4.1 Budget Rules

State balanced budget requirements play a central role in the estimation framework.[16] I collect information on balanced budget requirements from a 1987 report by the Advisory Commission on Intergovernmental Relations (ACIR) and from various reports by the National Association of State Budget Officers (NASBO). Rules can be differentiated in large part on the basis of whether they affect the *enactment* or *execution* of a state's budget. An example of a rule that applies to the budget's *enactment* is a rule requiring the legislature to pass a balanced budget. Such a rule does not force states to respond quickly to deficits that emerge over the course of the fiscal year. It requires only that the budget be balanced (in expectation) in the following fiscal year, i.e., that $\mathbf{E}(G_t + 1) \leq \mathbf{E}(T_t + 1)$. Stricter rules apply more directly to the *execution* of the budget. The strictest rule (also known as the "No-Carry" rule) prohibits carrying deficits through the next budget cycle. This rule requires that if

[15]This was also the case for the adjustments over the full course of the business cycle as investigated in Section 2.

[16]The discussion in this sub-section quotes liberally from joint work with Stephen Miran (Clemens and Miran, 2012).

Table 5: List of States by Budget Rule Classification

Weak Rules	Strong Rules	
CALIFORNIA	ALABAMA	MISSOURI
CONNECTICUT	ARIZONA	NEBRASKA
ILLINOIS	COLORADO	NEW JERSEY
LOUISIANA	DELAWARE	NEW MEXICO
MARYLAND	FLORIDA	OKLAHOMA
MICHIGAN	GEORGIA	OHIO
NEW HAMPSHIRE	HAWAII	RHODE ISLAND
NEW YORK	IDAHO	SOUTH CAROLINA
PENNSYLVANIA	INDIANA	SOUTH DAKOTA
WISCONSIN	IOWA	TENNESSEE
VERMONT	KANSAS	UTAH
	MAINE	VIRGINIA
	MINNESOTA	WASHINGTON
	MISSISSIPPI	WEST VIRGINIA
		WYOMING

Note: The table contains a classification of the 40 states with annual *legislative* cycles that are included in the analysis presented in Tables 6 through 10. This sample builds from the sample of 27 annually *budgeting* states analyzed by Poterba (1994) and by Clemens and Miran (2011) by adding the 13 states that operate with biennial *budgetary* cycles and annual *legislative* cycles. States were coded according to a stringency index found in Table 3 of ACIR (1987). States with an index value < 7 are classified as weak >= 7 as strong. The index value of 7 is the threshold separating states that do and do not allow deficits from previous fiscal years to be carrier through the current fiscal year (i.e., the no carry over rule).

a deficit is incurred at time t, the budget for the following year must be such that $Deficit_t + \mathbf{E}(G_t + 1) \leq \mathbf{E}(T_t + 1)$.[17]

I generate the measure of budget rules using a 1 to 10 index produced by the Advisory Council on Intergovernmental Relations (1987). I designate the 11 states with scores less than 7 as "weak-rule" states. This is the cutoff associated with the

[17]Past research has explored some of the consequences of these rules. Notable studies include work by Poterba (1997) and Bohn and Inman (1996), who examine the impact of different requirements on a broad range of budgetary outcomes. Highlights also include Poterba and Rueben (2001) and Lowry (2001), whose work addresses the nexus between balanced budget requirements, state fiscal behavior, and interest rates on general-obligation debt. These studies confirm empirically that requirements which apply to the budget's execution have greater impact than those that apply only to the budget's enactment. Strict budget rules are associated with lower spending levels, modestly greater accumulation of surpluses in budget stabilization funds, and faster adjustment in response to fiscal shocks.

relatively crucial distinction between states with and without a rule that approximates the No-Carry rule.[18] Table 5 categorizes the 40 states in the sample by their classification as having weak or strong budget rules.

4.2 Deficit Shocks

The construction of the measure of deficit shocks was described in the previous section. Here I present evidence similar to that presented by Clemens and Miran (2012), but for a larger sample of states, regarding the timing of deficit shocks with respect to the business cycle. Figure 3 graphs national means (across the states) of deficit shocks and de-trended personal income per capita from 1988 to 2004. The figure shows that deficit shocks become large when a state's economy enters a recession. When de-trended personal income turns sharply downward, large, positive deficit shocks occur. Deficit shocks tended to be small and negative during the expansionary years of the mid- and late-1990s. The adverse shocks experienced at the beginnings of recessions and the favorable shocks experienced during expansions result in a mean shock that is fairly close to 0. Because deficit shocks occur close to

[18]In addition to the ACIR and NASBO classifications of budget rules, a classification can also be found in a 1993 report by GAO. Differences between these classification systems are the subject of an exchange between Levinson and Krol and Svorny (Levinson, 1998; Krol and Svorny, 2007; Levinson, 2007). An alternative classification scheme, based on direct readings of statutes and constitutions across states, has also been recently produced by Hou and Smith (2006). The literature points towards the notion that state political culture may ultimately be as important as the actual content of the requirements themselves Hou and Smith (2006). We focus on the ACIR classification system because of its power for predicting state's mid-year budget cuts. This is another case in which we would devote more time and space to robustness analysis if we were ultimately pushing a particular estimate of the multiplier on state government spending. Given that we have not settled on an estimate of the multiplier, however, we note only that robustness analyses along these lines, coupled with a compelling justification for the baseline specification, are crucial components of analyses that rely on particular schemes for classifying budget rules.

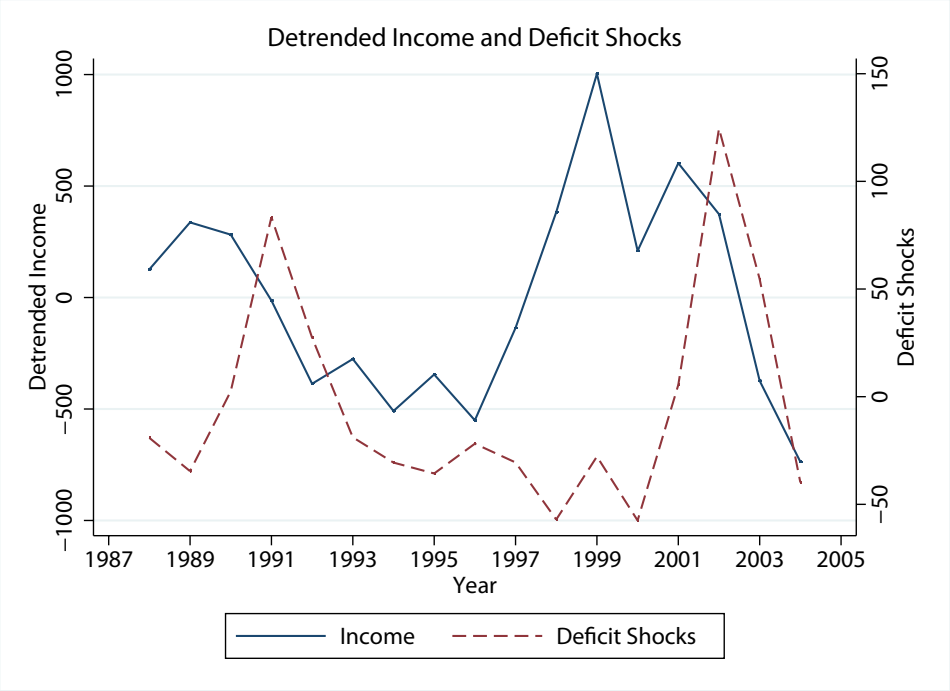

Figure 3: **Detrended Income and Deficit Shocks.** The figure graphs deficit shocks per capita and de-trended personal income per capita. The deficit shocks were constructed using data from semi-annual reports by the National Association of State Budget Officers (NASBO). Personal income data come from the BEA.

the peak of a state's business-cycle, they are negatively correlated with changes in personal income and positively correlated with the level of personal income.

4.3 Measures of Public-Sector Worker Organizations

My measure of public-sector worker organizations uses the 1987 Census of Governments. Unfortunately, the Census of Governments stopped collecting information on the extent of worker organizations after 1987. Nonetheless, the 1987 data provide a baseline look at these organizations in the year immediately before the sample begins. I begin by constructing the fraction of full time workers in each category

who are reported as being organized. Table 6 presents summary statistics for these worker-organization rates. The means range from 32% for Education to 55% for Highways and the distributions reveal significant variation within each functional category across states. Note that since direct state spending on education primarily involves higher education, the relevant education workers are university employees rather than elementary and secondary teachers and administrators. Highway workers include workers involved in road maintenance (including, e.g., snow and ice removal), toll booth workers, and operators of bridges and ferries). The "Other" category is dominated by government administration and workers involved with mass transit, which the census considers a utility rather than a component of highway/transportation spending.

Worker-organization rates tend to correlate highly across groups within states, with the exception of the residual "Other" category. In results not shown I found that *absolute* rates of unionization do not affect the total quantity of cuts from state budgets in the face of fiscal shocks. The presented analysis thus focuses on the effect of *relative* rates of public worker organization (within a state) on the composition of the budget cuts enacted. The analysis involves a binary indicator of strong union status, which I construct as follows. For each category of workers, I calculate the fraction of workers organized in their "own" category and in "all other" categories. I then rank states on the basis of the difference between these "own" and "all other" fractions. Finally, I categorize the top half of states according to this (relative) measure as having a strong union associated with the spending category in question. The measure is constructed such that a) half of the states are categorized as having a

Table 6: Summary Statistics for Fiscal Variables: 1987-2004

Variable	Obs.	Mean	Std. Dev.
Deficit Shocks and Rescissions ($ per capita)			
All States in Sample			
ΔOUTLAYS	429	-19	33
DEFSHOCK*1{DEFSHOCK > 0}	429	42	69
DEFSHOCK*1{DEFSHOCK <= 0}	429	-28	53
Strong Budget Rule States			
DEFSHOCK*1{DEFSHOCK > 0}	313	37	66
DEFSHOCK*1{DEFSHOCK <= 0}	313	-31	53
Weak Budget Rule States			
DEFSHOCK*1{DEFSHOCK > 0}	116	55	75
DEFSHOCK*1{DEFSHOCK <= 0}	116	-20	51
Broad Budget Categories ($ per capita)			
Non Welfare Current and Capital	429	1721	583
Non-Welfare Current	429	1384	474
Non-Welfare Capital	429	337	152
Total Capital	429	341	157
Non-Construction Capital	429	71	47
Major Functional Categories ($ per capita)			
Education	429	601	243
Health and Hospitals	429	245	100
Highways	429	287	125
Law Enforcement	429	136	51
Other	429	394	281
Utilities	429	35	87
Non-Utilities Other	429	359	258
Major Functions (Unionization Rates)			
Education		0.46	0.34
Health and Hospitals		0.44	0.29
Law Enforcement		0.51	0.32
Highways		0.55	0.28
Other		0.59	0.34

Note: The 429 observations in the table correspond to the observations for the years 1988-1994 and 2001-2004 for the 40 states presented in Table 5. The selection of years is driven by results presented in Table 7 and discussed in the text. The ΔOUTLAYS variable contains the mid-year budgetary rescissions reported by the National Association of State Budget Officers (NASBO). The DEFSHOCK variables are constructed using information on budget forecasts, state budget realizations, mid-year rescissions, and mid-year tax changes, with the final variable constructed as described in the text. All of these data are taken from semi-annual reports by NASBO. State spending across categories is defined as reported in Table 1 with one exception: the Other category from Table 1 has been divided into Law Enforcement and Other, with Utilities also being broken out of the Other category for purposes of the analysis repoted in Table 8. Information on unionization rates for public sector workers comes from the 1987 Census of Governments. Law Enforcement consists primarily of the corrections budget. Utilities include publicly own electric, gas, and water facilities and infrastructure as well as publicly owned mass transit systems.

(relatively) strong union for each spending category, and b) each state is categorized as having a strong union in 2 or 3 of the 5 spending categories.

4.4 Description of Fiscal Variables

The first section of Table 6 contains summary statistics for the deficit shocks and mid-year rescissions. The mid-year outlay changes in the sample averaged $19 per capita, with some observations exceeding $200. The variable equal to the deficit shock times an indicator for positive deficit shocks has a mean of $42 per capita including the zeroes and $78 excluding them. The variable equal to the deficit shock times an indicator for negative deficit shocks has a mean of -$28 per capita including the zeroes and -$59 excluding the zeroes.

Over the period in the sample, deficit shocks tended to be a bit larger in weak-rule states than in strong rule states, with mean positive deficit shocks of $55 in the former and $37 in the latter. This is likely driven by the relatively extensive reliance of states with weak budget rules on personal income taxation. Estimation concerns associated with the impact of differences in states' tax bases on their deficit shocks led me to check the robustness of all results to controlling for interactions between the deficit shock variables and the share of each states' revenues that come from taxes (results not shown). The inclusion of these controls does not substantively impact the results.

In this portion of the study, which only uses data from 1988 through 2004, I am able to break expenditures on Law Enforcement (primarily the corrections budget) out from the Other category from section 2. The breakdown of functional categories

into Education, Health, Highways, Law Enforcement, and Other is convenient as this can be matched with the information on public worker organizations from the 1987 Census of Governments. These are direct expenditures by state governments and do not include intergovernmental grants from state governments to local governments. Consequently, the Education category, which accounts for the largest share of non-welfare spending (slightly more than 1/3), primarily reflects spending on institutions of higher education as opposed to elementary and secondary education. Additionally, the Health category does not include payments related to Medicaid, which are categorized as public welfare expenditures.

5 Results

5.1 First Stage Regressions

Table 7 presents results describing the behavior of state governments in the face of unexpected fiscal shocks from 1988 through 2004. The table breaks the sample down into three periods, with 1988-1994 representing an initial period during which states experienced significant fiscal stress, 1995-2000 representing an expansionary period during which states experienced few positive deficit shocks, and 2001-2004 representing a second period of fiscal stress. The difference between the behavior of states with strict and weak budget rules is striking. From 1988 to 1994, strong-rule states enacted an average of 50 cents in budget cuts per dollar of deficit shock, while

weak-rule states enacted an average of only 10 cents in such cuts.[19] From 2001 to 2004, strong-rule states enacted an average of 34 cents in budget cuts per dollar of deficit shock, while weak-rule states enacted essentially no cuts.

Differences between estimates for the expansionary period versus the two periods of fiscal stress are substantial. Deficit shocks are generally un-predictive of state governments' mid-year actions during the 1995-2000 expansion. The point estimates for this period are not statistically distinguishable from zero and the interaction between budget rules and positive deficit shocks yields an economically large, wrong signed, and highly imprecisely estimated coefficient. The imprecision is driven by the fact that there are very few observations involving positive deficit shocks in states with weak budget rules during this period. These were also years when states were more likely to have surpluses left over from prior years, making it possible for them to balance their budgets with smaller mid-year spending reductions and tax increases. The measurement of deficit shocks may also be more error prone during expansionary years due to the absence of reporting on mid-year spending increases.[20] For some combination of these reasons, the budget rules lack predictive power during the expansionary period. Consequently, I focus solely on the periods of fiscal stress in my effort to decompose these cuts across budgetary categories. Most of the spec-

[19]This first result is quite close to being a replication of results reported by Poterba (1994), who studied the period extending from 1988 to 1992.

[20]This reflects some combination of institutional realities and measurement error. The rules for changing appropriations in response to adverse shocks differ from those for changing appropriations in response to favorable shocks. Increases in appropriations require legislation. In the face of unexpected deficits, however, many state governors are constitutionally empowered to impose budget cuts unilaterally. Hence while the variable is indeed right-censored, the degree to which this reflects measurement error is unclear.

Table 7: First Stage Regressions: Period by Period

	(1) ΔOutlays 1988-1994	(2) ΔOutlays 1995-2000	(3) ΔOutlays 2001-2004	(4) ΔOutlays 1988-1994 and 2001-2004
Weak Rules*DEFSHOCK*1{DEFSHOCK > 0}	0.397***	-0.912	0.336***	0.334***
	(0.0881)	(0.626)	(0.119)	(0.0803)
Weak Rules*DEFSHOCK*1{DEFSHOCK < 0}	-0.0244	0.111	-0.220	-0.0729
	(0.0459)	(0.0981)	(0.151)	(0.0632)
DEFSHOCK*1{DEFSHOCK > 0}	-0.502***	0.0506	-0.337***	-0.398***
	(0.0708)	(0.129)	(0.101)	(0.0633)
DEFSHOCK*1{DEFSHOCK < 0}	0.0577	0.00349	0.107	0.0679
	(0.0483)	(0.0120)	(0.137)	(0.0411)
State Fixed Effects?	Yes	Yes	Yes	Yes
State Specific Trends?	Yes	Yes	Yes	Yes
Year Effects?	Yes	Yes	Yes	Yes
Number of Observations	272	236	157	429

Note: ***, **, and * indicate statistical significance at the .01, .05, and .10 levels respectively. Standard errors, calculated allowing for arbitrary correlation at the state level, are in parentheses beneath each point estimate. In all columns, the sample contains the 40 states listed and classified as in Table 5. In columns 1 the years of the sample are 1988-1994, in column 2 the sample includes data from 1995-2000, in column 3 the sample includes data from 2001-2004, and in column 4 the sample pools the data used in columns 1 and 3.

ifications presented below use the specification in column 4 as their first stage. In column 4 the two periods of fiscal stress are simply stacked together. This is done fairly literally in the sense that, to assist with second-stage precision (which is generally in short supply), separate sets of state fixed effects and trends are included for each period of fiscal stress.[21]

5.2 Second Stage Results

Table 8 presents relatively detailed breakdowns of the impact of mid-year rescissions on spending across categories. All entries in the table correspond to point estimates and standard errors for γ_1 the coefficient on $\triangle Outlays$ from equation (7). In the first row I explore the distribution of budget cuts across the technical spending categories, where the sum of the non welfare current and capital expenditures in columns 2 and 3 add to the aggregate of non welfare current and capital expenditures from column 1. Cuts across these broad spending categories are not very precisely estimated. The point estimate of 1.1 in column 1 suggests that, on average, a dollar in budget cuts reported to NASBO does indeed correspond to a $1 reduction in discretionary spending. The standard error of roughly 0.6 reflects low power driven by some combination of the moderate size of the shocks used to generate variation, measurement error, and genuinely high variance in the behavior of states that claim to rescind $1 in spending. The numbers in brackets beneath the point estimates and standard errors correspond to each spending category's share of to-

[21] Estimation with a single set of state fixed effects and state-specific trends for the full sample period yields results that are qualitatively similar, but even less precisely estimated.

tal non welfare capital and current expenditures. The point estimates suggest that spending cuts are disproportionately loaded onto capital spending, and in particular onto capital spending outside of construction projects (which largely corresponds to maintenance and equipment purchases). Mid-year rescissions at the beginnings of recessions follow a pattern similar to that of spending adjustments over the full course of the business cycle, where capital expenditures exhibited greater cyclicality than other expenditures.[22]

In rows 2 and 3, I break discretionary spending into its functional categories. Rescissions appear across the board, with a disproportionately small share falling on Education and a disproportionately large share falling on the residual Other category. When I break this residual down into Utilities and Non-Utilities (primarily governmental administration), it becomes apparent that Utilities, in particular, bear a disproportionately large share of rescissions.

The results suggest that, in general, spending categories associated with lumpy, one-time commitments bear a disproportionate share of rescissions. I further illustrate this phenomenon in Figure 4. To produce Figure 4 I divided the aggregate of Non Welfare Current and Capital spending into 12 categories, namely the current and capital accounts of Education, Health, Highways, Law Enforcement, Utilities, and the remainder. For each category I then estimated the coefficient γ_1 as for Table 7, then scaled them so that a coefficient of 1 would correspond to a rescission exactly in proportion to a category's share of the total. I then plotted each category's scaled γ_1 against its coefficient of variation (CV), which I calculated within states

[22]Recall from Section 2 that this was particularly true of states that have either annual budgetary or annual legislative cycles, which are the only states in the sample used for this section's analysis.

Table 8: Relationship Between Mid-Year NASBO Budget Changes and Spending as Measured in the Census of Governments

	(1)	(2)	(3)	(4)	(5)
Technical Budget Categories	Non Welfare Current and Capital	Non-Welfare Current	Non-Welfare Capital	Total Capital	Non-Construction Capital
	1.104*	0.716	0.388*	0.374*	0.171*
	(0.598)	(0.436)	(0.222)	(0.218)	(0.0887)
	[1.000]	[0.804]	[0.196]	[0.198]	[0.041]
Large Functional Categories	Education	Health and Hospitals	Law Enforcement	Highways	
	0.187	0.116	0.0365	0.132	
	(0.180)	(0.127)	(0.0372)	(0.129)	
	[0.349]	[0.142]	[0.079]	[0.167]	
Breakdown of Other	Other	Utilities	Non-Utilities Other		
	0.644	0.208***	0.436		
	(0.393)	(0.0683)	(0.371)		
	[0.229]	[0.020]	[0.209]		

Note: ***, **, and * indicate statistical significance at the .01, .05, and .10 levels respectively. Standard errors, calculated allowing for arbitrary correlation at the state level, are in parentheses beneath each point estimate. The numbers reported in brackets represent each dependent variable as a share of total Non Welfare Current and Capital (i.e., the first dependent variable). The sample consists of the 429 observations whose summary statistics were presented in Table 6. Each table entry represents the coefficient on ΔOUTLAYS from the 2nd stage results of Two-Stage-Least-Squares (2SLS) estimation. The first stage of the relevant specification is reported in column 4 of Table 7. The interactions between an indicator for weak budget rules and the two DEFSHOCK variables are the excluded instruments. The dependent variables are real per capita spending in the categories named at the top of each column, with the categories constructed as described in the notes to Tables 1 and 6. Specifications also include controls for the main effects of the two DEFSHOCK variables (results not shown).

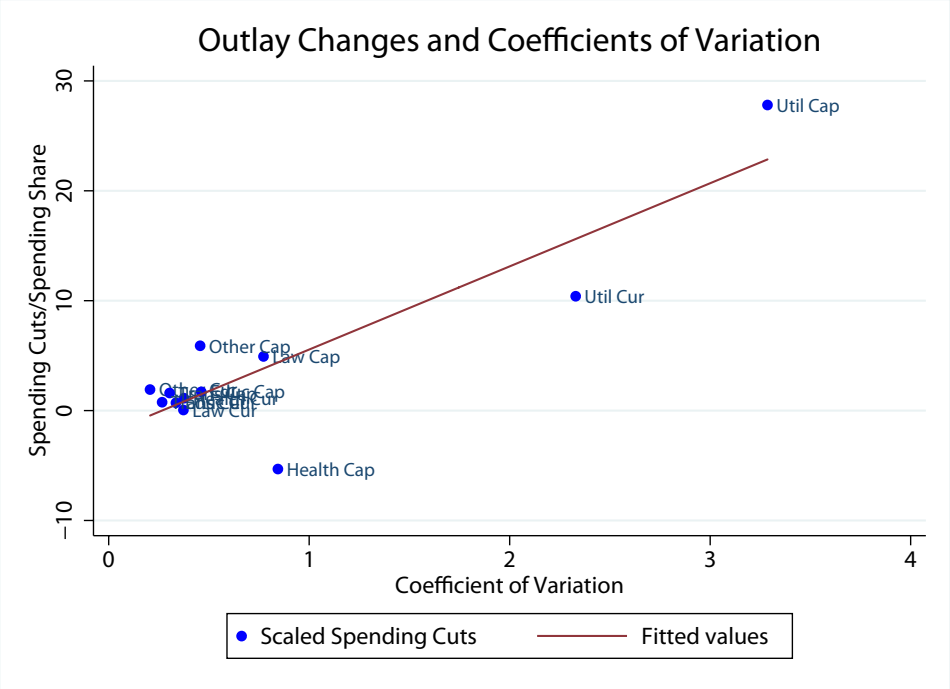

Figure 4: **Outlay Changes and Coefficients of Variation.** Y-axis values are coefficients estimated in the same manner as the estimates presented in Table 7, but taken separately for the capital and current accounts of spending on education, health, highways, law enforcement, utilities, and other, with each coefficient scaled by the inverse of its share of the total spending outside of insurance trusts and safety-net programs. The x-axis values are the coefficients of variations (CVs) for each spending category, with CVs calculated for each state over time, then averaged across states.

over time, then averaged across states. The positive correlation between the rescission coefficients and CVs confirms that rescissions fall disproportionately on spending categories characterized by significant variation within states across time.[23] The figure changes little if the spending variables are de-trended prior to construction of

[23]The categories with notably large CVs correspond to the current and capital components of utilities, while the outlier with a negative rescission coefficient results from an imprecisely estimated coefficient on the capital portion of the budget for health and hospitals, which is quite small as a share of total spending.

the CVs. The results described above, as well as those in the following section, are robust to directly controlling the level of real per capita income as well as controlling for interactions between the deficit shocks and the share of each state's revenue that comes from taxation.[24]

5.3 Sources of Cross-State Variation in the Distribution of Rescissions

I explore two plausibly important sources of variation in the composition of rescissions across states. In results not shown, I find no evidence that the political composition of state governments exerts a significant impact on the composition of rescissions. The results in this instance were not sufficiently precise to be regarded as strong evidence against the presence of such effects.

I also investigate the importance of public-sector union groups. In specifications similar to the standard first-stage specifications, I find no evidence that the presence of strong unions reduces the total quantity of rescissions enacted per dollar of deficit shock (results not shown). The specifications presented below investigate the effects of differences in the relative strength of the union groups within a state. Having found that unions exert no impact on the quantity of rescissions, I investigate their impact on the composition of the cuts enacted. The relative strength of the public-sector worker organizations appears to be a significant determinant of cross-state

[24]The latter control is potentially important because states with weak budget rules also tend to rely relatively extensively on taxation, making it possible that deficit shocks will have different implications for the positions of state budgets in the two groups of states.

variation in the composition of mid-year rescissions.

I first present the union results in Table 9 on a category-by-category basis. Since I only have cross-sectional variation in the relative strength of public-sector unions, the category-by-category analysis amounts to dividing states along union-strength lines in addition to along budget-rule lines. This leaves a fairly small number of states in each cell. Across all 5 spending categories, the results suggest that smaller rescissions take place when the relevant worker group is relatively strong. While consistent across the categories, however, the results are not statistically strong in any one case. This pushes me towards specifications that stack the categories, yielding observations at the state-by-category-by-year level. These specifications more fully utilize the available variation in worker organizations, which occurs at the state-by-category level.

Table 10 presents both first and second stage results for specifications that utilize observations at the state-by-category-by-year level. Columns 1 and 2 report results for the first stage on $\triangle Outlays$ and on the interaction between the union indicator and $\triangle Outlays$. In these columns I include the instruments involving both the positive and negative deficit shock variables. I drop the negative deficit shock instruments in Columns 5 and 6. Dropping these instruments leads the Kleibergen-Paap rk Wald Statistic to increase from 4.41 to 8.34. This exceeds standard weak instrument thresholds for tests of distortion to the size of the estimated confidence intervals in the case of two endogenous regressors and two instruments. Results from Stock and Yogo (2002) imply that the specifications should be run using Limited Information Maximum Likelihood (LIML) to confirm that estimation using Two Stage Least

Table 9: Outlay Changes and Relative Union Strength by Spending Category

	(1)	(2)	(3)	(4)	(5)
	Education	Health and Hospitals	Law Enforcement	Highways	Other
ΔOUTLAYS	0.494***	0.268	0.0778	0.156	0.749*
	(0.189)	(0.171)	(0.0475)	(0.122)	(0.455)
ΔOUTLAYS*1{Strong Education Union}	-0.351				
	(0.228)				
ΔOUTLAYS*1{Strong Health & Hospital Union}		-0.288			
		(0.192)			
ΔOUTLAYS*1{Strong Police Union}			-0.128*		
			(0.0767)		
ΔOUTLAYS*1{Strong Highway Worker Union}				-0.152	
				(0.338)	
ΔOUTLAYS*1{Strong "Other" Union}					-0.451
					(0.500)
State Fixed Effects and Year Effects?	Yes	Yes	Yes	Yes	Yes
State Specific Trends?	Yes	Yes	Yes	Yes	Yes
Observations	429	429	429	429	429

Note: ***, **, and * indicate statistical significance at the .01, .05, and .10 levels respectively. Standard errors, calculated allowing for arbitrary correlation at the state level, are in parentheses beneath each point estimate. The regressions shown are the 2nd stage results of Two-Stage-Least-Squares (2SLS) estimation. As in Table 8, the sample corresponds to the sample whose summary statistics were presented in Table 6 and that was used in the first stage regression reported in column 4 of Table 7. The excluded instruments are the interactions between a weak-budget-rules indicator and the two DEFSHOCK variables as well as interactions between the weak-budget-rules indicator, the two DEFSHOCK variables, and the relevant indicator for the presence of a strong public sector worker union. The main effect of ΔOUTLAYS and the interaction between ΔOUTLAYS and the union indicator are both treated as endogenous variables. The specification thus involves separate first stage regressions for generating predicted values of each of these variables. The main effects of the two DEFSHOCK variables, as well as interactions between the two DEFSHOCK variables and the relevant indicator for the presence of the strong union were also included as controls. The dependent variables are the real per capita spending quantities of the categories named at the top of each column. These variables were constructed using data from the ASSGF as previously described. The strong union indicators were constructed using data on public sector worker organization from the 1987 Census of Governments. A state is said to have a strong union for a particular category of spending when the fraction of workers relevant to that category is large relative to the fraction of workers unionized in other categories.

Squares (2SLS) does not result in downwardly biased standard errors.

Second stage estimates of the effect of strong unions on budget cuts appear in columns 3,4, 7 and 8. The specifications in columns 3 and 4 are, respectively, 2SLS and LIML specifications which take columns 1 and 2 as their first stages. The specifications in columns 7 and 8 are 2SLS and LIML specifications which take columns 5 and 6 as their first stages. The stacked results confirm what was observed in Table 8. Most mid-year budgetary rescissions occur in categories associated with relatively weak public-sector worker organizations. Neither the point estimates nor the standard errors are affected by the various specification changes.

In results not shown, estimates suggest that the differential cuts associated with weakly unionized workers occur primarily in the capital component of each category's budget. Mid-year budget cuts do not appear to have significant effects on public-sector wages. As shown earlier in Table 6, capital expenditures bear a disproportionate share of mid-year cuts, consistent with capital expenditures being the most readily deferrable or reducible expenditures on relatively short notice.

Other results not shown suggest relatively strong effects of public-sector unions for the period of fiscal stress running from 1988 to 1994 than that running from 2001 to 2004. This may reflect the fact that the strong-union designation is based on data from 1987, making it more informative regarding the state of public worker organizations during the earlier period. In other specifications, I have obtained results with similar implications when specifying the union variables continuously. This includes generating a continuous measure of the relative unionization rates as well as controlling separately for the fraction of workers unionized in each spending category's

Table 10: Scaled Outlay Changes and Relative Union Strength: Stacked Spending Categories

	(1) ΔOUTLAYS	(2) ΔOUTLAYS *1{Union}	(3) Spending	(4) Spending	(5) ΔOUTLAYS	(6) ΔOUTLAYS *1{Union}	(7) Spending	(8) Spending
ΔOUTLAYS			1.392**	1.396**			1.432**	1.432**
			(0.620)	(0.621)			(0.645)	(0.645)
ΔOUTLAYS*1{Strong Union}			-0.941**	-0.944**			-0.914**	-0.914**
			(0.421)	(0.422)			(0.436)	(0.436)
Weak Rules*DEFSHOCK	0.341***	0.0334*			0.328***	0.0284		
*1{DEFSHOCK > 0}	(0.0614)	(0.0188)			(0.0595)	(0.0173)		
Weak Rules*DEFSHOCK	-0.0735	-0.0150						
*1{DEFSHOCK < 0}	(0.0556)	(0.0281)						
Weak Rules*1{Strong Union}	-0.0203	0.236***			-0.0222	0.235***		
*DEFSHOCK*1{DEFSHOCK > 0}	(0.0262)	(0.0582)			(0.0266)	(0.0582)		
Weak Rules*1{Strong Union}	0.00208	-0.0264						
*DEFSHOCK*1{DEFSHOCK < 0}	(0.0156)	(0.0231)						
State Fixed Effects and Year Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
State-Specific Trends	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Estimator			2SLS	LIML			2SLS	LIML
Kleibergen-Paap rk Wald F-Statistic			4.41	4.41			8.34	8.34

Note: ***, **, and * indicate statistical significance at the .01, .05, and .10 levels respectively. Standard errors, calculated allowing for arbitrary correlation at the state level, are in parentheses beneath each point estimate. The regressions shown are the 1st and 2nd stage results of instrumental variables specifications using interactions between a weak-budget-rules indicator and the DEFSHOCK variables, as well as interactions between a weak-budget-rules indicator, the DEFSHOCK varibles, and a strong-union indicator as excluded instruments. The main effects of the two DEFSHOCK variables, as well as interactions between the two DEFSHOCK variables and the indicator for the presence of a strong union were also included as controls (results not shown). Observations are at the spending category-by-state-by-year level, resulting in 2145 observations (the 429 observations from the previous tables times 5 spending categories). The dependent variable was constructed through the following transformation of real per capita spending in each of the relevant spending categories (i.e., in Education, Health & Hospitals, Highways, Law Enforcement, and Other). First, the real per capita spending amounts were scaled by the inverse of each category's share of Total Non-Welfare Current and Capital spending (with the average taken at the year-by-nation level). Second, the spending quantities were demeaned and de-trended at the state-by-category level. An implication of this initial demeaning and de-trending is that the presented results are little changed by the inclusion or exclusion of year effects, state fixed effects, and state-specific trends. Columns 1 and 2 present the coefficients on the excluded instruments from the two first stage regressions preceding the second stage estimates that appear in columns 3 and 4. The specification in column 3 was estimated using Two-Stage-Least-Squares (2SLS). The specification in column 4 is equivalent to column 3, but estimated using Limited Information Maximum Likelihood (LIML). The specifications in columns 5-8 are equivalent to those in columns 1-4, but with the set of excluded instruments restricted to include the interactions involving positive deficit shocks.

"own" and "all other" worker categories.

The union result fades out in the subsequent fiscal year. While the results are insufficiently precise to draw strong conclusions, this is consistent with public unions having differential influence over the allocation of mid-year rescissions to already enacted budgets than over spending as determined in the subsequent appropriations cycle. In many states, the governor is authorized to dictate rescissions unilaterally when revenues come in lower than projected. Appropriations, on the other hand, must be approved by state legislatures. The results are thus consistent with models in which interest groups can more effectively lobby in the face of a single, executive actor than in the face of relatively dispersed power as under a legislature.

6 Conclusion

The above analysis draws out a variety of facts regarding the behavior of state governments over the course of the business cycle. Economic downturns are associated with reductions in discretionary spending on infrastructure, education, other state government services, and transfers to local governments. These fluctuations tend to be most severe in states that utilize relatively volatile revenue bases and budget over relatively brief windows.

Pro-cyclical spending reflects the reality of complying with balanced budget requirements during recessions after failing to save during expansions. Confronted with the need to make cuts, states appear to proceed so as to limit disruptions to public-service provision. This was reflected in the disproportionate share of cuts

borne by capital expenditures and by budgetary categories that are likely to contain deferrable projects. Finally, I find evidence that interest groups can play an influential role in the budget-cutting process; public-sector unions, in particular, appear adept at avoiding mid-year rescissions.

The pro-cyclicality of discretionary spending almost certainly comes with significant costs. Conducting capital projects during expansions will cost more than conducting them during recessions (due to high wages and other input costs) and may contribute to the severity of the business cycle. Cyclical spending also implies service flows that are more volatile than necessary. An interesting direction for future work will be to estimate the effect of these fluctuations on targeted outcomes, in particular outcomes related to safety-net programs and education.[25] Spending reductions driven by differences in the volatility of state revenue bases may be an attractive source of variation for studying the effects of these cyclical changes.

The relatively extreme volatility of spending in states that rely extensively on taxation has potentially interesting distributional implications. In these states, additional pro-cyclicality in spending comes with additional counter-cyclicality in revenue collections. On net, these countervailing forces have an ambiguous implication for the volatility of the state's economy. However, spending and tax collections can affect very different groups of people. Counter-cyclical revenue collections will most directly affect high income tax payers while volatile expenditures will most directly affect public workers and the beneficiaries of public services. Investigation of how

[25]The observed cyclical patterns will affect all levels of education, as changes in state grants to localities affect primary and secondary education while state governments' direct expenditures affect higher education.

these groups are affected by differences in the volatility to which they are exposed (e.g., in terms of their consumption over the business cycle), may be an interesting direction for future work.

A final question of interest, to the extent to which pro-cyclical spending is costly, is why states do not take more steps to avoid it. Standard explanations look to political factors (e.g., upcoming elections) that may lead politicians to discount the costs of future deficits (or volatility) in exchange for short-run political gain. The extent to which fiscal institutions mitigate or exacerbate these political tendencies has clear importance. Of equal importance, but more difficult to ascertain, are the extent to (and channels through) which such institutions influence the efficiency with which government services are produced.

References

ACIR (1987): "Fiscal Discipline in the Federal System: National Reform and the Experience of the States," Discussion Paper A-107, Advisory Commission on Intergovernmental Relations.

Bohn, H., and R. Inman (1996): "Balanced-budget rules and public deficits: Evidence from the US states," in *Carnegie-Rochester Conference Series on Public Policy*, vol. 45, pp. 13–76. Elsevier.

Chodorow-Reich, G., L. Feiveson, Z. Liscow, and W. Woolston (2012): "Does state fiscal relief during recessions increase employment? Evidence from the American Recovery and Reinvestment Act," *American Economic Journal: Economic Policy*, 4(3), 118–145.

Clemens, J., and S. Miran (2012): "Fiscal Policy Multipliers on Subnational Government Spending," *American Economic Journal: Economic Policy*, 4(2), 46–68.

Fatás, A., and I. Mihov (2003): "The Case for Restricting Fiscal Policy Discretion*," *Quarterly Journal of Economics*, 118(4), 1419–1447.

——— (2006): "The macroeconomic effects of fiscal rules in the US states," *Journal of Public Economics*, 90(1-2), 101–117.

Feiveson, L. (2011): "General Revenue Sharing and Public Sector Unions," Discussion paper, Mimeo, Massachusetts Institute of Technology.

Follette, G., A. Kusko, and B. Lutz (2009): *State and local finances and the macroeconomy: the high-employment budget and fiscal impetus*. Divisions of Research & Statistics and Monetary Affairs, Federal Reserve Board.

Grembi, V., T. Nannicini, and U. Troiano (2011): "Do Fiscal Rules Matter? A Difference-in-Discontinuities Design," Discussion paper, Harvard Economics Department Working Paper.

Hou, Y., and D. Smith (2006): "A framework for understanding state balanced budget requirement systems: Reexamining distinctive features and an operational definition," *Public Budgeting & Finance*, 26(3), 22–45.

Krol, R., and S. Svorny (2007): "Budget rules and state business cycles," *Public Finance Review*, 35(4), 530.

Levinson, A. (1998): "Balanced budgets and business cycles: Evidence from the states," *National Tax Journal*, 51, 715–732.

——— (2007): "Budget Rules and Business Cycles: A Comment," *Public Finance Review*, 35(4), 545–549.

Lowry, R. (2001): "A visible hand? Bond markets, political parties, balanced budget laws, and state government debt," *Economics & Politics*, 13(1), 49–72.

Poterba, J. (1994): "State responses to fiscal crises: Natural experiments for studying the effects of budgetary institutions," *Journal of Political Economy*, 102(4), 799–821.

Poterba, J. (1997): "Do budget rules work?," *NBER Working Paper 5550*.

Poterba, J., and K. Rueben (2001): "Fiscal News, State Budget Rules, and Tax-Exempt Bond Yields* 1," *Journal of Urban Economics*, 50(3), 537–562.

Serrato, J., and P. Wingender (2010): "Estimating local fiscal multipliers," *University of California at Berkeley, mimeo*.

Shoag, D. (2010): "The Impact of Government Spending Shocks: Evidence on the Multiplier from State Pension Plan Returns," Discussion paper, Harvard University, mimeo.

Snell, R. (2010): "Annual and biennial budgeting: The experience of state governments," in *National Conference of State Legislatures: Issue Areas-Budget and Tax*.

Sorensen, B., L. Wu, and O. Yosha (2001): "Output fluctuations and fiscal policy: US state and local governments 1978-1994," *European Economic Review*, 45(7), 1271–1310.

Stock, J., and M. Yogo (2002): "Testing for weak instruments in linear IV regression," *NBER Technical Working Paper 0284*.

Wilson, D. (2012): "Fiscal Spending Jobs Multipliers: Evidence from the 2009 American Recovery and Reinvestment Act," *American Economic Journal: Economic Policy*, 4(3), 251–282.