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STOP US BEFORE WE SPEND AGAIN: INSTITUTIONAL CONSTRAINTS ON GOVERNMENT SPENDING

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A distributive politics model establishes that the presence of exogenously enforceable spending limits reduces spending and that the effect of executive veto authority is contingent on whether spending is capped and whether the chief executive is a liberal or conservative. Surprisingly, when spending limits are in place, governments with conservative executives spend more than those with more liberal chief executives. Limits are welfare improving, as is the executive veto when it leads to the building of override coalitions. Using 32 years of US state budget data, this paper also establishes empirically that strict balanced budget rules constrain spending and also lead to less pronounced short-term responses to fluctuations in a state's economy. Party variables like divided government and party control of state legislatures tend to have little or no direct effect, with political institutions and economic indicators explaining much of the variation in state spending.

> It is a cry for help – to stop us before we spend again. We just cannot keep doing this to future generations.
>
> (Senator Charles Robb, D-VA, speaking in favor of a balanced budget amendment to the US Constitution; see Robb, 1994)

1. INTRODUCTION

THE INFLUENCE of political institutions on government spending is evident in recent estimates of state budget deficits. Even though all states except for Vermont have balanced budget laws on the books, most predicted deficits for fiscal year 2004 (Lav and Johnson, 2003). While ultimately these predictions proved to be overly pessimistic, they are instructive. States with stricter balanced budget requirements were predicting deficits that were 20% lower as a percent of their budgets than states with weaker rules. In the last three decades, ''stricter'' states spent about 10% less than their more lenient counterparts. These figures suggest that institutions may introduce important variations in public expenditure patterns.

In this paper, I model two institutions: spending limits and executive veto authority. The results are important not only for what they tell us about

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budgeting but for what they imply more generally about the importance of studying institutions in a rich decision-making environment. The unintended consequences so often observed after reform may reflect little more than a failure to understand the interplay of institutions. In the model, the effects of spending limits (a.k.a. budget caps) and veto rights are linked. The central results shed light on existing institutional frameworks as well as budgetary reform efforts.

The major contribution of this paper is to use game theory to offer a theoretical link between budget rules and government spending. The model shows that limits on spending are effective and improve the legislature's welfare, but that the impact of executive veto authority on spending depends on whether a cap is in place and on the ideology of the chief executive. Perhaps unsurprisingly, in the absence of a spending limit, spending declines when a conservative executive replaces a liberal. However, when a cap is in place, the conservative executive induces *greater* spending than his liberal counterpart. Conservative executives, who can credibly threaten to veto legislation, improve legislative welfare in both cases. Liberal executives, who never veto legislation, have no impact on spending or legislative welfare.

The relationships implied by the theory are then explored in a data analysis of the US states that spans over three decades. Previous research on this subject has typically worked with fewer years of data or has not been informed by a strong theoretical foundation. In this analysis, I find strong evidence that balanced budget rules lead to lower spending in the states. In addition, contrary to previous work, partisan factors such as divided government and the composition of state legislatures have little influence on total spending, once institutional and economic factors are accounted for.

2. INSTITUTIONS IN BUDGETARY POLITICS

2.1 The Distributive Politics Problem

One approach to studying spending is to examine bargaining in a distributive politics framework. Distributive goods benefit a particular geographic region but are funded out of general revenues, and they are sometimes derisively referred to as "pork-barrel" projects. Legislators in such a framework have an incentive to maximize the value of the distributive good in their districts and minimize spending in other districts. In addition, legislators will prefer projects that are larger than efficient, since their districts do not absorb the full costs of projects.

In the distributive politics literature, political scientists and economists have focused their attention on who gets what (e.g. Balla et al., 2002; Baron, 1991; Buchanan and Tullock, 1962; Carrubba and Volden, 2000; Riker, 1962; Weingast, 1979), whether projects are efficient (e.g. Baron, 1991, 1993; DelRossi and Inman, 1999; Weingast et al., 1981), and how legislative

organization affects outcomes (e.g. Baron, 1989; Baron and Ferejohn, 1989). The well-developed theory of distributive politics makes this framework ideal for examining the effects of some key real-world institutions on spending outcomes. This paper focuses on two of these institutions.

2.2 The Spending Limit

A legislature may be able to set a spending limit, or budget cap, in advance of the allocation of projects. To the best of my knowledge, this is the first distributive politics model that has explored the effect of this institution.[1] In fact, most distributive politics theories do not analyze total spending. Typically, the pie is either fixed (i.e. a divide-the-dollar game in which legislators determine how to split a dollar across districts) or spending is a byproduct of project selection.

Many governments are required to abide by such limits to some degree. For example, as McKinnon and Nechyba (1997) discuss, American states face a hard constraint because they cannot mint money, cannot expect to be bailed out by the federal government, and will face an exodus if they mismanage the budget.[2] Further, many states have strict balanced budget requirements, such that any end-of-year deficits must be eliminated immediately and cannot be carried over to the next fiscal year.[3] Several scholars have also argued that state bondholders will hold the state accountable if fiscal mismanagement occurs.[4]

Bohn and Inman (1996) demonstrate that states with balanced budget requirements subject to enforcement from elected state high courts tend not to run deficits in the general fund, and in fact often run surpluses. Similarly, Eichengreen (1994) and Eichengreen and Bayoumi (1994) demonstrate that states with more stringent budget rules tend to have lower deficits (or higher surpluses), though they find no relationship between these rules and the level of spending. Alesina and Bayoumi (1996) find that stricter fiscal rules tend to reduce deficits, though von Hagen (1991) argues that fiscal restraints have a limited effect on state debt. Poterba (1994) finds that stricter balanced budget rules lead states to react more effectively to unanticipated deficits.

[1]Ferejohn and Krehbiel (1987) use a social choice framework to examine the effect of institutional arrangements on budget size; they show that rules are not neutral with respect to budgetary outcomes.

[2]This hints at the interjurisdictional competition that occurs between states on fiscal policy. As Case et al. (1993) show, state expenditures are influenced by outlays of similar states. While beyond the scope of this paper, whether this competition translates over to budget rule enforcement is an important question.

[3]Of course, states can engage in accounting tricks as much as any other entity.

[4]For example, Poterba and Rueben (1999) demonstrate that states with stricter budget rules have lower costs of borrowing, and Bayoumi et al. (1995) find that "credit markets do appear to provide incentives for sovereign borrowers to restrain borrowing." Lowry and Alt (2001) argue that balanced budget laws help bond markets better keep state government fiscal policies in check.

2.3 *The Executive Veto*

Existing work has for the most part also failed to consider the effects of an executive with veto authority, a key feature of budget-making. Some exceptions exist. For instance, McCarty (2000) extends Baron (1991) and shows that an executive with preferences over the division of the distributive pie can affect both the size and composition of winning coalitions. In addition, Fitts and Inman (1992) and Inman and Fitts (1990) argue that presidents can utilize resources at their disposal to overcome the universalistic (and inefficient) tendencies of the legislature. Commitment to a particular position is central to this ability. The veto is clearly an important institution because it alters bargaining both within a legislature and between branches of government. I model the veto as applying to the entire budget.[5] Since executive preferences are given with respect to total spending, not its allocation, the model is internally consistent, and it captures the view that the executive is often interested in the "big picture" of spending rather than on individual line items.[6]

3. THE MODEL

3.1 *Actors and Preferences*

This model is based on Baron (1993). In the rest of the paper, I refer to it as the baseline model. A legislature L is comprised of n identical legislators, where n is odd for convenience, who have preferences over a vector of district-specific projects $\mathbf{X} = (x_1\ x_2\ x_3 \ldots x_n)$, $x_i \in [0, \infty)$, indexed by $i \in \{1, 2, 3, \ldots, n\}$. The net benefits of a project for a legislator in district i are

$$bx_i - \tfrac{1}{2}cx_i^2, \quad b > 0,\ c > 0.^7$$

[5]In many states, governors possess line-item veto authority in addition to the ability to veto entire pieces of legislation. The item veto allows them to strike or reduce individual items from a budget. Most studies have found little evidence for its importance in influencing total spending (e.g. Carter and Schap, 1990; Holtz-Eakin, 1988; Nice, 1988). See Masia (1995), though, for an argument that the composition of spending may be affected by this institution. De Figueiredo (2003) provides an explanation for the decision of a state to adopt the item veto authority. While an exploration of the item veto's adoption and effect is worthwhile, for analytical tractability I do not consider item veto authority.

[6]For instance, the Cato Institute, a Washington DC think tank, issues an annual "Fiscal Policy Report Card on America's Governors" which, as the title suggests, directly links overall spending in the states with the governors.

[7]This functional form, also used in Baron (1993), implies that the type of good being distributed is closer to a private than a public good. This is a plausible assumption if we think of traditional "pork-barrel" projects that benefit a narrow group of individuals in a district. See Primo and Snyder (2005) for a discussion of how functional forms affect the relationship between legislature size and government spending.

The social net benefit (i.e. social welfare) function for the legislature is

$$\sum_{j=1}^{n} bx_j - \tfrac{1}{2}c\sum_{j=1}^{n} x_j^2.$$

The social net benefit function implies that the optimal project scale is b/c for each district and that the net benefits of a project decline monotonically as projects move away from b/c (i.e. the function is single-peaked).[8]

Because the cost function $\frac{1}{2}cx_i^2$ is convex in project size and there are no fixed costs, a set of smaller projects that collectively total size z will be less expensive combined than one large project of size z. In the case of the function x^2, this is easily seen by noting that the square of a sum of two positive numbers must be greater than the sum of squares. This fact, combined with a linear benefit function, suggests that a set of smaller projects summing to one produces larger social net benefits than one large project of size one. For instance, in a five-member legislature with $b = c = 1$, awarding a project of size one to every district produces a social net benefit of 2.5. But if a project of size five is given to one legislator and no projects are awarded to any other legislators, then the total social benefit is -7.5.

The benefits of the projects do not spill over into other districts (i.e. no positive externalities are present), and districts share the total cost of projects equally. Therefore, the net benefits from $\mathbf{X}$ for legislator i are

$$NB_i(\mathbf{X}) = bx_i - \frac{1}{2n}c\sum_{j=1}^{n} x_j^2.$$

Given this function, legislator i's ideal vector of projects consists of $x_i = nb/c$ and $x_j = 0$, $\forall j \neq i$. Legislators prefer projects that are larger and more expensive than the efficient level, b/c, exemplifying the distributive politics problem.

3.2 Legislative Organization

A legislature L must select a vector of projects $\mathbf{X} = (x_1\ x_2\ x_3\ \ldots\ x_n)$. The game is an infinite-horizon bargaining model with the following structure. At the beginning of every period, nature selects a legislator at random to serve as an agenda setter, who is referred to by the pronoun "she." Each legislator's probability of being selected is $1/n$. The agenda setter makes a proposal which consists of a project for each district, with a possible project size being zero. Let x represent the size of the proposer's project, and y the

[8]Put another way, marginal utility is declining in project size (as evidenced by a negative second derivative of the net benefit function). For example, suppose that $b = c = 1$. Then the optimal project size is 1, which provides a social net benefit $1 - 0.5 = 0.5$. The social marginal benefit from moving from a size 0 project to a size 0.5 project is $\frac{3}{8}$, but the marginal utility of moving from a size 0.5 project to a size 1 project is only $\frac{1}{8}$.

size of projects for those members who receive an offer from the proposer (termed "coalition members" and individually referred to by the pronoun "he"). By symmetry, in equilibrium y will be the same for all members who receive a project. The legislature, operating under a closed rule (i.e. no amendments allowed), then votes on the proposal by simple majority rule.[9] If the proposal receives at least $(n+1)/2$ votes, it is accepted, and the game ends. If the proposal is rejected, nature selects a new agenda setter at random, and she offers a new proposal. The game continues indefinitely until an agreement is reached. For simplicity, I set the discount factor for the legislators to one.[10]

3.3 Equilibrium Concept

This game has infinitely many Nash equilibria; I focus on a subset of these. The equilibrium concept is subgame-perfect Nash restricted to the consideration of stationary strategies, in which players must take the same actions at every node in which the game is structurally identical.[11] This means that in every period, the same equilibrium offers will be made.[12] This equilibrium, in addition to being intuitive, is also analytically tractable and is the most common one presented in games of this type. A legislator who is indifferent between voting for or against a proposal is assumed to vote for it. To eliminate equilibria that involve legislators voting against legislation that gives them higher utility than the alternative or voting for legislation that gives them lower utility than the alternative, weakly dominated strategies are also ruled out.

[9]Admittedly open rules are far more common in legislatures than closed rules. In this model, a closed-rule solution is more tractable analytically. In addition, the nature of the relationship between spending, expected net benefits, vetoes, and coalition sizes is generally the same in the open-rule and closed-rule versions of the model. For further details on the open rule, see Primo (2005).

[10]Baron (1993) discusses the effect of changes in the discount factor on equilibrium outcomes. This is not central to the analysis here, which is focused on how institutional arrangements change coalition size and budget size. The main results are unchanged by allowing δ to vary, and the more general version is presented in Primo (2005).

[11]See Baron and Kalai (1993) for a discussion of the "focal quality" of the stationary equilibrium. They show that the stationary equilibrium is the "simplest" equilibrium of a Baron and Ferejohn (1989) game with infinitely many subgame-perfect Nash equilibria, with "simplest" having a technical definition discussed in detail in their paper.

[12]Also, the structure of this game implies that the ex ante expected net benefit in the game will be equal to the net benefit realized by a member of the coalition. This holds in the case where $\delta = 1$. The continuation value for a coalition member under simple majority rule will be

$$\frac{1}{n}bx + \frac{n-1}{2n}by - \frac{c}{2n}\left(bx^2 + \frac{n-1}{2}y^2\right).$$

But this is equivalent to the expected net benefit of the game. Unless otherwise noted, when I refer to net benefits, this can be taken to mean either the expected value of the game ex ante for all legislators or the actual benefits received by a member of the winning coalition.

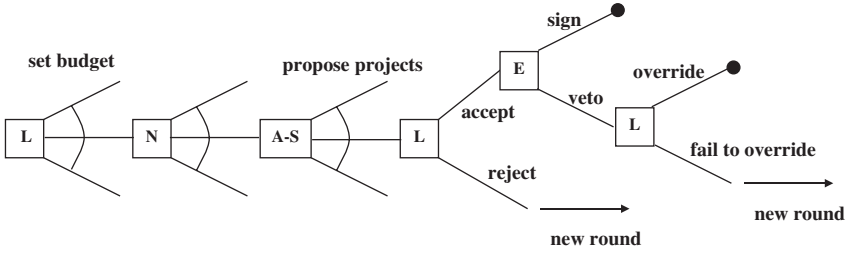

Figure 1. Representation of extensive form in full model. N, nature; A-S, agenda setter; L, legislature voting; E, executive.

I add two features to this setup. First, I allow the legislature to select a cap on spending before the agenda setter is known. The agenda setter must propose a set of projects that does not exceed the spending limit. Then, I include an executive with preferences over total spending. After an allocation passes, the executive can sign or veto the legislation, and the legislature can override a veto with a supermajority of $s \geq (n+1)/2$ legislators. If a veto is successful, the legislature selects a new budget and the game begins again. Figure 1 is a representation of the extensive form. I now turn to the equilibrium results.

In order to demonstrate precisely how each institution affects equilibrium outcomes, I consider the following cases:

1. A Majority Rule Legislature (Baseline Model).
2. A Majority Rule Legislature with a Spending Limit.
3. A Majority Rule Legislature and an Executive with Veto Authority.
4. A Majority Rule Legislature, a Spending Limit, and an Executive with Veto Authority (Full Model).

3.4 Equilibria

Proposition 1 (Baron, 1993, Baseline Model). The subgame-perfect Nash equilibrium in stationary strategies is as follows. In every period, the agenda setter proposes $y^* = b/c$ to $(n-1)/2$ legislators and $x^* = [(n+1)/2](b/c)$. In every period, those members who receive an offer of at least y^* vote for it, and all other legislators vote against it. The agenda setter accepts offers of at least y^*, and since $x^* > y^*$, the agenda setter votes for the proposal.

A summary of the equilibrium values can be found in Table 1. Define the budget I as the cost of the projects, or $(c/2)(x^2 + [(n-1)/2]y^2)$. In this case, $I = [b^2(n^2 + 4n - 1)]/[8c]$. Three features of this result merit further discussion: (a) the agenda setter receives a much larger project than her supporters, (b) the net benefits for coalition members are negative in equilibrium, and (c) coalition members receive an efficient project.

TABLE 1 EQUILIBRIUM VALUES OF COALITION SIZE, y, x, SPENDING, AND EXPECTED NET BENEFITS FOR THE MODELS

	Baseline model (majority rule)	Spending limit	Liberal executive with veto	Conservative executive with veto	Liberal executive with veto and limit	Conservative executive with veto and limit
Coalition size	$\frac{n+1}{2}$	$\frac{n+1}{2}$	$\frac{n+1}{2}$	s	$\frac{n+1}{2}$	s
y^*	$\frac{b}{c}$	$\frac{4nb}{c(n^2+4n-1)}$	$\frac{b}{c}$	$\frac{b}{c}$	$\frac{4nb}{c(n^2+4n-1)}$	$\frac{nb}{c[(n-s+1)^2+(s-1)]}$
x^*	$\frac{n+1}{2}\frac{b}{c}$	$\frac{n+1}{2}\frac{4nb}{c(n^2+4n-1)}$	$\frac{n+1}{2}\frac{b}{c}$	$\frac{b(n-s+1)}{c}$	$\frac{n+1}{2}\frac{4nb}{c(n^2+4n-1)}$	$\frac{(n-s+1)nb}{c[(n-s+1)^2+(s-1)]}$
Spending	$\frac{b^2(n^2+4n-1)}{8c}$	$\frac{2b^2n^2}{c(n^2+4n-1)}$	$\frac{b^2(n^2+4n-1)}{8c}$	$\frac{b^2[(n-s+1)^2+(s-1)]}{2c}$	$\frac{2b^2n^2}{c(n^2+4n-1)}$	$\frac{b^2n^2}{2c[(n-s+1)^2+(s-1)]}$
Legislature's ex-ante expected net benefits	$\frac{b^2(-n^2+4n+1)}{8cn}$	$\frac{2b^2n}{c(n^2+4n-1)}$	$\frac{b^2(-n^2+4n+1)}{8cn}$	$\frac{b^2[-(n-s+1)^2-(s-1)+2n]}{2nc}$	$\frac{2b^2n}{c(n^2+4n-1)}$	$\frac{b^2n}{2c[(n-s+1)^2+(s-1)]}$

To see why the agenda setter receives a larger project, consider a coalition member's decision. He votes for the bill if his net benefits are at least as large as what he could expect if the game continued to the next period. By stationarity, the values of x and y selected by the agenda setter will be identical in each period. Also, because agenda setters and coalition members are chosen randomly, each legislator has a $1/n$ chance of being selected an agenda setter and an $(n-1)/(2n)$ chance of being a member of the coalition. These two facts imply that the continuation value (the expected value of the game for a legislator who rejects an offer) is

$$v = \frac{1}{n} bx^* + \frac{n-1}{2n} by^* - \frac{c}{2n}\left(bx^{*2} + \frac{n-1}{2} y^{*2} \right).$$

In equilibrium, spending will be the same in all periods, so the coalition member's decision reduces to $by^* \geq (1/n)bx^* + [(n-1)/(2n)]by^*$, and since the constraint binds, this becomes $x^* = [(n+1)/2]y^*$. (Solving this for any override voting rule s implies $x^* = (n-s+1)y^*$, which will be useful later.)

This reasoning also explains the surprising result that the ex post net benefits for all supporters are negative, as are the expected net benefits at the beginning of the game. If all legislators except the agenda setter are worse off in this game than if no spending took place, how can this be an equilibrium? Why wouldn't the legislators simply vote against such a proposal indefinitely? The answer lies in their expectations about what happens if a proposal fails. If the proposal fails and bargaining continues, then the legislator offered y^* in round t has an $(n-1)/(2n)$ chance of being left out of the coalition altogether in round $t+1$, which is an even worse outcome. Thus, defection is not profitable. If this were a one-shot game, then a minimum winning coalition of legislators would have to receive non-negative benefits, or else they would vote down the proposal and take zero spending. In this infinite-horizon world, continuation values are negative, which drives the result. It is the fear of the future that forces coalition members to accept a bill that provides them with negative net benefits and enables the agenda setter to extract a large project for herself.

Finally, a feature of this equilibrium is that every legislator in the coalition receives an efficient project, except for the proposer, who gains at the expense of those without a project. A stylized fact about distributive projects in unconstrained settings (i.e. absent a spending limit) is that they are larger than efficient. Therefore, this model may seem like an odd choice for a baseline, since it predicts that $(n-1)/2$ legislators will receive an efficient project. This outcome is not as problematic as it first appears, as the efficiency result holds only for $\delta = 1$. For $\delta < 1$ and for sufficiently large n, y^* will be larger than efficient in this baseline model.[13] In addition, an open-rule version of the baseline model also features larger than efficient projects.[14]

[13]This result was first noted by Baron (1993).
[14]See Primo (2005).

In the $\delta = 1$ case, an efficient project is chosen because "the shadow price" of taking into account the preferences of a coalition member causes the agenda setter's decision regarding y^* to become that of the social planner, whose concern is maximizing overall welfare. Letting s be the size of the majority required for budget passage, the shadow price λ is $(s-1)/(n-s+1)$. The marginal benefit to the agenda setter of increasing y is λb, or the marginal benefit to a coalition member weighted by the shadow price. The marginal cost will be her share of the marginal cost $(c/n)(s-1)y$ plus the coalition member's share of the marginal cost weighted by the shadow price, or $\lambda(c/n)(s-1)y$. Setting marginal benefits equal to marginal costs, and substituting in the value of λ, gives $b = cy$. But this is exactly the first-order condition from maximizing the function $by - (c/2)y^2$. In short, the efficient outcome obtains because the shadow price causes the agenda setter's problem to become that of the social planner, but in general this will not be the case. This result also implies that the size of y^* is invariant with respect to s, which will be useful later.

To determine whether institutions can mitigate this suboptimal state of affairs, I extend the baseline model to include (1) a pre-bargaining period in which the legislature sets the level of spending and (2) an executive who can veto legislation. All legislators have equal probabilities of being selected as the agenda setter or being offered projects. Therefore, in the pre-bargaining period the preferences of one legislator can be used to calculate the budget constraint that is selected. After the legislature sets the size of the budget, the agenda setter makes a proposal that satisfies the cap, and the legislature votes on it. If the proposal fails, the legislature selects a new cap, and a new round of bargaining begins.

The model builds-in enforcement of the budget constraint.[15] The agenda setter, once chosen, may have an incentive to propose a bill that both rescinds the budget constraint and requests an allocation that does not satisfy the budget constraint. Under many circumstances, the other legislators would support the legislation if they believed that agenda setters in subsequent rounds would behave similarly. To avoid this, I assume that the budget constraint is binding. Perhaps it is constitutionally mandated, or changes require such high costs that the agenda setter does not wish to challenge the cap. As discussed earlier, this is a reasonable assumption in many US states.[16]

The executive veto operates as follows. If the agenda setter's bill is vetoed, the legislature can override the veto with a supermajority of s legislators, $s \geq (n+1)/2$. I assume that the executive has preferences only over the size of the budget, not the allocation of the budget, and that these preferences are

[15]Formally, exogenous enforcement is implemented in the model by restricting the strategy space of the proposer.

[16]See Primo (2005) for a discussion of the endogenous enforcement of budget rules.

common knowledge. If the executive vetoes a bill and the veto is not overridden, spending is set at zero for that period, the legislature chooses a new spending level, and the game resumes. Let the executive's ideal point for spending be denoted by E, where $E \in \{L, H\}$. If $E = L$, then the executive is said to be a low spender who prefers no distributive spending. If $E = H$, where H is large enough such that the executive always prefers more spending than the legislature, then the executive is said to be a high spender. I also use the terms conservative and liberal, respectively, to refer to these two types of executives. Let Z be the spending level such that the high-spending executive vetoes all budgets greater than this amount, and signs all budgets lower than this amount. Assume that $Z > [b^2(n^2 + 4n - 1)]/[8c]$, the budget selected by the agenda setter in the baseline model.[17]

The following results establish the equilibria that result under different institutional arrangements: a spending limit but no executive veto; no spending limit and an executive veto; and both a spending limit and an executive veto (the full model). The results are then summarized and intuitively explained. Proofs appear in Appendix A.

Proposition 2 (Majority Rule Legislature with a Spending Limit). The subgame-perfect Nash equilibrium in stationary strategies is as follows. In the spending limit stage, the legislature selects $I^* = [2b^2n^2]/[c(n^2 + 4n - 1)]$. Then, in every period of bargaining, the agenda setter offers $y^* = [4n/(n^2 + 4n - 1)][b/c]$ to $(n - 1)/2$ legislators and $x^* = [(n + 1)/2][4n/(n^2 + 4n - 1)][b/c]$. Everybody who receives an offer of at least y^* votes for it. The agenda setter votes for a proposal that gives him at least y^*, and since $x^* > y^*$, the agenda setter votes for the proposal.

Proposition 3 (Majority Rule Legislature and a Liberal Executive with Veto Authority). The subgame-perfect Nash equilibrium in stationary strategies is as follows. In every period, the agenda setter proposes $y^* = b/c$ to $(n - 1)/2$ legislators and $x^* = [(n + 1)/2][b/c]$. In every period, those members who receive an offer of at least y^* vote for it, and all other legislators vote against it. The agenda setter accepts offers of at least y^*, and since $x^* > y^*$, the

[17] I do not present the results for a continuum of executive ideal points for spending in this model or the next, because this complicates the analysis and does not add any new insights. Consider three intervals of ideal points: call them low, moderate, and high. For low ideal points, the agenda setter always builds override coalitions. For high ideal points, the agenda setter always constructs majority coalitions. The equilibrium in the low and high cases are invariant with respect to the ideal points within the interval. Think of the equilibrium levels of spending as a step function in the low and high intervals of executive ideal points. For moderate ideal points, the agenda setter and the legislature must determine whether to set spending to a level that allows them to build a majority coalition, or whether to set spending to a level that requires an override coalition. Therefore, a local change in executive preferences may not influence spending, but large shifts will.

agenda setter votes for the proposal. The executive never vetoes legislation on the equilibrium path.

Proposition 4 (Majority Rule Legislature and a Conservative Executive with Veto Authority). The subgame-perfect Nash equilibrium in stationary strategies is as follows. In every period, the agenda setter proposes $y^* = b/c$ to $(s-1)$ legislators and $x^* = (n-s+1)(b/c)$. In every period, those members who receive an offer of at least y^* vote for it, and all other legislators vote against it. The agenda setter accepts offers of at least y^*, and since $x^* \geq y^*$, the agenda setter votes for the proposal. The executive credibly threatens to veto all legislation in which spending is positive, but a veto is never successful on the equilibrium path.

Proposition 5 (Full Model, Case 1: Majority Rule Legislature, a Spending Limit, and a Liberal Executive with Veto Authority). The subgame-perfect Nash equilibrium in stationary strategies is as follows. In the spending limit stage, the legislature selects $I^* = 2b^2n^2/[c(n^2+4n-1)]$. Then, in every period of bargaining, the agenda setter offers $y^* = [4n/(n^2+4n-1)][b/c]$ to $(n-1)/2$ legislators and $x^* = [(n+1)/2][4n/(n^2+4n-1)][b/c]$, and everybody who receives an offer of at least y^* votes for it. The agenda setter votes for a proposal that gives him at least y^*, and since $x^* > y^*$, the agenda setter votes for the proposal. The executive never vetoes legislation on the equilibrium path.

Proposition 6 (Full Model, Case 2: Majority Rule Legislature, a Spending Limit, and a Conservative Executive with Veto Authority). The subgame-perfect Nash equilibrium in stationary strategies is as follows. In the spending limit stage, the legislature selects $I^* = b^2n^2/[2c((n-s+1)^2+(s-1))]$. Then, in every period of bargaining, the agenda setter offers $y^* = [bn/c][(n-s+1)^2+(s-1)]^{-1}$ to $(s-1)$ legislators and $x^* = [n-s+1][bn/c][(n-s+1)^2+(s-1)]^{-1}$, and legislators who receive an offer of at least y^* vote for it. The agenda setter votes for a proposal that gives him at least y^*, and since $x^* \geq y^*$, the agenda setter votes for the proposal. The executive credibly threatens to veto all legislation in which spending is positive, but a veto is never successful on the equilibrium path.

Comparative statics imply the following:

1. The institution of a spending limit lowers spending and improves legislative welfare, independent of the executive veto.
2. The influence of the executive veto on spending is contingent on the presence of a spending limit and the ideology of the executive. When a spending limit is in place, spending is higher under a conservative executive than a liberal one. When a spending limit is not in effect, spending is higher under a liberal executive than a conservative one.

Legislative welfare is always higher under a conservative executive, regardless of whether a spending limit is in place.

3. Among all the institutions considered, the legislature's expected net benefits are highest when (i) the executive is a conservative and (ii) the legislature can impose a spending limit on itself. Legislative welfare is also increasing in coalition size.

Regardless of the presence of an executive veto, a cap on spending reduces outlays and improves overall welfare because of the additional constraint on the agenda setter – i.e. the cost of projects cannot exceed the spending level set by the legislature. The legislature is made better off in this case for two reasons. First, the legislature can never do worse than in the baseline model, since it can always select the spending level from the baseline as its budget constraint. Next, the baseline model produces negative benefits whenever $n \geq 5$. This implies that the legislature can never do worse than a net benefit of zero whenever $n \geq 5$, since it can always select zero spending. Therefore, a sufficiently large legislature always makes itself better off with a spending limit.[18]

Another perspective is that the agenda setter, at the proposal stage, and the legislature, at the spending limit stage, have different incentives. The agenda setter maximizes her own utility, subject to the constraint that a winning coalition votes for her proposal. When faced with a cap, the agenda setter responds by reducing the size of all projects, but she reduces hers at a faster rate. This leads to welfare gains for the legislature, as the agenda setter's project is much larger than efficient. The key is that the ratio between x and y remains unchanged when the legislature sets spending in the first period, just as in the baseline model. Because of this, any reduction in y has to reduce x at a greater rate.

In the case of majority rule,

$$y^* = \sqrt{\frac{8I}{c(n^2+4n-1)}} \quad \text{and} \quad x^* = \frac{n+1}{2}\sqrt{\frac{8I}{c(n^2+4n-1)}}.$$

Because $x^* = [(n+1)/2]y^*$, we can write the derivative of x^* with respect to I as $[(n+1)/2](\partial y^*/\partial I)$, making clear that x^*, the agenda setter's project scale, declines in I $(n+1)/2$ times faster than y^* does.

While the agenda setter is interested in maximizing her utility, the legislature wishes to select the I that maximizes the average, or expected, benefits of a legislator. Formally, for simple majority rule, it maximizes

$$\frac{1}{n}bx + \frac{n-1}{2n}by - \frac{I}{n},$$

[18]Since legislatures are rarely smaller than five members, I focus on cases where n is sufficiently large.

where x and y are functions of I. Substituting $[(n+1)/2]y$ for x gives

$$by - \frac{I}{n}.$$

In equilibrium, the agenda setter selects $y^* = \sqrt{8I/[c(n^2+4n-1)]}$, so the legislature maximizes

$$b\sqrt{\frac{8I}{c(n^2+4n-1)}} - \frac{I}{n}.$$

The marginal benefit of an additional dollar of spending for legislator i is

$$\frac{b}{2\sqrt{I}}\sqrt{\frac{8}{c(n^2+4n-1)}},$$

while the marginal cost of an additional dollar of spending for legislator i is $1/n$.

Recall that the equilibrium level of spending in the baseline model is

$$I = \frac{b^2(n^2+4n-1)}{2c}.$$

At this level of spending, $MB_i - MC_i$ is equal to

$$\frac{2}{(n^2+4n-1)} - \frac{1}{n},$$

which simplifies to

$$\frac{-(n^2+2n-1)}{n(n^2+4n-1)}.$$

This quantity is negative, as is the second derivative of the net benefit function with respect to I, evaluated at $I = b^2(n^2+4n-1)/(2c)$. Because the net benefit function is concave in I, this indicates that the maximum net benefit is achieved by reducing I from the level that results when the agenda setter is unconstrained.

How does the legislature manage to lower spending and increase its net benefits, just by selecting I properly? When it selects I, the legislature takes into account the *expected* benefits of the game for a given I. The agenda setter, once chosen, maximizes her utility. Put differently, a legislator who does not yet know who the agenda setter or coalition members will be gets a smaller ''bang for the buck'' than the agenda setter, whose district receives a large share of every additional dollar of total spending. Because the interests of the agenda setter and the legislature as a whole conflict, the legislature will clearly want to move to a lower I than the one preferred by the agenda setter.

It will decrease I until the expected gains from inducing a reduction in the agenda setter's project are outweighed by the utility losses resulting from smaller projects for other coalition members.

The effect of the executive veto is contingent on the spending limit and the executive's ideology. The liberal executive will have no effect on the legislature since there is no veto threat (given a sufficiently high ideal point for overall spending). The conservative executive will induce the building of an override coalition (given his preference for no distributive spending), and the spending limit may alter how the agenda setter builds coalitions when anticipating the actions of these executives.

We can interpret executive vetoes as influences on coalition size. First, the legislature's welfare is improving in s, the size of the coalition, regardless of whether a spending limit is in place. Intuitively, this is because the distributive politics problem partially resolves itself as s increases. In the limit, when $s = n$, the socially optimal outcome obtains. Second, the equilibrium results also imply that spending is increasing in coalition size when a spending limit is in effect, while it is decreasing when no such rule is present. The second result merits further scrutiny.

When no spending limit is in place, the need to build an override coalition increases the probability that any given legislator will be offered a project in the next period. The agenda setter must take this into account when calculating the optimal project sizes. In the baseline model we saw that the agenda setter acted as a social planner for coalition members, implying that $y^* = b/c$. The earlier discussion also established that $x^* = (n - s + 1)y^*$. This implies that in equilibrium the total scale of projects will be equal to $(n - s + 1)y + (s - 1)y$, or ny. Because y is invariant with respect to s, this implies that as s increases, x must decline in order to keep the total scale of projects equal to ny. Because costs are convex and the agenda setter's project is larger than efficient, the transfer of some of her project to the new coalition members lowers total costs. This result is counterintuitive at first: one might think that adding more projects would increase spending, not decrease it. That the additional projects are taken out of the agenda setter's (inefficient) project and that costs are convex drive the result.

In sum, all legislators except for the agenda setter are better off because the agenda setter's project is more efficient and more legislators receive a project. Thus, the effect of a conservative executive, when no spending limit is present, is to increase the coalition size, which induces the provision of additional efficient projects for districts *and* reduces spending.

The strategic calculus changes when a spending limit is in force. In this situation, spending is increasing when a conservative executive replaces a liberal executive, because the effect of the override coalition is to increase, rather than decrease, spending. Suppose that the size of the coalition increases from minimum-majority to supermajority due to a veto threat from a conservative executive. There are two effects to consider. First, what is the

effect on the agenda setter's behavior, holding I constant? Second, what is the effect on the legislature's selection of I, taking into account the agenda setter's reaction to a change in s?

For a given budget size, the agenda setter builds the required supermajority by reducing the size of her project, adding new coalition members, and increasing the size of all coalition members' projects. To see why this is the case, consider the total cost function, which is $(c/2)x^2 + (s-1)(c/2)y^2 = I$. Since I is now fixed, this implies that the effect of a change in s on the costs of projects must net to zero. Recall that in equilibrium, $x^* = (n-s+1)y^*$. Knowing this, we can rewrite the function as $(c/2)((n-s+1)^2 y^{*2} + (s-1)y^{*2}) = I$. Totally differentiating with respect to s gives

$$\frac{c}{2}\left(-2(n-s+1)y^{*2} + 2(n-s+1)^2 y^* \frac{\partial y^*}{\partial s} + y^{*2} + 2(s-1)y^* \frac{\partial y^*}{\partial s}\right).$$

Combining terms gives

$$\frac{c}{2}\left(-2(n-s+0.5)y^{*2} + 2\Big((n-s+1)^2 + (s-1)\Big)y^* \frac{\partial y^*}{\partial s}\right).$$

The first term in the large parenthesis is clearly negative, implying that the second term is positive, since the total derivative must equal zero. As all other values in the second term are positive, this implies that $\partial y^*/\partial s$ must be positive as well. Next, since y is increasing in s, x must be declining in s in order for total spending to remain the same. In short, then, the relationship between x^* and y^*, combined with the additional spending constraint, produces the result.

Intuitively, as s increases, to keep spending the same [and to maintain the relationship $x^* = (n-s+1)y^*$] the agenda setter has only two choices: decrease y and x, or decrease x and increase y. All other alternatives have the effect of either decreasing or increasing spending or are logically inconsistent with the constraint $x^* = (n-s+1)y^*$. A decrease in y would have the effect of hurting the agenda setter even more, since her project would become that much smaller.[19] This makes decreasing x and increasing y the most attractive alternative.

The legislature's decision regarding the spending limit takes this behavior into account. We can write its maximization problem, now using s instead of $(n+1)/2$, as

$$\frac{b}{n}(n-s+1)y + \frac{b(s-1)}{n}y - \frac{c}{2n}[(n-s+1)^2 y^2 + (s-1)y^2],$$

[19]This is clear from examining the derivative of x with respect to s: $-y + (n-s+1)(\partial y/\partial s)$.

where x and y are functions of I. Combining the first two terms and substituting I for $(c/2)[(n-s+1)^2y^2+(s-1)y^2]$ gives

$$by-\frac{I}{n}.$$

Taking first-order conditions gives

$$b\frac{\partial y}{\partial I}-\frac{1}{n}=0.$$

To see why I must be increasing in s (and why a conservative executive leads to more spending), we just need to examine the impact of a change in I on y and how that is influenced by a change in s. Intuitively, $\partial y/\partial I$ must be positive. The reason is that as I increases, the agenda setter has to increase the projects of supporters in order to increase her own, since $x^*=(n-s+1)y^*$. The question, then, is how $\partial y/\partial I$ changes as s changes. It is easy to calculate that

$$\frac{\partial^2 y}{\partial I\partial s}>0.$$

The intuition is that as s increases, the agenda setter loses some power and more of an additional dollar goes toward supporters and is spent more efficiently (i.e. the marginal benefit is higher). This also follows from the discussion of the agenda setter's behavior above. So if s increases, $\partial y/\partial I$ increases as well, meaning that

$$b\frac{\partial y}{\partial I}-\frac{1}{n}>0.$$

In order to re-establish equality, the legislature must adjust I upward because $\partial^2 y/\partial I^2<0$. In words, the impact of a change in I on y is declining as I increases because y is a function of the square root of I due to costs being quadratic. By increasing I, the legislature once again establishes equality in the first-order condition.

Intuitively, the legislature, when selecting I, observes that as s increases, the agenda setter's power is mitigated. Therefore, an additional dollar of spending is allocated to relatively more efficient spending (i.e. projects for coalition members). This has the effect of making an increase in I attractive until the marginal benefit of an increase once again equals the marginal cost.

In short, the legislature's best response is to increase spending as the coalition size increases because doing so is welfare-improving. Overall, spending is increasing in coalition size, and a conservative executive, by threatening a veto, induces supermajority winning coalitions and greater spending when a spending limit is present. Both actions – that of the legislature in increasing spending, and that of the agenda setter in increasing y and decreasing x – contribute to this effect.

Summarizing the effects of the executive veto, when a spending limit is in place, a conservative executive leads to more spending than a liberal executive. When no spending limit is in place, a conservative executive leads to less spending. Yet in both cases, the expected net benefits of the legislature are higher with a conservative executive. The reason is straightforward: net benefits are based both on the size of spending and the efficiency of spending. Because the conservative executive induces a more equitable and hence more efficient distribution of spending, welfare is increasing in both cases even though spending is moving in opposite directions.

4. THE EMPIRICAL CONNECTION

These theoretical results suggest that institutions matter in the distribution and size of spending. We can represent the relationships derived from the formal theory with a simple regression equation:

$$\begin{aligned}\text{Spending} = \alpha &+ \beta_1 \text{conservative executive} + \beta_2 \text{spending limit} \\ &+ \beta_3 \text{spending limit} \times \text{conservative executive} + \varepsilon.\end{aligned}$$

The model predicts that $\beta_1 < 0$, $\beta_2 < 0$, $\beta_3 > 0$, $\beta_2 + \beta_3 < 0$, $\beta_1 + \beta_3 > 0$, $\beta_3 < |\beta_2|$, and $\beta_3 > |\beta_1|$.

The model is a tool that can be brought to bear on spending in the US states, as it offers a theoretical foundation for understanding the impact of budget rules and gubernatorial ideology.[20] First, it offers an explanation for why spending limits might decrease spending. After all, spending limits might simply be enacted at the level at which legislators would have spent without a rule. Second, it points to a surprising interaction effect between executive ideology and spending limits.

4.1 The Spending Limit

I use balanced budget rules to operationalize spending limits in the states. While not identical, the two rules can be connected because the formal theory implicitly assumes that the tax base is fixed by the legislature when it sets the spending limit.[21] A balanced budget rule, if enforced, implies that the acts of setting spending levels and (expected) tax revenues are one and the same. To the extent that a balanced budget rule is enforceable, it constrains

[20]One drawback is that the model considers distributive spending, while most spending is not distributive in nature. To the extent that distributive spending "greases the wheels" of politics (Evans, 2004), though, the model is similar enough to reality that it is helpful for understanding state spending patterns. See Clarke and Primo (2005) for a detailed discussion of the connection between models and empirical analyses.

[21]The executive may have a say in how these taxes or spending limits are set, but because all legislators view the future identically in the spending limit stage, the role of the executive can be assumed away so long as his veto authority is subject to override. In addition, there may be other considerations, beyond the scope of this paper, at work in the tax arena, specifically relating to the choice of tax instruments.

legislatures to design budgets that will be in balance (i.e. when they set a budget size at the beginning of a session, they have to stay within that limit or face unpalatable alternatives down the road).

To determine what constitutes a strict, enforceable balanced budget rule requires some background. State balanced budget rules constrain legislatures either prospectively or retrospectively.[22] A prospective rule requires that the budget proposed and/or enacted be in balance. This is the weakest type of enforcement (present in all states except for Vermont), because it does not stipulate what happens if revenue estimates are incorrect and a deficit is incurred. As a consequence, state legislatures have great leeway, presumably, in overstating anticipated revenues in such a way as to allow greater levels of spending. A prospective rule is unlikely to have an impact on behavior, since there is little incentive to make "honest" revenue estimates.

Retrospective rules place some limitations on what a state must do if deficits exist at the end of the fiscal year. In seven states, a carryover rule allows for deficit rollover to the next fiscal year, provided that the deficit is explicitly accounted for in next year's budget. In 36 states, the strictest provision, a no-carryover rule, requires that a state cannot carry over a deficit to the next fiscal year (or in the case of biennial budgeting, next biennium) and must address it immediately by reducing spending, generating additional revenue, or obtaining federal aid.

Bohn and Inman (1996) find that budget deficits are smallest (and hence budget rules "bite") in states with no-carryover rules and elected (as opposed to appointed) state high courts. One theoretical reason for this finding is that high courts, which are the ultimate arbiter of spending disputes, are less likely to be beholden to the legislature or the governor if they are selected by the electorate. While budget disputes rarely wind their way to a state high court, it may be that the threat of enforcement is enough to obtain compliance with the rules.[23] What makes this an appropriate operationalization of a spending limit is that there is external evidence that this combination of rules "bites." Therefore, we can examine the usefulness of the model for understanding state spending by operationalizing spending limits in the US states as the presence of a no-carryover rule plus an elected high court.[24] Seventeen states fit this criterion.[25] (See Table 2 for a state-by-state breakdown of the rules discussed here.)

[22]These descriptions draw in part from Advisory Commission on Intergovernmental Relations (1987) and Bohn and Inman (1996).

[23]For a detailed argument about court enforcement, see Inman (1998). For a skeptic's view on whether such a threat actually exists, see Briffault (1996).

[24]The Advisory Commission on Intergovernmental Relations (ACIR) (1987) created an index measuring the stringency of budget rules in the state; this measure will be used as a robustness check.

[25]A state's selection procedure for high court justices is coded based upon initial selection to the bench. Therefore, appointed justices who face retention elections are coded as appointed.

TABLE 2 BUDGET RULES BY STATE

State	Limit	ACIR	State	Limit	ACIR
Alabama	X	10	Montana	X	10
Alaska		6	Nebraska		10
Arizona		10	Nevada		4
Arkansas	X	9	New Hampshire		2
California		6	New Jersey		10
Colorado		10	New Mexico	X	10
Connecticut		5	New York		3
Delaware		10	North Carolina	X	10
Florida		10	North Dakota	X	8
Georgia	X	10	Ohio	X	10
Hawaii		10	Oklahoma		10
Idaho	X	10	Oregon	X	8
Illinois		4	Pennsylvania		6
Indiana		10	Rhode Island		10
Iowa		10	South Carolina		10
Kansas		10	South Dakota		10
Kentucky	X	10	Tennessee	X	10
Louisiana		4	Texas	X	8
Maine		9	Utah		10
Maryland		6	Vermont		0
Massachusetts		3	Virginia		8
Michigan		6	Washington	X	8
Minnesota	X	8	West Virginia	X	10
Mississippi	X	9	Wisconsin		6
Missouri		10	Wyoming		8

Sources: Advisory Commission on Intergovernmental Relations (1987); Bohn and Inman (1996); *Book of the States*, various years; author's interpretation of state law.
Notes: A state has a spending limit if it has a no-carryover balanced budget rule and an elected high court. ACIR refers to the stringency index, ranging from 0 to 10, calculated by the Advisory Commission on Intergovernmental Relations.

There is a potential endogeneity problem in using a spending limit as an independent variable to explain state spending. This endogeneity can cut in two ways. First, fiscally conservative states may be more likely to create rules that constrain spending, thereby reinforcing preferences. If this is true, then the spending limit may simply reflect the preferences for spending in a state, rather than the effect of the rule. Second, a fiscally liberal state that is in dire financial straits may be more likely to create rules that constrain spending, which is likely to dampen their apparent effects (as such a state would be likely to have trouble living up the rule). Endogeneity is always a concern in institutional analysis. Fortunately, it is less of a concern here. First, one component of the spending limit operationalization, the selection of state high court justices, is based on factors unrelated to the budget process. Second, balanced budget rules were typically implemented well before the

budgetary era under study, and often were part of a state's first constitution, thereby creating a healthy separation between the creation of the institution and spending decisions in the late twentieth century (National Association of State Budget Officers, 1992; Savage, 1988). The spending limit is therefore considered exogenous for the purposes of this analysis.[26]

Finally, the model introduces an empirical puzzle: if caps on spending are welfare-improving, then why are they not present in all states? One conjecture relates to the theorized mechanism for external enforcement. Since the efficacy of balanced budget rules is contingent on the presence of independent (elected) state high courts, one component of the enforcement mechanism is exogenous to the budget process, as the judicial selection mechanism is of course based on many unrelated factors. In fact, there are only six states that fit the requirements for a spending limit (i.e. an elected high court) but do not have the strictest type of balanced budget rule in place. This is a fairly small number, and one reason why some hold-outs remain is that many balanced budget restrictions were implemented when state constitutions were ratified. There may not be enough demand for a change in the rules, especially when at first glance there appears to be little difference between, say, a balanced budget rule that allows deficits to be carried over and a no-carryover rule which does not.

4.2 Executive Vetoes and Interaction Effects

Just as the presence of spending limits varies across the states, the rules required to pass and veto budget legislation differ, as well. For example, in some states only a majority is needed to override a veto. In this case, the veto threat does not bite, in that the same coalition that passes a budget also overrides any veto. Override coalitions need not be greater than majority-sized in such a state. This implies that in these states the ideology of the governor will not affect spending. Where appropriate, these factors are taken

[26]Matsusaka (1995) makes a related argument in his work on citizen initiatives. Rueben (1995) accounts for endogeneity of tax and expenditure limits by using the presence of the initiative as an instrument and finds that tax and expenditure limitations have a small but real negative effect on state spending. (Including tax and expenditure limits in my analysis does not change the results in any meaningful way.) Poterba and Rueben (1999) have less success when using similar instruments to study state bond markets. I attempted to use similar instruments to those used by Rueben, and Poterba and Rueben; specifically, I considered whether a recall provision for elected officials, the signature requirement for getting initiatives onto the ballot, the presence of the initiative, and the year a state entered the union predicted whether a state would have a spending limit, using my primary measure. The R^2 on the linear probability model I estimated was approximately 0.05, with none of the variables having a statistically significant effect on the presence of a spending limit. Previously utilized instruments, therefore, are inappropriate for use when working with the primary definition of a spending limit considered here. A likely reason is that the definition I use includes an exogenous factor – whether high court justices are elected or appointed – and therefore directly addresses the endogeneity concern. These instruments are likely inappropriate in general because the citizen initiative has been shown to affect spending.

into account in the construction of gubernatorial ideology variables (see footnote 30). There is not enough variation in the passage and veto requirements to warrant directly including them in the analysis.

I use party affiliation to measure whether an executive is conservative and hence will veto spending legislation, with Republicans being conservative and Democrats being liberal. This is an admittedly crude measure that makes finding robust effects difficult. Continuous measures, such as those constructed by Berry et al. (1998), also have serious problems such as temporal comparability and measurement error.[27] Future work may be able to overcome these methodological hurdles.

Despite these challenges, there is prima facie evidence for a relationship between spending, the presence of spending limits, and the governor's party. The simplest way to analyze the data is through a one-tailed *t*-test assessing the difference in means between states with budget caps and states without, as well as between states with Democratic governors and states with Republican governors. For states with spending limits, the mean level of state and local spending is $3,336 vs. $3,756 in states without a cap, a statistically significant difference. Similarly, states with spending limits have higher mean spending when a conservative (i.e. Republican) governor is in office rather than a liberal (i.e. Democratic) governor ($3,528 vs. $3,234). There is no statistically significant difference between conservative and liberal executives when a spending limit is not in effect. The values are $3,730 for a liberal and $3,785 for a conservative. Similar results hold for state-level spending.

5. EXPLANATIONS FOR STATE SPENDING

5.1 Dependent Variable

Descriptive statistics for the variables (except interactions) are located in Table 3. Data sources are presented in Table 4. The dependent variable in the analysis is per capita real direct general expenditures, measured in 2000 dollars. This category includes all state and local spending except for utilities, liquor stores, or insurance trust sectors, which the Census Bureau categorizes separately (US Census Bureau, 2000).

State and local spending are combined because local governments are not sovereign and can be thought of as extensions of the state. In fact, states will often shift financial responsibilities to local governments in order to keep the state fiscal house in order. By including local spending, this shift is accounted for. As a robustness check, state-level spending is used as a dependent variable as well. A variable measuring the proportion of state and local

[27]Also, as I note in footnote 17, there are ranges of ideal points for which spending is constant with respect to changes in executive ideology. To the extent, then, that governors in states are not ideologically diverse on the dimension of total spending, we may find no effect of executive party or ideology on overall spending even with a continuous measure.

TABLE 3 SUMMARY STATISTICS

Variable	Mean	SD	Minimum	Maximum
State and local spending	3,613.14	1,050.81	1,604.96	7,531.09
State-only spending	1,662.10	644.12	634.26	4,903.17
State/(state + local) spending	0.46	0.09	0.22	0.81
State personal income	19,999.96	4,909.29	9,256.19	40,328.40
State and local federal aid	752.75	259.27	251.23	2,283.03
State and local debt change	220.87	276.04	−600.22	6,077.39
Unemployment rate	6.01	1.99	2.05	16.50
Population growth	1.22	1.24	−3.83	7.36
Seats in upper chamber	39.37	9.67	18	61
Seats in lower chamber	113.58	56.83	35	400
Citizen initiative	0.43	0.50	0	1
Spending limit	0.34	0.47	0	1
No-carryover rule	0.72	0.45	0	1
Biennial budgeting	0.38	0.49	0	1
Republican governor (modified)	0.43	0.50	0	1
% Democrat upper chamber	59.79	19.91	10.42	100.00
% Democrat lower chamber	59.46	19.20	14.49	100.00
Democratic unified government	0.35	0.48	0	1
Republican unified government	0.14	0.35	0	1
Normalized Democratic presidential vote share	0.11	1.00	−2.56	3.05

Notes: Financial variables in thousands of real 2000 dollars. $N = 1{,}504$. Alaska, Minnesota, and Nebraska are omitted from the analysis.

TABLE 4 DATA SOURCES

Variables	Source
Spending data and population	Census Bureau
State personal income	Bureau of Economic Analysis, Department of Commerce
Unemployment	1968–1975: Bureau of Labor Statistics; *Manpower Report of the President* (DOL); *Employment and Training Report of the President* (DOL); 1976–2000: Bureau of Labor Statistics
Party variables and legislature size	Klarner (2003)
Presidential vote share	http://www.uselectionatlas.org
Citizen initiative	Matsusaka (1995)
Budget rules	*Book of the States*, Bohn and Inman (1996), ACIR (1987)

spending done at the state level is included in the analysis to account for the differential tendencies of states to shift spending mandates to the local level. (The proportion variable ranges from 0.22 to 0.81, showing that the states vary widely in this regard.) In addition, this analysis attempts to account for the ability of states to shift spending to "off-budget" accounts which can be funded through revenue bonds not guaranteed by the state, or to take on

more traditional debt, by measuring changes in total long- and short-term debt. Both factors affect state fiscal policy.[28]

Because the data are for state fiscal years, most of which begin in July, timing becomes an issue. Whenever possible, fiscal year data are used. When not possible, it is assumed that decisions for fiscal year t were made in calendar year $t-1$, and variables are matched up accordingly. For instance, the governor's party in year $t-1$ will be matched with the spending observation at time t.[29]

5.2 *Spending Limit and Gubernatorial Ideology Variables*

The indicator variable for spending limit is coded 1 if a cap is present and 0 otherwise. A spending limit is operationalized as the presence of an elected high court and a no-carryover rule for deficits. As a robustness check, the presence of just a no-carryover rule is also used in the FGLS specifications. The ideology of the governor is measured by an indicator variable coded 1 if the governor is a Republican, and 0 otherwise. This dummy variable is then modified to account for budget passage and veto rules that affect the impact of the governor. It is referred to as the "modified" Republican governor variable throughout the paper.[30] The (modified) ideology of the governor is interacted with the spending limit variable to examine whether the influence of gubernatorial ideology is contingent on the presence of a spending limit. Given the presence of a spending limit, a conservative governor should lead to increased spending.

5.3 *Control Variables*

I control for economic, demographic, institutional, and partisan variables that may influence spending. These include real state personal income per capita (Wagner, 1883), real federal aid per capita, unemployment, popula-

[28]Von Hagen (1992, p. 354) discusses the "tendency of state governments to delegate state functions and debt-raising power to off-budget entities and local governments." Kiewiet and Szakaly (1996, p. 91) find that state-level debt limitations led to increased debt at the local level: "In states where the issuance of long-term debt at the state level is constitutionally constrained, there is a shift in debt issuance to local levels of government."

[29]Some states engage in biennial budgeting, but I assume that the legislature in the second year of the budget can change the decision of the previous legislature if there is a dramatic shift in its preferences. I include biennial budgeting as a control variable to account for the possibility that spending may differ in states with this institutional feature.

[30]This variable is used in the generalized least squares and error-correction models presented later in the paper to account for some unique cases. The variable is created as follows. Suppose it takes m out of n legislators to pass the budget and s legislators to override the governor's veto, where m and s vary by state. In states where $s > m$, the governor's ideology is measured as above. In most states, a two-thirds vote is required to override a veto, and a majority vote is required to pass the budget. States in which $0.5n < m = s$ are observationally equivalent to states where a conservative governor is always in office, since coalitions larger than a majority are always predicted. Therefore, such states are coded as having conservative governors in all cases. In states where $0.5n = m = s$, the governor is presumed to have little power, and the variable is always set to zero.

tion growth, the presence of citizen initiatives (Feld and Matsusaka, 2003; Matsusaka, 1995, 2000; Matsusaka and McCarty, 2001), the size of the state legislative chambers (Gilligan and Matsusaka, 1995, 2001), the proportion of Democrats in the state legislature, the presence of unified Democratic or Republican government (Alt and Lowry, 1994, 2000, 2003; Poterba, 1994), and normalized state presidential vote share in the most recent election. Income and the unified government variables are also interacted to examine whether unified governments respond differently to the income of a state when setting spending. Finally, because the Southern states were dominated by Democrats for much of the time period under study, I conduct a robustness check to see if the results are significantly affected by the elimination of the South from the analysis.

6. METHODOLOGY

The state spending data extend from 1969 to 2000 for 47 of the 50 states.[31] The error structure in such time-series cross-section data may violate standard i.i.d. error assumptions in OLS, due to the presence of heteroskedasticity as well as temporally and spatially correlated errors (Beck and Katz, 1995). In addition, TSCS data are susceptible to the same econometric problems as time-series data within a single unit.

To address econometric issues not captured by simple analysis, two sets of regressions will be estimated: a levels analysis using feasible generalized least squares (FGLS), and an error-correction model. Feasible generalized least squares addresses the serial correlation in the errors inherent in time-series data, and panel-corrected standard errors correct for heteroskedasticity. The error-correction framework models both long-term and short-term relationships in the data, and therefore "provide[s] time-series analysts with what may be a golden mean between the two widely used modeling techniques that focus exclusively on either levels or changes" (Durr, 1992, p. 188).

[31]Alaska is left out of the analysis because it is an extreme outlier on all matters financial. As Kiewiet and Szakaly (1996, p. 75) colorfully put it, "The state of Alaska has a financial structure which, for not unsimilar reasons, bears more resemblance to that of Saudi Arabia than to that of any other state in the union." Dropping Alaska is the norm in public finance analyses of the states. Hadi's multivariate outlier test (Hadi, 1992, 1994) confirms that Alaska is an outlier when real federal aid per capita, real personal income per capita, and real state and local spending per capita are considered. The Hadi test suggests that some years of data for Wyoming are also outliers, and this is most likely due to the large amount of federal aid given to the state for mineral land management. Wyoming is left in the analysis, however, because its status as an outlier is less clear-cut, and throwing away data is to be avoided whenever possible. Minnesota and Nebraska are omitted because, in the case of Nebraska, it has only one non-partisan legislative chamber, and in the case of Minnesota, because for several years in the dataset, it also had a non-partisan legislature.

6.1 *Levels Analysis: Feasible Generalized Least Squares*

In the first model, I use feasible generalized least squares (FGLS), assuming a common serial correlation parameter and AR(1) process across states and utilizing panel-corrected standard errors to account for panel heteroskedasticity.

Year fixed effects are estimated in order to account for any systematic shifts in spending common to all states due to changes in the economic situation or the role of the federal government. State fixed effects cannot be included because the presence of a spending limit in a given state does not vary across time. State fixed effects, therefore, would be perfectly collinear with the spending limit and nearly collinear with the citizen initiative variable. In working with time-invariant independent variables in the context of a time series, one must make a choice between including fixed effects or eliminating the time-invariant independent variables. Given that my goal is to determine the influence of budget rules, it is clear that it would be inappropriate to model state fixed effects.[32]

Where appropriate, regional effects are added to tap unobserved heterogeneity. In addition, Southern states are more likely to have spending limits in place, as well as to have lower spending, so the regional indicator variables guard against the spending limit variable picking up regional spending preferences.

The baseline model, with financial variables in per capita real 2000 dollars, omitting time and unit subscripts for convenience, is

$$\begin{aligned}\text{State and local spending} = {} & \alpha + \beta_1 \text{spending limit} + \beta_2 \text{Republican governor (modified)} \\ & + \beta_3 \text{cap} \times \text{gov} + \beta_4 \text{federal aid} + \beta_5 \text{state income} + \beta_6 \text{change in state and local debt} \\ & + \beta_7 \text{unemployment} + \beta_8 \text{population growth} + \beta_9 \text{upper house size} + \beta_{10} \text{lower house size} \\ & + \beta_{11} \text{initiative} + \beta_{12} \text{biennial budgeting} + \beta_{13} \text{proportion Dem lower} \\ & + \beta_{14} \text{proportion Dem upper} + \beta_{15} \text{unified Dem govt} + \beta_{16} \text{unified GOP govt} \\ & + \beta_{17} \text{normalized Dem pres. vote} + \beta_{18} \text{unified Dem govt} \times \text{state income} \\ & + \beta_{19} \text{unified GOP govt} \times \text{state income} + \text{year fixed effects} + \text{regional effects} + \varepsilon,\end{aligned}$$

where $\varepsilon_{i,t} = \rho\varepsilon_{i,t-1} + v_{i,t}$, and ρ is a serial correlation parameter in [0, 1].

[32]A random-effects approach adds a unit-specific random disturbance term to the regression in lieu of a unit-specific constant. Random effects are best used when we are sampling from a larger population, though. The reason they make less sense when the population is fixed is that, for example, we did not take a random draw of California; we got *the* California. Further, Hsiao (2003, p. 80) notes that the coefficients on time-invariant independent variables will be inconsistent (with the asymptotics in t) for TSCS models with lagged dependent variables and random effects. The dynamics exacerbate the potential for random effects to be correlated with other right-hand-side variables. One way to solve this problem is by instrumenting (e.g. Arellano and Bond, 1991; Hausman and Taylor, 1981), but the Hausman–Taylor estimator is not appropriate in a dynamic setting and the Arellano–Bond estimator has its asymptotics in n, not t.

6.2 *Error-Correction Model (ECM)*

As noted above, the error-correction framework models both long-term and short-term relationships in the data. The general error-correction framework, denoting Δ as a difference operator, is

$$\Delta y_t = \alpha + \beta \Delta x_t + \rho(y_{t-1} - \theta x_{t-1}) + \varepsilon_t.$$

β represents the short-term effects of changes in the independent variable, while θ reflects long-term effects. The rate at which long-term effects occur is represented by the absolute value of ρ. Suppose that a one-unit change in the independent variable induces a one-unit change in the dependent variable over the long term (i.e. $\theta = 1$). Then $\rho = -0.7$ means that 70% of the effect occurs in the first period, with 21% occurring in the next period $[0.7(1-0.7) = 0.21]$, 6.3% in the third period $[0.7(1-0.7-0.21)]$, and so on.[33] The ECM must include the *first differences* (and lagged differences) of variables that are expected to have short-run effects, and the *lagged levels* of variables that are expected to have long-run equilibrium effects.[34] The dependent variable is differenced and a lagged level is included as an independent variable.

Error-correction models are often discussed in the context of cointegration, or variables that move in tandem. However, in the seminal paper on error correction, Davidson et al. (1978) showed that an error-correction mechanism can be used to understand the long- and short-term effects of variables, even when series are not cointegrated, with only minor bias and a slight loss in efficiency. Beck (1991) and De Boef and Granato (1999) argue that error-correction models are appropriate when theoretically justified, whether series are cointegrated or not. The central insight of the ECM is the idea that one can account for both long-term and short-term fluctuations in time-series data by explicitly modeling both.

The ECM cannot adequately tap the effects of variables that vary cross-sectionally but not temporally, so variables such as the citizen initiative and the number of seats in the state legislature are left out of the analysis. In addition, the hypothesis "spending will be lower in states with spending limits than in states without spending limits" cannot be tested directly with an ECM. While the ECM will not allow a direct test of the effect of spending limits, it will be extremely useful in an indirect test. In other words, do states without limits respond differently to an increase in state personal income than states with such caps? States with spending limits should not extract as much of any additional dollar of income as states without them, since this

[33] ρ will typically be negative here. To see why, rewrite the left-hand side of the equation as $y_t - y_{t-1}$. Moving y_{t-1} to the right-hand side means that the coefficient on y_{t-1} will be $1+\rho$, which in most time series implies that $\rho < 0$.

[34] The first difference of a variable at time t is calculated as $x_t - x_{t-1}$. A lagged level of a variable at time t is defined as x_{t-1}.

would set an expectation for future budget years that could lead to (unallowable) deficits in the long term. For example, consider a state in which there is no concern for deficits because of a weak balanced budget rule. If state revenues increase, spending can be increased immediately without fear of needing to make cuts in a subsequent downturn, since deficit spending is permissible. In a state with a strict balanced budget rule, a state may not want to spend an additional dollar of revenue immediately because a subsequent downturn could necessitate politically unpalatable cuts.

We should not expect large partisan effects in the ECM specification for one-period lags, because partisanship changes fairly slowly. To account for this, fourth seasonal differences for partisan variables are added to the specification. Separate ECMs are estimated for states with and without spending limits to allow for different dynamic relationships.

The error-correction model can be written as

$$
\begin{aligned}
\Delta\text{state and local spending}_t = {} & \alpha + \beta_1 \text{state and local spending}_{t-1} + \beta_2 \text{state income}_{t-1} \\
& + \beta_3 \text{federal aid}_{t-1} + \beta_4 \text{change in state and local debt}_{t-1} \\
& + \beta_5 \text{state income} \times \text{unified Dem govt}_{t-1} + \beta_6 \text{state income} \times \text{unified GOP govt}_{t-1} \\
& + \beta_7 \text{unemployment}_{t-1} + \beta_8 \text{population growth}_{t-1} \\
& + \beta_9 \text{proportion Dem lower}_{t-1} + \beta_{10} \text{proportion Dem upper}_{t-1} \\
& + \beta_{11} \text{Republican governor(modified)}_{t-1} + \beta_{12} \text{normalized Dem pres. vote}_{t-1} \\
& + \beta_{13} \text{unified Dem govt}_{t-1} + \beta_{14} \text{unified GOP govt}_{t-1} \\
& + \beta_{15} \Delta\text{state income}_t + \beta_{16} \Delta\text{federal aid}_t \\
& + \beta_{17} \Delta\text{change in state and local debt}_t + \beta_{18} \Delta\text{state income} \times \text{unified Dem govt}_t \\
& + \beta_{19} \Delta\text{state income} \times \text{unified GOP govt}_t + \beta_{20} \Delta\text{unemployment}_t \\
& + \beta_{21} \Delta\text{pop growth}_t + \beta_{22} \Delta\text{proportion Dem lower}_t \\
& + \beta_{23} \Delta\text{proportion Dem upper}_t + \beta_{24} \Delta\text{Republican governor (modified)}_t \\
& + \beta_{25} \Delta\text{normalized Dem pres. vote}_t + \beta_{26} \Delta\text{unified Dem govt}_t \\
& + \beta_{27} \Delta\text{unified GOP govt}_t \\
& + \text{additional differences of political variables (up to 4th seasonal difference)} \\
& + \text{year fixed effects} + \varepsilon.
\end{aligned}
$$

7. RESULTS

7.1 FGLS

The results of the FGLS analysis, along with robustness checks, are presented in Table 5. The first column presents the baseline specification, the second column uses an alternative measure of spending limit, the third column omits the South, and the fourth column uses state-only spending as the dependent variable. State-only spending is significantly smaller than state plus local spending, so the coefficients for institutional variables in the last column should be of a smaller magnitude than in the first three columns.

TABLE 5 PRAIS–WINSTEN FGLS REGRESSION WITH PANEL-CORRECTED STANDARD ERRORS, REGIONAL EFFECTS, AND YEAR FIXED EFFECTS

Variable	Model 1	Model 2	Model 3	Model 4
Spending limit	−127.68***	–	−140.03**	−60.59**
	(38.40)		(63.37)	(24.39)
No-carryover law	–	−227.81***	–	–
		(47.29)		
State income	0.08***	0.08***	0.08***	0.04***
	(0.01)	(0.01)	(0.01)	(0.00)
Federal aid	0.94***	0.87***	0.90***	0.53***
	(0.09)	(0.08)	(0.09)	(0.04)
Debt change	0.03**	0.03**	0.03**	0.02
	(0.01)	(0.01)	(0.01)	(0.02)
State/(state + local) spending	−203.13	−77.82	−183.53	3,682.53***
	(193.21)	(197.04)	(233.94)	(169.93)
Unemployment	14.34*	8.95	12.11	6.65
	(7.39)	(7.53)	(9.35)	(4.08)
Population growth	−22.96***	−22.33***	−23.30**	−9.03**
	(8.26)	(8.22)	(10.11)	(4.45)
Seats in upper chamber	5.90***	5.75***	6.96***	0.97
	(1.64)	(1.73)	(2.22)	(0.74)
Seats in lower chamber	−1.70***	−2.37***	−2.03***	−0.82***
	(0.31)	(0.37)	(0.37)	(0.19)
Citizen initiative	−160.96***	−161.08***	−161.38***	−66.78***
	(35.14)	(38.41)	(52.66)	(22.85)
Biennial budgeting	85.21***	69.72***	−169.70***	37.76**
	(26.70)	(25.01)	(39.36)	(17.08)
% Democratic (upper)	−1.17	−1.07	−1.35	0.24
	(0.77)	(0.76)	(0.87)	(0.40)
% Democratic (lower)	1.73*	1.16	1.58	0.56
	(0.92)	(0.90)	(1.10)	(0.46)
Republican governor (modified)	11.34	3.85	17.45	0.31
	(17.18)	(23.64)	(21.13)	(8.32)
Governor × limit	−44.09*	–	−54.63*	−15.11
	(23.77)		(32.86)	(12.03)
Governor × no carry	–	−11.80	–	–
		(27.15)		
Democratic unified	−74.57	−71.99	−117.39	−80.53***
	(47.17)	(47.48)	(75.02)	(24.86)
Republican unified	−6.51	−23.35	−43.82	35.87
	(62.71)	(62.47)	(65.31)	(31.40)
Democratic unified × Income	0.004	−0.004	0.006*	0.0042***
	(0.002)	(0.002)	(0.003)	(0.0012)
Republican unified × income	0.0003	0.001	0.002	−0.002
	(0.003)	(0.003)	(0.003)	(0.001)
Democratic presidential vote share	−7.34	−11.19	−17.25	−5.72
	(8.72)	(8.66)	(16.86)	(5.09)
Constant	2,259.37***	2,666.71***	2,339.26***	−747.63
	(274.33)	(295.44)	(325.23)	(165.78)
South omitted	No	No	Yes	No
Estimate of ρ	0.80	0.82	0.82	0.85
R^2	0.81	0.81	0.78	0.82
N	1,504	1,504	1,024	1,504

Notes: *$p<0.10$; **$p<0.05$; ***$p<0.01$. Dependent variable is real state and local spending per capita measured in 2000 dollars, except in Model 4, which uses state-only spending.

Economic and Demographic Variables. State personal income has a substantively and statistically significant effect on spending in all specifications. Specifically, state and local governments extract approximately eight cents of every dollar of state income. The effect of unemployment is statistically significant in only some specifications. In the primary specification, a one-point unemployment increase translates into a (statistically significant) increase of 14 dollars of per capita state and local spending. The effect of unemployment is small when compared with the mean spending level of $3,600 and reflects a modestly countercyclical fiscal policy. Unsurprisingly, federal aid and increases in debt consistently lead to more spending.

Institutional Variables. The presence of a spending limit decreases spending by $127 per capita in the main specification, relative to not having one in effect. This effect is robust across all specifications. When just state spending is used, a smaller coefficient results, but the relevant comparison is whether spending is reduced by the same proportion. The mean of state and local spending in states without a limit is $3,756, while state spending is $1,710. The effect of a spending limit is to reduce state and local spending by about 3.4% and state-only spending by about 3.6%.[35] The use of the no-carryover rule as the measure of a spending limit produces a larger effect. The reason has to do with how comparisons are made with dummy variables. In the main specification, I am comparing spending in states with no-carryover rules plus elected courts to all other states, including those with no-carryover rules and appointed courts. In the specification with just a no-carryover rule, I am comparing spending in states with such a rule to states without, regardless of the composition of the courts.

Consistent with previous research, the presence of a citizen initiative decreases spending. Another interesting finding, which contrasts with Gilligan and Matsusaka (1995), is that the number of seats in the lower house has a negative and significant effect on spending, while the effect of upper chamber seats is positive and significant (except in Model 4). These opposing results demonstrate that more theoretical development of the impact of legislature size is needed.[36]

Party Variables. None of the party variables or citizen preference variables are consistently statistically significant across all specifications. For example, the percentage of Democrats in the lower house has a positive effect on spending in the baseline specification, but in no other. The party of the governor has no effect, either; the coefficient for governor is statistically insignificant, and joint significance cannot be established for the governor

[35]This calculation does not include the interaction terms that include the spending limit variable.

[36]See Primo and Snyder (2005) for a start down this path.

and (governor × limit) variables. Similarly, the interaction terms on the state income and unified government variables are not statistically significant across all specifications. An *F*-test of all the party variables in the primary specification does not achieve statistical significance ($p = 0.50$). Further, the condition number for the party variables in the primary specification is 11, indicating that multicollinearity is not a serious concern. If all party variables except for the gubernatorial party variable and interaction are removed, the lack of an effect of the gubernatorial variables is unchanged. Finally, the citizen preferences variable is not statistically significant in any specification. In short, these findings are extremely robust.

7.2 Error-Correction Model

The error-correction model produces intriguing results that offer support for the claim that states with spending limits tend to keep their fiscal houses in better order. In an effort to simplify the presentation of the results, I present selected coefficients from the error-correction model – specifically, those related to how states respond to changes in income.[37] A star (*) indicates that the coefficients are significant at the 0.05 level or better. For states with spending limits,

$$\begin{aligned}\Delta\text{state and local spending}_{it} = &-0.005\Delta\text{state income}_{it}\\ &-0.10^{*}\,(\text{state and local spending}_{i,t-1}\\ &-0.11^{*}\,\text{state income}_{i,t-1})\\ &+\text{constant}+\text{other variables}+\varepsilon_{it}.\end{aligned}$$

For states without spending limits,

$$\begin{aligned}\Delta\text{state and local spending}_{it} = &\;0.065^{*}\Delta\text{state income}_{it}\\ &-0.06^{*}(\text{state and local spending}_{i,t-1}\\ &-0.14^{*}\text{state income}_{i,t-1})\\ &+\text{constant}+\text{other variables}+\varepsilon_{it}.\end{aligned}$$

These equations demonstrate that the presence of a spending limit prevents states from immediately using the additional revenues implied by an increase in state income. In states without spending limits, an additional dollar of state income translates into an immediate 6.5-cent increase in spending (indicated by the difference term). The interpretation of the state income lag term is that an increase in state income increases spending in the long term by 11 cents in states with a spending limit, and by 14 cents in states

[37]The differenced party variables have no statistically significant effect in the ECMs, and the lags of Democrats in the upper and lower chambers have oppositely signed coefficients. Therefore, just as with FGLS, there is little evidence of any party effects.

where a spending limit is not in place. The rate of increase is 0.10 in states with spending limits, and 0.06 for states without these limits.[38]

The ECM results point to the role of spending caps in limiting spending increases: as state personal income jumps, states without limits tend to take the resulting increase in tax revenue and spend it. If the economy subsequently falters, there is little concern about tightening the budget to adjust to ''hard times,'' since the balanced budget rule can easily be violated. States with spending limits are far more cautious about increasing spending in this manner, preferring instead to ''re-equilibrate'' over the long run and forego short-run increases. This result is consistent with Crain's finding that states with strict balanced budget rules exhibit less volatility in spending over time (Crain, 2003).

An alternative perspective is that states without spending limits can set spending levels without regard for revenues, since they are unconcerned with deficits. Therefore, changes in state revenue should not have as much of a short-term impact on those states as in states where budgets must be balanced every year, meaning that the above results would be contrary to expectations. This alternative perspective suggests that a state without a spending limit would apply more of that shock to a rainy-day fund, since it has already made spending decisions without regard to balance. The data do not support this hypothesis.

Returning to my argument, suppose that there is a positive revenue shock due to an increase in state personal income, but that spending decisions have already been made. My analysis implies that states with a spending limit that have already made their spending decisions are likely to place the surplus in a ''rainy-day fund'' to be tapped in cases when negative revenue shocks occur. States without spending limits are more likely to view the revenue shock as ''found money'' and find a way to allocate some of it. Bohn and Inman (1996) find precisely this: states with stricter balanced budget rules tend to have larger rainy-day funds and to put surpluses into those funds.

8. DISCUSSION

This paper contributes to our understanding of how and why spending limits matter in constraining government outlays. While it may seem obvious that budget rules intended to decrease spending would do so, there is ample evidence that such rules sometimes fail to accomplish their intended ends. The Gramm–Rudman–Hollings deficit reduction bill, which failed in the 1980s to eliminate deficits, is a prime example. A major source of this and other failures was the inability to successfully enforce the provisions put in place. By modeling an externally-enforceable spending limit, I have demonstrated that spending limits have the potential to work. The question

[38]The coefficient outside the parenthesis is negative, but so is the coefficient inside the parenthesis, making the impact positive.

then becomes: Given that rules often must be enforced without recourse to a third party, how can they be designed so that they achieve their desired ends? This is where future research should turn.

This paper also demonstrates that the impact of institutions is often contingent on the presence of other related institutions. Without a model, it would be difficult to develop the claim that the impact of executive ideology is dependent on the presence of spending limits. The theory offers an explanation: a spending limit offers the legislature leverage to induce more efficient spending on the part of the agenda setter, so that when supermajority coalitions have to be built to forestall a likely veto from a conservative executive, the legislature is willing to set spending at a higher level to account for the additional coalition members that will receive projects.

Further theoretical work is needed on (political) institutional design and its impact on spending. For instance, I am probing how legislative design affects the ability of legislatures to endogenously enforce rules (Primo, 2005). This research will also explain why endogenous enforcement of budget rules often fails. For analytical tractability, it is often not possible to model as rich an institutional environment as we might like. However, our goal should be a unified theory of institutional design that enables us to develop a richer understanding of spending decisions.

Empirically, the major finding here is that spending in the US states is driven more by economic and institutional features, and less by partisan factors. While there is an extensive literature linking state budget rules to deficit spending, there is relatively little work probing the link between these rules and the size of spending. The failure to find that gubernatorial ideology, or its interaction with spending limits, influences spending may in large part be due to the crude measures of ideology available. As I discuss below, the lack of statistical significance may be more important for what it says about partisan factors than for what it says about ideology.

The importance of the spending limit finding lies in its strong connection to theory. Limits, when enforceable, are shown in the model to lower spending in all cases. I find a similar, robust relationship in the US states. This paper is the first to provide both a strong theory and a lengthy time series to establish the importance of budget limits for constraining spending. Other institutional features, such as the citizen initiative and the size of state legislatures, also influence spending. Further theoretical work is needed on the fiscal implications of legislative design in a bicameral setting in order to reconcile the contradictory effects of upper and lower state chambers.

The party findings are sure to be surprising to those who believe that ''parties matter.'' While many papers find no party effects, there are a series of papers by Alt, Lowry, and others who find that parties do matter. Yet in the analysis I performed, the governor had no statistically significant effect on spending in the empirical analysis. While the governor's party had no effect, I noted earlier that the theory's comparative statics relate to shifts

from very liberal to very conservative executives (and vice versa). It may be that governors simply are not that different across the states – that perhaps because of competition from other states, they seek to ensure a certain amount of spending. In the model, if executives do not differ greatly in their preferences over total spending, then the executive veto will have little effect on spending. Another possibility is that the governor's party is a poor proxy for ideology.

The failure of a different aspect of parties – unified or divided government – to influence spending appears to contradict the seminal work of Alt and Lowry (1994), among others. There are at least two reasons for these discrepancies: first, my paper has a longer time series, which may suggest that the effect of parties has changed over time. As a first cut at this problem, a one-tailed *t*-test comparing divided government states with states with unified democratic governments (in the non-South) shows lower state and local spending in unified Democratic states, which contradicts Alt and Lowry's findings. However, the same *t*-test, restricting the sample to 1968–1987, points to a small positive effect of unified Democratic governments, which is consistent with their findings.[39] Further work is needed on establishing the conditions for which divided and unified government should be expected to influence spending. Moreover, this paper does not address the more likely scenario – that party differences influence relative spending on programs or the distribution of funds within the state (e.g. Ansolabehere and Snyder, 2003). This question is beyond the scope of the paper, but may be a place to probe further for party effects.

9. CONCLUSION

In closing, this paper makes both a theoretical and empirical contribution regarding the importance of institutions in determining policy outcomes. It offers a theoretical framework for understanding institutional interactions. The model shows that capping spending before bargaining over who gets what reduces the size of government. Spending limits "bite" because they allow the legislature to check the agenda setter's desire to engage in excessive spending for her district. The effect of veto authority is contingent both on ideology as well as the presence of a spending limit. Importantly, both the executive veto, when the executive is conservative, and the spending limit are welfare-improving institutions in the distributive politics framework.

Using 32 years of state budget data, I demonstrate that states with externally enforceable budget rules spend less than states without such restrictions, in part due to their reaction to an improved economy. Additional state personal income is not immediately spent by states with caps, suggesting that the spending limit is a calming force on the tendency for

[39]The results are consistent for unified Republican governments – they tend to have a negative effect on spending in both sets of *t*-tests.

government to grow as the citizenry gets richer. Other institutions, such as citizen initiatives, also influence spending. Partisan variables have little or no effect, meaning that the influence of parties may lie elsewhere, such as in the distribution of spending. Overall, then, economic and institutional conditions in a state drive aggregate spending outcomes, and future research should further explore how political institutions drive spending decisions.

APPENDIX A

A.1 Proof of Proposition 1: Baseline Model

Majority rule is just a special case where $s = (n+1)/2$, and so the proof for Proposition 1 is simply the proof of Proposition 4, replacing s with $(n+1)/2$ and ignoring details regarding the executive. □

A.2 Proof of Proposition 2: Majority Rule Legislature and a Spending Limit

Majority rule is just a special case where $s = (n+1)/2$, and so the proof for Proposition 2 is equivalent to the proof of Proposition 6, substituting $(n+1)/2$ for s and ignoring details regarding the executive. □

A.3 Proof of Proposition 3: Majority Rule Legislature and a Liberal Executive with Veto Authority

By assumption, the liberal executive's spending preferences are always significantly higher than those of the legislature and agenda setter, so there is never an incentive to induce a veto. Therefore, the liberal executive has no effect on the bargaining, and the outcomes are equivalent to those in Proposition 1. □

A.4 Proof of Proposition 4: Majority Rule Legislature and a Conservative Executive with Veto Authority

By construction, the conservative executive forces the building of an override coalition. Therefore, the agenda setter chooses x and y to maximize

$$bx - \frac{c}{2n}(x^2 + (s-1)y^2)$$
$$\text{s.t. } by - \frac{c}{2n}(x^2 + (s-1)y^2) - v \geq 0,$$

where v is the equilibrium continuation value of a legislator receiving an offer of y, and where

$$v = \frac{bx^*}{n} + \frac{(s-1)by^*}{n} - \frac{c(x^{*2} + (s-1)y^{*2})}{2n}.$$

The Lagrangian is

$$L = bx - \frac{c}{2n}(x^2 + (s-1)y^2) + \lambda\left(by - \frac{c}{2n}(x^2 + (s-1)y^2) - v\right),$$

which gives three first-order conditions:

$$\frac{\partial L}{\partial x} = b - (1+\lambda^*)\frac{cx^*}{n} = 0,$$
$$\frac{\partial L}{\partial y} = -(1+\lambda^*)\frac{(s-1)cy^*}{n} + \lambda^* b = 0,$$
$$\frac{\partial L}{\partial \lambda} = by^* - \frac{c}{2n}(x^{*2} + (s-1)y^{*2}) - v = 0.$$

Solving for x^* and y^* in terms of λ^* gives $x^* = bn/[(1+\lambda^*)c]$ and $y^* = \lambda^* bn/[(1+\lambda^*)(s-1)c]$.

Substituting these values, as well as the value of v, into the third first-order condition and solving for λ^* gives

$$\lambda^* = \frac{(s-1)}{(n-s+1)}.$$

Substituting back into x^* and y^* gives

$$x^* = (n-s+1)\frac{b}{c}$$
$$y^* = \frac{b}{c}.$$

Spending I is

$$\frac{c}{2}(x^{*2} + (s-1)y^{*2}),$$

which reduces to

$$I = \frac{b^2}{2c}[(n-s+1)^2 + (s-1)].$$

Net benefits for supporters, equivalent to v, are

$$NB = v = \frac{b^2}{2nc}[-(n-s+1)^2 - (s-1) + 2n].$$

By construction, legislators offered y^* will accept, since they can do no better by rejecting. Further, the agenda setter always accepts her own offer, since $x^* \geq y^*$. That a supporter never wants to deviate from the equilibrium strategy is obvious.

To show that the agenda setter would never want to offer something different than x^* in any round, note that to offer $\tilde{y} < y^*$ or $\tilde{x} > x^*$ would make her worse off. If $\tilde{y} > y^*$ or $\tilde{x} < x^*$ were offered, then the supporters would

reject the offer, which makes her worse off. This shows that no defection with regard to project scales is rational.

To show that the agenda setter never builds an oversized coalition (larger than s), note that if the agenda setter adds a member to the coalition, it is observationally equivalent to building a coalition of size $s+1$. The agenda setter's net benefit as a function of s is

$$NB_{as} = \frac{b^2}{2cn}[n^2 - s^2 + s].$$

The first derivative of this function is $[b^2/(2cn)][-2s+1]$, which is negative for all s. Therefore, adding to the coalition is not optimal for the agenda setter. This proves that this is an equilibrium.

Uniqueness is easily established by contradiction. First, there can be no equilibrium where the agenda setter offers a different proposal that is accepted, since by construction of the above proof it cannot be better than the proposal that solves the maximization problem. This leaves an equilibrium where the agenda setter's proposals are always rejected. This equilibrium is ruled out by the elimination of weakly dominated strategies, because such an equilibrium would require legislators to vote against projects that they prefer to the expected value of continuing the game. □

A.5 Proof of Proposition 5: Full Model (Spending Limit and Executive with Veto Authority) and a Liberal Executive

Consider a high-spending executive whose indifference budget, Z, is greater than $b^2(n^2+4n-1)/8c$, the equilibrium spending level in the baseline model. Consider the legislature's decision: it can propose spending greater than Z and provoke a veto, thereby forcing the agenda setter to build a supermajority coalition. Or it can propose the optimal I such that a majority coalition forms. If it chooses to induce a majority coalition, clearly it will pick the I described in the majority rule outcome with a spending limit. Suppose that it chooses to build a supermajority coalition. First, it would never choose a budget larger than $Z+\varepsilon$, since the net benefit function is declining in I in this interval. (This is easily verified.) Therefore, let the I selected be $Z+\varepsilon$. Again, because net benefits are declining in I in this interval, I can consider just the case where $Z+\varepsilon = b^2(n^2+4n-1)/(8c)+\varepsilon$. (For simplicity, the equations below will omit the ε.)

Recall that the expected net benefit of a majority-rule coalition member is

$$NB = \frac{2b^2}{c(n^2+4n-1)}.$$

The net benefit of a supermajority coalition member is

$$NB = \frac{b^2}{2c}\sqrt{\frac{(n^2+4n-1)}{(n-s+1)^2+(s-1)}} - \frac{b^2(n^2+4n-1)}{8nc}.$$

The supermajority net benefits can be rewritten as

$$NB = 8n\sqrt{n^2+4n-1}\left[\frac{1}{n\sqrt{(n-s+1)^2+(s-1)}} - \sqrt{n^2+4n-1}\right].$$

It is straightforward to show that the supermajority net benefits are negative and that the majority net benefits are positive, implying that the majority equilibrium will form.

Next, majority rule is just a special case where $s = (n+1)/2$, so the proof of Proposition 6, excepting the discussion of the executive and substituting in $(n+1)/2$ for s, provides the solution to the bargaining within the legislature. □

A.6 Proof of Proposition 6: Full Model (Spending Limit and Executive with Veto Authority) and a Conservative Executive

By construction, the conservative executive forces the building of an override coalition. The agenda setter chooses x and y to maximize

$$bx - \frac{c}{2n}(x^2 + (s-1)y^2)$$

subject to

$$by - \frac{c}{2n}(x^2 + (s-1)y^2) - v \geq 0 \quad \text{and} \quad I - \frac{c}{2}(x^2 + (s-1)y^2) \geq 0,$$

where v is the equilibrium continuation value of a legislator receiving an offer of y, and I is the budget selected by the legislature in the first period. Recall that

$$v = \frac{bx^*}{n} + \frac{(s-1)by^*}{n} - \frac{c(x^{*2} + (s-1)y^{*2})}{2n}.$$

The Lagrangian is

$$L = bx - \frac{c}{2n}(x^2 + (s-1)y^2) + \lambda\left(by - \frac{c}{2n}(x^2 + (s-1)y^2) - v\right) + \gamma\left(I - \frac{c}{2}(x^2 + (s-1)y^2)\right),$$

which gives four first-order conditions:

$$\frac{\partial L}{\partial x} = b - (1+\lambda^*)\frac{cx^*}{n} - \gamma^* cx^* = 0,$$
$$\frac{\partial L}{\partial y} = -(1+\lambda^*)\frac{(s-1)cy^*}{n} + \lambda^* b - \gamma^* c(s-1)y^* = 0,$$
$$\frac{\partial L}{\partial \lambda} = by^* - \frac{c}{2n}(x^{*2} + (s-1)y^{*2}) - v = 0,$$
$$\frac{\partial L}{\partial \gamma} = I - \frac{c}{2}(x^{*2} + (s-1)y^{*2}) = 0.$$

Solving for x^* and y^* in terms of λ^* and γ^* gives

$$x^* = \frac{bn}{(1+\lambda^*+\gamma^* n)c}$$
$$y^* = \frac{\lambda^* bn}{(1+\lambda^*+\gamma^* n)(s-1)c}.$$

This implies that $y^* = [\lambda^*/(s-1)]x^*$.

The third first-order condition and the definition of v requires that $x^* = (n-s+1)y^*$.

Combining these two relations implies that $\lambda^* = (s-1)/(n-s+1)$.

Next, to calculate γ^*, substitute the relations for x^* and y^* into the fourth first-order condition. Algebraic simplification implies that

$$\gamma^* = \frac{1}{n-s+1}\left[b\sqrt{\frac{(n-s+1)^2+(s-1)}{2cI}} - 1\right].$$

Substituting this back into the relation for x^* and y^* gives the equilibrium values

$$y^* = \sqrt{\frac{2I}{c[(n-s+1)^2+(s-1)]}}$$
$$x^* = (n-s+1)\sqrt{\frac{2I}{c[(n-s+1)^2+(s-1)]}}.$$

In the first period, the legislature selects the value of I that makes it best off, given expectations about the agenda setter's behavior in the distributive game. Since all legislators are equally likely to be either an agenda setter or a member of the coalition receiving projects, I consider the decision of a generic legislator. All legislators will vote identically.

Formally, the legislator's problem is to choose the I that maximizes

$$\frac{b}{n}(n-s+1)\sqrt{\frac{2I}{c[(n-s+1)^2+(s-1)]}}+\frac{b(s-1)}{n}\sqrt{\frac{2I}{c[(n-s+1)^2+(s-1)]}}$$
$$-\frac{c}{2n}\left[(n-s+1)^2\frac{2I}{c[(n-s+1)^2+(s-1)]}+(s-1)\frac{2I}{c[(n-s+1)^2+(s-1)]}\right].$$

Simplifying, taking the first-order conditions, and verifying the second-order conditions for a maximum implies that

$$I^*=\frac{b^2n^2}{2c[(n-s+1)^2+(s-1)]}.$$

Substituting I^* back into x and y gives

$$y^*=\frac{bn}{c[(n-s+1)^2+(s-1)]}$$
$$x^*=(n-s+1)\frac{bn}{c[(n-s+1)^2+(s-1)]}.$$

This implies that net benefits for supporters are

$$NB=v=\frac{b^2n}{2c[(n-s+1)^2+(s-1)]},$$

a positive number. This implies that setting spending to zero is not optimal.

Verifying that defection will never occur proceeds identically as in the proof of Proposition 4. □

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