Endogenous Cost Lobbying: Theory and Evidence

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Abstract

Special interests attempt to influence lawmakers through many mechanisms, one of which is informational lobbying. While there has been a substantial growth in the empirical literature on lobbying, there has been less direct testing of the implications of the theoretical models in the area. We provide the first empirical tests of a major class of models of costly legislative informational lobbying, the Potters-van Winden-Grossman-Helpman (PWGH) signaling model. Using data derived from over 50,000 observations of annual lobbying expenditures by special interest groups in the American states, we find that, as predicted by this class of models, special interest groups increase lobbying expenditures when the legislature is controlled by “enemies” rather than “friends.” We develop theoretical extensions to the core model that reflect the variety of observed institutional features of state governments over multiple periods, and then test much more refined and detailed predictions of interest group lobbying controlling for year, state, and interest group fixed effects. Overall, the results provide substantial support for the PWGH class of signaling models of lobbying.

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Introduction

One of the main mechanisms that interests groups use to influence policy making is by producing or discovering information and providing this information to lawmakers through lobbying efforts. Information about the efficacy, distributional impact, cost, popularity, and legality of programs is extremely valuable to re-election-oriented legislators. Not surprisingly, then, one finds a “Gucci gulch” of lobbyists outside the committee rooms of Congress and state legislatures across the county.

Transmitting information to lawmakers – lobbying – is an activity quite distinct, both practically and legally, from contributing money to political campaigns. Nonetheless, informational lobbying requires expenditures by groups: money to pay lobbyists’ salaries, money to maintain offices, money to commission studies, money to hire experts, and so on. One may gain at least a rough measure of the extent of informational lobbying by examining the volume of lobbying expenditures by special interests. At the U.S. federal level, annual lobbying expenditures in the last presidential electoral cycle were about $3 billion. By way of comparison, during that same period, expenditures by special interests on campaign contributions totaled about $600 million annually (de Figueiredo and Richter 2014). Perhaps surprisingly, lobbying, not campaign contributions, absorbs the bulk of “influence dollars” spent by special interest groups.

There have been a number of papers that examine the empirical regularities of informational lobbying. These papers have centered on the number of interest groups, the size and type of interest groups, the targets of interest groups and their lobbying intensity, and the effectiveness of lobbying. (An extensive review of this literature can be found in de Figueiredo & Richter 2014.) In the area of targeting, there seems to be a growing consensus in the literature that both allied (Kollman 1997, Caldeira & Wright 1998, Hojnacki & Kimball 1999, Heberlig 2005, Hall & Deardorff 2006, Hall & Miler 2000) and marginal (Holyoke 2003, Kelleher & Yackee 2009, Bertrand et al. 2012, Gawande et al. 2012) legislators on both sides of the issue are targeted for lobbying efforts. Because current US lobbying disclosure regulations do not require lobbyists to identify which legislators they are targeting, research on
this subject usually relies on survey data or inference from lobbying expenditure data. However, in their empirical work on counteractive lobbying, Austen-Smith & Wright (1994, 1996) provide a clear link between theory and empirical regularities. Their research on Supreme Court nominations finds empirical support for the theory that lobbyists target marginal legislators to “swing” them to the lobbyist’s position and that lobbyists target friends to “counteract” lobbying from opposition groups. Hall & Miler (2000) and Hojnacki & Kimball (1998) have critiqued the counteractive lobbying approach, instead arguing that interest groups’ legislative allies are the primary targets, followed by marginal legislators. They show empirically, in accordance with the theoretical predictions of Rotemberg (2003) and Hall & Deardorff (2006), that lobbyists mainly target allies (as a legislative subsidy) and agenda setters to influence the shape of legislation or to encourage these allied legislators, in turn, to lobby marginal and influential policy makers. These two approaches result in a pattern of lobbying where a variety of different legislators are targeted, even by one group, on the basis of their position in Congress and their position on an issue.2

In this paper, we contribute to this debate and attempt to bring an entire class of game theory signaling models to bear—endogenous cost models—to inform our empirical work and identify how lobbying effort will differ across different forms of legislative structures and alignment. In doing so, we hope to expand a small but important literature in lobbying that directly tests formal models of lobbying (Austen-Smith & Wright, 1996; Kang, 2012; Hall and Deardoff 2006; and Cameron & de Figueiredo, 2013).3 The paper focuses on most prominent model of informational lobbying with endogenous costs, the Potters-van Winden-Grossman-Helpman (PWGH) model. To the best of our knowledge, no empirical paper investigates the predictions of models of endogenous cost lobbying, specifically, and signaling models more generally. We extend the model to mirror the institutional structure and alignment of states, and then we employ some of the most extensive data yet collected on lobbying expenditures (as distinct from campaign contributions) by special interest groups. The data were collected from ethics commissions in the American states and include time series of aggregate lobbying expenditure data from 38 states as well as group-specific annual lobbying expenditures in each of twelve states, over 50,000
observations. We examine both sets of data. In addition, using the group-specific data, we construct panel data for groups operating in multiple states. The states involved possess a variety of legislative institutions, with varying political control and composition. This variation allows us to examine how legislative design and control affects lobbying expenditures, independent of interest group-specific effects. The expenditures studied here include approximately $6.7 billion in the aggregate lobbying data and $600 million in the more detailed micro-level data. Detailed expenditure records available in Wisconsin and Idaho indicate the bulk of the lobbying expenditures paid the salaries of lobbyists and their staff, rent for their offices, studies of policies, and fees for expert consultants. None were expended on campaign advertisements, campaign consultants, campaign literature, get-out-the-vote drives, issue advertising, or “walking around money.” In fact, it is illegal to report campaign contributions and campaign-type expenditures as lobbying expenditures. Thus, the data are well suited for studying expenditures in connection with informational lobbying.

As we discuss below, the PWGH model predicts that special interest groups increase informational lobbying expenditures when the legislature is controlled by “enemies” rather than by “friends.” In essence, groups must work harder to persuade a hostile audience. We extend the PWGH model to multiple periods so as to incorporate biennial budgeting. The extended theoretical model predicts that a group’s expenditures will be (weakly) higher in the budget years of biennial states, compared to annual states. But, it predicts, a group’s expenditures will be lower in the off-budget years of biennial states, compared to annual states. For biennial states, it predicts that a group’s expenditures will be higher in budget years if the state has higher off-year legislation costs (for example, if it is difficult for the legislature to meet in the off-budget year). But, the model predicts, a group’s expenditures will be lower in such states in off-budget years. Finally, the model predicts that lobbying expenditures will be independent of the size of state legislatures. It may be worth noting that most of these predictions (excepting the “friends” versus “enemies” prediction) are quite distinct from those made by vote buying or campaign contribution models. In fact, as is widely documented, campaign contributions are closely tied to the electoral cycle rather than budgeting cycles.
We find strong empirical support for almost all of the model’s predictions. In most cases, the predicted effects are substantively large, statistically significant, and robust to changes in specifications. Overall, the results provide substantial empirical support for the PWGH class of models of interest group lobbying.

The paper is organized in the following way. Section 2 describes the data. Section 3 reviews the PWGH model and extends it to encompass situations when a legislature changes pre-existing policy only periodically, as occurs in states with biennial budgeting. Several clear and distinctive predictions emerge. Section 4 uses the state data to investigate the PWGH predictions in a series of empirical tests. Section 5 discusses the findings and concludes. An Appendix contains proofs and additional empirical details.

II. The Lobbying Expenditure Data

The Lobbying Disclosure Act of 1995 provided data to scholars on lobbying expenditures at the federal level. But many state legislatures had already or concurrently passed similar legislation, creating state ethics commissions that collected substantial data on lobbying expenditures. Thus, extensive data now exists about lobbying expenditures in the American states. However, little of this data has been collected and analyzed heretofore.4

We exploit the state ethics commission data to create three distinct data sets. The first comprises annual aggregate lobbying expenditures by all interest groups in all states where such data had been kept for at least two years as reported in early 2005, thirty-eight states in all. Table 1 provides a list of the states, and the time periods for which the data is available and employed in this paper. This data yields 408 state-year observations.5

****INSERT TABLE 1 ABOUT HERE****

The second and more detailed data set consists of annual lobbying expenditures by individual interest groups in a panel of twelve states: Georgia, Idaho, Indiana, Kentucky, Maryland, Massachusetts,
Montana, New Jersey, Oregon, Virginia, Washington and Wisconsin. These states were chosen on the basis of data quality and availability. The individual interest group data encompasses more than 50,000 interest-group-state-year observations with positive expenditures on lobbying. The time periods in the panel average over six years but range from four years to ten years. Each state averages just over 4,000 observations.

A third data set is derived from this second. It consists of a panel of just over 7,052 interest group-state-year observations. In order to be included in this sub-sample, the interest group must be a firm or union and must have lobbied in more than one budget year in multiple states in the panel. There are 600 interest groups which meet these criteria. This sample frame is largely driven by the theory, which is discussed below. Nevertheless, business and labor interests comprise the vast majority of lobbying expenditures recorded.

An obvious issue with the disclosure data is that reporting requirements differ across states. Hence, simple cross-state differences in lobbying expenditures may largely reflect different legal requirements for reporting expenditures. Accordingly, in the statistical analyses in the paper, to control for different reporting requirements as well as other time-invariant unmeasured characteristics, we employ state or interest group fixed effects whenever possible.

To provide an overview of the most striking feature of the data, Figure 1 displays annual lobbying expenditures in three states with important variation in legislative processes: New York, Wisconsin, and Oregon. New York has annual regular sessions and annual budgeting, Wisconsin has annual regular sessions but biennial budgeting, and Oregon has biennial regular sessions and biennial budgeting.

The figure suggests a close relationship between lobbying expenditures and the budget cycle. In particular, Oregon’s and Wisconsin’s lobbying expenditures increase substantially in budget years, and drop in off-budget years, resulting in a saw-tooth pattern in expenditures. New York, with annual budgeting, displays no such pattern, however it suggests there may be non-stationarity in the data (which

****INSERT FIGURE 1 ABOUT HERE****

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we will address below). Finally, comparing Oregon to Wisconsin, it appears that regular sessions engender more lobbying effort than special sessions.

Because previous studies focused exclusively on the federal level, where budgeting is annual, the link between lobbying and budgeting seems to have escaped the notice of analysts using time series data. But the pattern is not difficult to understand. Budgeting forces reconsideration (if only nominally) of policy in virtually every arena in which a government is active. Budgeting thus affords a regular opportunity for aggressive claimants to make new or expanded bids on the public fisc. It also creates a threat – at least potentially – to the rents of virtually every vested interest, as well as the potential for taxation by the state government and thus rent dissipation for the interest group. In contrast, legislative action outside the institutionalized budget process requires substantial and sustained investments of time and effort by legislative entrepreneurs (Arnold 1990). Even modest changes must negotiate a torturous path through multiple, stringent veto points (Krehbiel 1998). Accordingly, serious change in existing policies, or innovation of new ones, is rare (Baumgartner and Jones 1993, Mayhew 1991). Because there is little reason to lobby when the status quo appears inviolable, and considerable reason to do so when the status quo seems vulnerable, it is no surprise the state data reveals a close link between lobbying expenditures and budget years in states with biennial budgeting. Because regular sessions afford greater scope for legislative action than special sessions, lobbying expenditures predictably are greater in the former than the latter.

To insure that this is not merely a spurious correlation, we briefly present a multivariate statistical analysis confirming the patterns on display in the figure (see Table 2). A battery of augmented Dickey-Fuller and Fisher tests indicate that some of the longer time series of expenditures, like New York, in this aggregate state-year data are not stationary. The regressions eliminates the non-stationarity of the data in each and every state by taking first differences.

We employ a number of independent variables (Table A1 defines each variable and indicates its source.) These include indicator variables for a budget year and election year for the state legislature. We also include variables that measure the number of days the legislature met in regular session and special
session in that year. We characterize the makeup of the state government as unified Republican, unified Democratic, or divided government. All variables are differenced within state. In addition, we control for per capita income in the state, and, in all the regressions, use state fixed effects for the 38 states.

****INSERT TABLE 2 ABOUT HERE****

In Table 2 we use two different dependent variables: the difference in the log of annual, per capita interest group lobbying expenditures and the difference in the log of annual interest group lobbying expenditures. A positive coefficient on a variable means an increase in the variable increases the difference in the amount of lobbying within a state relative to mean level of lobbying for that state; a negative coefficient means an increase in the variable of interest decreases the difference in the amount of lobbying. Standard errors of the coefficients are listed in parenthesis below the coefficient estimates. Statistical significance at the 95% and 99% level are noted.

The results across the two models are nearly identical. Each 10 day change in the length of the legislative session results in 6% increase in the lobbying rates. The most pronounced effect, however, concerns budget years. Special interests increase their lobbying efforts substantially during budget years. The 23% increase in lobbying during budget years is robust across both specifications and statistically significant at the 99% level of confidence, controlling for other factors. The patterns shown in Figure 1 seem to be characteristic of broad patterns in the American states.

Having established the importance of the budget cycle to lobbying effort in this exploratory analysis, we wish to use this fact and variation in the institutional structures across the states to explore the validity of models of endogenous cost lobbying. We now turn to theory.

III. Endogenous Cost Lobbying: Theory

Advice-giving by interested or biased parties has spawned a large and complex theoretical literature. Within this literature, existing models of non-verifiable information fall into two broad classes: cheap-talk models, in which a biased expert transmits information using a costless signal, and expenditure
models, in which a biased expert pays to communicate. The first class of models, initiated by Crawford and Sobel (1982), and extended by numerous authors (for example, Krishna and Morgan 2001 and Battaglini 2004) is by far the more extensive. Because our interest is expenditures on lobbying, however, we focus on the second class of models.

The lobby expenditure literature distinguishes two situations. In the first costly activism situation, the advisor pays an exogenous fee (typically a flat fee) to engage in advocacy or acquire information (e.g. Lohmann 1993, Grossman and Helpman 2001 [section 5.1], Bennedsen and Feldmann 2002, and Battaglini and Benabou 2003). The focus of the analysis is how the legislator extracts truthful information from observed levels of activism, or on the micro-details of advocacy. Since there is no room in these models for the SIG (special interest group) to vary the level of lobbying expenditure (given participation), the state expenditure data are poorly suited for testing these models.

The second group of models examines situations with endogenous spending. In these models, an observable, endogenously chosen expenditure level provides information about the group’s private information. Initiated by Potters and Van Winden (1992) and Austen-Smith (1995) and extended in Grossman and Helpman (2001: Section 5.2), these models adapt the standard technology of costly signaling to a political setting. Data on groups’ lobbying expenditures appears well-suited for testing this type of model, with one caveat.

We proceed as follows. First, we review the basic framework, which we see as applicable in states with annual policy making due to annual budgeting. We then consider lobbying in the off-budget year of states with biennial budgeting. Here, due to the costliness of legislative action, the status quo is privileged absent a compelling reason for change. We distinguish states with higher and lower legislation costs in the off-budget year. Finally, we consider rational lobbying in budget years for states with biennial budgeting. Here, the state’s policy receives active reconsideration but actors anticipate a degree of stickiness in policy in the next period. We conclude the section by detailing testable propositions about lobbying expenditures under different political configurations and across states with different institutional arrangements. Proofs are relegated to the Appendix.
A. The Basic Model: Lobbying With Annual Budgeting

In the basic PWGH framework, a legislature (G) has public policy preferences that depend on the state of the world, a random variable \( \theta \). A special interest group (SIG) has preferences over \( \theta \) as well, though in any state of the world the SIG may prefer higher (or lower) levels of the policy relative to the legislator. In this sense, the SIG is “biased.” The SIG, knowing \( \theta \), signals its private information to the decision maker by expending money on lobbying. In the basic framework, G sets policy \( p \) \textit{de novo}, based upon its beliefs about \( \theta \) after observing the SIG’s expenditure.

The policy space is the non-negative real line with \( p \in P = \mathbb{R}_+ \). States of the world are a continuous random variable \( \tilde{\theta} \) drawn from \( \Theta = [\theta_{\min}, \theta_{\max}] \), \( \theta_{\min} \geq 0 \). The utility function of the policy maker is

\[
G(p; \theta) = -(p - \theta)^2
\]

While that of the SIG is:

\[
U(l, p; \theta, \delta) = -(p - \theta - \delta)^2 - l
\]

where \( l \) denotes the monetary expenditure by the SIG.

The degree of SIG bias is parameterized as \( \delta \), which is common knowledge, making the SIG’s ideal point \( \theta + \delta \). Thus, if \( \delta \) is positive the SIG wishes a somewhat higher policy than does the policymaker for any state of the world (positive bias), but if \( \delta \) is negative, the SIG wishes a somewhat lower one (negative bias). We will associate positive bias with “liberal” groups and negative bias with “conservative” ones. Note that bias is defined relative to the legislature (that is, the median voter in the legislature).

The sequence of play is: 1) Nature draws \( \theta \) using common knowledge distribution \( F(\theta) \); 2) the SIG (costlessly) learns \( \theta \) and publicly burns money \( l \); 3) the legislature sets policy \( p \).

“Publicly burning money” is not necessarily required in a literal sense. The lobbyist, for example, could invest in elaborate reports, hire additional and more expensive experts, and so on. The key
requirements are that the SIG itself chooses its expenditure level, so it is not exogenously determined, and that the legislator observes the expenditure level.

A strategy for the SIG is a function mapping states of the world into expenditures, \( l : \Theta \to \mathbb{R}_+ \). A strategy for the policy maker is a function mapping expenditures into policy, \( r : \mathbb{R}_+ \to P \). An obvious but important point is that, in any equilibrium, the policy maker will set \( p \) to \( \theta \) if it knows it.

The following proposition summarizes Grossman’s and Helpman’s analysis.\(^{13}\)

**Proposition 1** (Annual budgeting). The following is a Perfect Bayesian equilibrium to the one-period lobbying game:

\[
\begin{align*}
l(\theta; \delta, \theta_{\text{min}}, \theta_{\text{max}}) &= \begin{cases} 
2\delta(\theta - \theta_{\text{min}}) & \text{if } \delta \geq 0 \\
2\delta(\theta - \theta_{\text{max}}) & \text{if } \delta < 0
\end{cases} \\
p(l; \delta, \theta_{\text{min}}, \theta_{\text{max}}) &= \begin{cases} 
\theta_{\text{min}} + \frac{l}{2\delta} & \text{if } \delta \geq 0 \\
\theta_{\text{max}} + \frac{l}{2\delta} & \text{if } \delta < 0
\end{cases}
\end{align*}
\]

Beliefs are determined by Bayes Rule whenever possible.

The intuition behind the result is simple. The gain to the SIG if G’s belief about \( \theta \) is slightly higher is \( \frac{\partial}{\partial \theta} U(\theta) = -2(p - \theta - \delta) \). To induce truthful revelation, the lobby expenditure function must be such that, at \( p = \theta \), this marginal gain must equal the marginal increase in lobbying expenditure with respect to higher \( \theta \). That is, \( 2\delta = l' \), implying \( l(\theta) = 2\delta \theta \). In addition, lobbying expenditures must be non-negative and equal to zero if \( \theta = \theta_{\text{min}} \) for the case of positive bias, and equal to zero if \( \theta = \theta_{\text{max}} \) for the case of negative bias. The equilibrium is fully separating.
B. Extension: Biennial Budgeting

In some states, such as Oregon, the legislature meets only every other year, absent a special session. In these states, policy is effectively frozen in the off-budget years. In other states, such as Wisconsin, the legislature meets annually but budgeting takes place on a biannual schedule. In these states, modifying budgets in the off-budget year is not impossible but it is difficult. To analyze lobbying expenditures in states like Oregon and Wisconsin, we extend the PWGH model to include two periods, a budgeting period and non-budgeting period. Policy is easy to change in the former; in the latter, it is not.

In what follows we assume the state of the world evolves as a random walk. More specifically, if the state of the world in period 1 is \( \theta_1 \), we assume the state of the world in the second period, \( \theta_2 \), is drawn from a uniform distribution on \( \left[ \theta_1 - \frac{1}{2}, \theta_1 + \frac{1}{2} \right] \). Uniform drift provides an obvious baseline and motivates the empirical work in a natural way.

1. Second Period Equilibrium

Policy making in the budget year establishes a status quo policy, \( p_1 \), in place at time 2. The policy maker then faces a cost of legislating, \( k_2 > 0 \), to set new policy \( p_2 \). The second period utility function for the legislature becomes:

\[
G(p_2; p_1, \theta_2, k_2) = \begin{cases} 
-(p_1 - \theta_2)^2 & \text{if } p_2 = p_1 \text{ (no action)} \\
-(p_2 - \theta_2)^2 - k_2 & \text{if } p_2 \neq p_1
\end{cases}
\]

An obvious implication is: if the policy maker knew \( \theta_2 \), it would not legislate unless \( \theta_2 \) were sufficiently far from \( p_1 \). If the policy maker alters policy knowing \( \theta_2 \) it will set \( p_2 = \theta_2 \), so the relevant comparison is \( -(p_1 - \theta_2)^2 \) versus \( -k_2 \). This implies: do not legislate if \( \theta_2 \in \left[ p_1 - \sqrt{k_2}, p_1 + \sqrt{k_2} \right] \). In essence, there is a “hole” in the \( \theta_2 \) space and the policy maker will not wish to legislative if \( \theta_2 \) falls in the hole.
We distinguish “high $k_2$” states from “low $k_2$” ones (we will drop the subscript when no confusion can arise). In the former, the cost of legislating in the second period is so high that regardless of the realization of $\theta_2$ the legislature will not act. For example, in a state where legislature simply does not meet in the off-budget years and cannot be convened in special session would conform to this definition. In contrast, in low $k_2$ states there are some realizations of $\theta_2$ that would lead the legislature to act, if the value became known. Recalling that $\theta_2$ is uniform on $\left[\theta_1 - \frac{1}{2}, \theta_1 + \frac{1}{2}\right]$, we show later that high $k_2$ states are defined by $k_2 \geq \left(\frac{1}{2} + \max\{\theta_1, p_1\} - \min\{\theta_1, p_1\}\right)^2$, as this condition assures that the edges of the “hole” extend beyond the support of $\theta_2$. In low $k_2$ states this inequality is reversed, a condition assuring part of the support of $\theta_2$ lies outside the “hole.”

In high $k_2$ states lobbying expenditures must be zero in the off-budget years since policy is completely unresponsive to lobbying, and zero expenditures dominates all other expenditure levels for the SIG. In contrast, in low $k_2$ states there are levels of $\theta_2$ that, if known, would lead the policy maker to revise policy. In the Appendix we construct a lobbying expenditure function that induces the SIG to truthfully reveal $\theta_2$ if it is outside the “hole” and otherwise indicate that $\theta_2$ lies in the “hole.” The policy maker sets $p_2 = \theta_2$ if $\theta_2$ lies outside the “hole” and does not alter policy if it is inside the hole.

Proposition 2 summarizes the second period equilibrium strategies.

**Proposition 2** (Off-budget year in states with biennial budgeting). The following comprise second period strategies in PBE to the two period lobbying game. 1) *High-$k_2$ states*: $p_2 = p_1$ and $l_2(\theta_2) = 0$ for all $\theta_2$. 2) *Low-$k_2$ states*:  $\ldots$
Beliefs are determined by Bayes’s Rule where ever possible.

2. First Period Equilibrium

We now consider equilibrium behavior in the first period, the budgeting period, with all actors anticipating rational play in the second, non-budgeting period. As in the case of annual budgeting, we assume \( k_1 = 0 \). In the Appendix, we show the following proposition characterizes first period play.

**Proposition 3** (Budget years in states with biennial budgeting). 1) If \( k_2 \geq \frac{1}{4} \), the following are first period strategies in a Perfect Bayesian equilibrium to the two-period lobbying game:

\[
l_2(\theta_2) = \begin{cases} 
2\delta(\theta_2 - \theta_{2\min}) & \text{if } \theta_2 \notin \left[ p_1 - \sqrt{k}, p_1 + \sqrt{k} \right] \\
2\delta(p_1 - \theta_{2\min}) - k & \text{if } \theta_2 \in \left[ p_1 - \sqrt{k}, p_1 + \sqrt{k} \right] \\
2\delta(\theta_2 - \theta_{2\max}) & \text{if } \theta_2 \notin \left[ p_1 - \sqrt{k}, p_1 + \sqrt{k} \right] \\
2\delta(p_1 - \theta_{2\max}) - k & \text{if } \theta_2 \in \left[ p_1 - \sqrt{k}, p_1 + \sqrt{k} \right]
\end{cases}
\]

And

\[
p_2(l_2) = \begin{cases} 
p_1 & \text{if } \delta > 0 \text{ and } l_2 = 2\delta(p_1 - \theta_{2\min}) - k \\
p_1 & \text{if } \delta < 0 \text{ and } l_2 = 2\delta(\theta_{2\max} - p_1) - k \\
\theta_{2\min} + \frac{l_2}{2\delta} & \text{if } \delta > 0 \text{ and } l_2 \neq 2\delta(p_1 - \theta_{2\min}) - k \\
\theta_{2\max} + \frac{l_2}{2\delta} & \text{if } \delta < 0 \text{ and } l_2 \neq 2\delta(\theta_{2\max} - p_1) - k
\end{cases}
\]
2) If \( k_2 < \frac{1}{4} \), the strategies given in Proposition 1 are first period strategies in a PBE to the two period lobbying game. In both cases, beliefs are determined by Bayes’s Rule where ever possible.

In high \( k_2 \) states, \( \theta_1 \) is perfectly revealed but the lobbying expenditure function is twice as steep as in annual states. In essence, lobby expenditures are shifted into the budgeting year, as the policy lock-in that occurs in the off-budget year makes the stakes that much higher for the SIG in the budget year. In low \( k_2 \) states, \( \theta_1 \) is again perfectly revealed and the lobby expenditure function is the same as in the annual states.

C. Empirical Implications

To test the models we utilize the lobbying expenditure functions detailed in Propositions 1-3. However, because \( \theta_1 \) and \( \theta_2 \) are unobservable random variables, we take expectations with respect to them to derive expected lobbying expenditure functions for SIGs over the budget cycle and across different institutional configurations (see Appendix).\(^{15}\) The five expected lobbying expenditure functions that result are gathered into Table 3.

INSERT TABLE 3 and TABLE 4 ABOUT HERE

Simple inspection of the expected lobbying expenditure functions yields five types of hypotheses, shown in Table 4. The first concerns the effect of SIG bias on expected lobbying expenditures: regardless of the institutional configuration, an increase in a SIG’s bias leads (strongly or weakly) to an increase in its lobbying expenditures. We regard this as the central and critical testable implication of the PWGH framework.

The second group of hypotheses concerns lobbying expenditures in budget years. Ceteris paribus, in budget years a SIG’s lobbying expenditures should be higher in states with biennial budgeting and high off-year legislation costs, than in the other two institutional configurations. And, a SIG’s lobbying
expenditures in states with annual budgeting should be indistinguishable from those in biennial states with low off-year legislation costs.

The third group of hypotheses addresses lobbying expenditures in the off-budget years. *Ceteris paribus*, in off-budget years a SIG’s lobbying expenditures should be higher in states with annual budgeting, next highest in states with biennial budgeting and low off-year legislation costs, and lowest in states with biennial budgeting and high off-year legislation costs. Note that this is the reverse order from that in the second group of hypotheses, a distinctive feature of the extended PWGH framework.

The fourth group of hypotheses concerns the drop in lobbying expenditures in off-budget years relative to budget years, in biennial states. Because this observation motivated the construction of the extended model we do not regard it as strictly a valid test of the model. However, we do note that Table 3 suggests that the ratio of lobbying expenditures in biennial low-k states between period 1 and 2 will be equivalent to the ratio of lobbying in period 2 of annual states to biennial states low-k states.

The fifth type of hypotheses involves lobby expenditures and the size of the state legislature. The size of the legislature does not enter any of the expected expenditure functions. This reflects the demonstration effect of spending: it is a signal accessible to all legislators. In contrast, vote buying models typically predict that SIG expenditures will increase with the size of the legislature, since assembling a majority often requires buying more votes in larger legislatures. The invariance of expenditures to the size of the legislature is a distinctive prediction of a signaling approach to lobbying, relative to vote buying models.

**IV. Data Analysis**

In order to test the five main predictions of the PWGH model, we conduct three sets of analyses. We start by testing the core prediction in the model, the effect of bias on the amount of endogenous lobbying expenditures that occur. We then examine the second, third, and fifth predictions – those concerning inter- or cross-institutional effects. To do so, we employ two different estimation methods. Finally, we
test the fourth cluster of intra- or within-institutional predictions in high \( k \) and low \( k \) states over the budget cycle.

A. Core Prediction: Increased Bias Leads to Higher Lobbying Expenditures

We begin by testing the core prediction of the theory: an increase in bias between the legislator and the interest group leads to higher lobbying expenditures – Hypothesis 1: \( \frac{\partial \bar{L}}{\partial \delta} \geq 0 \). In this subsection, we use 7,052 interest group state observations from the twelve state panel of groups. The groups analyzed here include all firms and unions operating in multiple states. This sample frame is a natural choice for two reasons. First, these interest groups frequently have an ideological character (i.e., liberal, conservative) and they are frequently allied with the major political parties (Democrats for labor, Republicans for firms). Second, by choosing groups that lobby in multiple states, we can estimate separate interest group fixed effects and state fixed effects. This sample frame is the third dataset referred to in Section 2.

The dependent variable is the log of lobbying expenditures for group \( i \), in state \( j \), at time \( t \). To measure bias, \( \delta \), we create a distance variable which is always positive. This variable measures the ideological distance of the firm (union) to the legislature. The distance is coded as 0 for a firm if the government (House, Senate, and Governor) is entirely Republican, and 0 for a union if the government is entirely Democratic. It is coded as 0.5 for both firms and unions if there is divided government. And it is coded as a 1 for the firm if the government is unified Democratic, and 1 for a union if the government is entirely Republican. We also include other control variables, such as log of per capita income in the state, the number days the legislature is in session, and the number of days the legislature is in special session. Group fixed effects, state fixed effects, and year fixed effects are used, as noted.

Table 5 presents the results. Models 1 through 5 present results with levels on levels. Model 1 uses no fixed effects, Model 2 adds group fixed effects, Model 3 adds time-varying control variables, Model 4 adds state fixed effects, and Model 5 includes fixed effects for group, state, and year.
The coefficient on distance is positive and statistically significant at the 99% level in all specifications. The inclusion of state fixed effects in Models 4 and 5 causes the size of the coefficient on distance to drop by almost two-thirds, but it remains positive. Substantively, Model 5, with the group, state, and year fixed effects and control variables, estimates there is a 30% increase in lobbying by firms (unions) when the government switches from being unified Republican (Democratic) to unified Democratic (Republican). Longer regular and special sessions also result in statistically more lobbying, with each additional 10 legislative days giving rise to 4-5% more lobbying expenditures by special interests.\footnote{16}

In Models 6 through 10, we replicate the five earlier models using a differences-in-differences estimator.\footnote{17} Models 7 through 10 include group, state, and/or year fixed effects as noted, as well. In Model 10, all coefficients are statistically significant at the 95% or 99% level and all have the same sign as in Model 5. The magnitude of the coefficient on Distance is somewhat larger than Model 5. It suggests a 73% increase in lobbying by firms (unions) when the government switches from being unified Republican (Democratic) to unified Democratic (Republican). There is only a 5% increase in lobbying with each additional ten legislative days in the session. That is, a shift in unified government has almost the same effect as adding 146 session days to the legislative calendar. The effect for special sessions is the same as the effect of regular sessions in this specification. This result is rather robust, statistically and economically significant, and consistent with the core prediction of the extended-PWGH model presented in Hypothesis 1, that the greater the distance between the interest group and the legislature, the more SIG lobbying that occurs.

\section*{B. Inter-Institutional Predictions: The Effects of the Budget Cycle on Lobbying}

We now turn to tests of the inter- or cross-institutional hypotheses, those shown in clusters 2, 3, and 5 in Table 4. We employ two different data sets. The first utilizes the individual business-labor data of the previous section and allows us to estimate the theoretical effects at the micro level. The second
utilizes aggregate state level lobbying expenditures from 38 states and allows us to estimate the theoretical effects at the macro level.

In the micro data, we cannot use state fixed effects because of the unvarying state characteristics (namely the states’ budgetary institutions). Instead, we employ interest group fixed effects, year fixed effects, state random effects, and a dummy variable, “lax regulations”, which controls for the states’ lobbying expenditures reporting requirements. In the macro data, we can estimate state fixed effects and then decompose the fixed effects to test the model’s predictions (following Card and Krueger 1992). We pursue both methods and obtain similar results.

1. **Interest Group Level Data**

Here we employ the same set of observations as in the previous section. Again the dependent variable is logged lobbying expenditures for group $i$, in state $j$, at time $t$. To measure bias, $\delta$, we utilize the same distance variable. We retain group fixed effects and year fixed effects and use state random effects. We also employ several dummy variables. To analyze the size of $k$ in the second period, we categorize states into three groups according the standards of the National Council of State Legislatures (NCSL). The first group is comprised of states that budget biennially and either do not meet at all in the off-year, or have limitations (either legislatively or constitutionally) on the budget bills that can be considered in the off-year. These are the high $k$ states with biennial budgeting. The second group is comprised of states that budget biennially, meet in the off-year, and have few constitutional or legislative limitations of which types of bills can be considered in the off-year. These are the low $k$ states with biennial budgeting. The final group of states is comprised of states with annual budgeting. Annual budgeting states are the omitted category in the statistical analysis. Finally, as a partial control for differing expenditure requirements, we include a dummy variable, Lax Regulations, for the states with the weakest lobbying expenditure disclosure requirements (See Appendix A1.)

In order to clearly test the predictions, we must run separate analyses on expenditures in budgeting years and those in off-budgeting years. Thus, we split the sample frame in two: Sample Frame
1 includes budget year data for the sub-sample of business-labor groups in the 12 state panel, while Sample Frame 2 includes data from the off-budget years for biennial states and budget years for annual states.

In budget years, the theory predicts groups in low-\(k\) states will have similar spending levels as groups in annual budgeting states (ceteris paribus). However, the theory predicts groups in high-\(k\) states will spend at twice this rate. (See Table 4.) In off-budget years, the theory predicts that group expenditures in low-\(k\) states will be lower than those in annual states. Similarly, group expenditures in high-\(k\) states in the off-years are also predicted to be lower than those in annual states. Additionally, expenditures in high-\(k\) states are predicted to be lower than those in low-\(k\) states, in the off-budget years.

**INSERT TABLE 6 HERE**

Table 6 presents the results of the estimation. Model 1 uses Sample Frame 1 to test the budget year hypotheses (Cluster 2 in Table 4); Model 2 uses Sample Frame 2 to test hypotheses about off-budget year expenditures (Cluster 3 in Table 4).

First, note that in both models the coefficient on bias is positive and statistically significant at the 99% level, again consistent with the core prediction of the theory. A change from a government which is completely aligned with the SIG’s interest to one which is opposed results in 180% (Model 1) to 134% (Model 2) more lobbying by the SIG, larger than earlier estimates.

Examining Model 1, the coefficient on Biennial Low \(k\) is positive but not statistically different from zero, indicating that lobbying expenditures in budget years in low \(k\) states are not statistically different from lobbying expenditures in annual states, as predicted. The coefficient on Biennial High \(k\) is positive and statistically significant at the 99% level. The point estimate for the coefficient on Biennial High \(k\) implies that lobbying expenditures in these states is 82% greater than in annual states. Given the standard error on the coefficient, an F-test fails to reject the hypothesis that lobbying expenditures in Biennial High \(k\) states is exactly twice that of annual states. Moreover, an F-test shows that the coefficient on Biennial High \(k\) is statistically different and higher than Low \(k\) Biennial, as predicted. Thus,
in this specification, we find that all predictions in the second hypothesis hold: \( L_{A} = L_{B1}^{low} k \), \( L_{B1}^{high} k = 2L_{A} \), \( L_{B1}^{high} k = 2L_{B1}^{low} k \).

Model 2 replicates Model 1 but uses Sample Frame 2 to test the off-budget year hypothesis. The coefficient on Biennial Low \( k \) is negative as predicted by the theory, and is statistically significant at the 99% level, lending support to the Hypothesis 3a (from Table 4). The coefficient on Biennial High-\( k \) is also negative as predicted by the theory, and statistically significantly different from zero 95% level as predicted in Hypothesis 3b. However, an F-test fails to reject the possibility that off-budget year spending by groups in high \( k \) states is not less than that in low-\( k \) states as predicted in Hypothesis 3c.

Overall, the individual level data show broad support for the theory’s predictions, supporting Hypotheses 2a, 2b, 2c, 3a, and 3b; only Hypothesis 3c does not find support in the individual interest group level data.

2. Aggregate Level Data

We now undertake a two-stage analysis of aggregate expenditure data by state and year (the data used in Section 2) as a second method for examining these same predictions. In the first stage, we estimate aggregate logged lobbying expenditures as a function of state fixed effects, plus control variables that vary over time. In the second stage, we decompose the state fixed effects with cross sectional regressions using non-time varying covariates (Card and Krueger 1992). The decomposition of the state fixed effects allows tests of the model’s predictions about cross-institutional effects.

The advantage of the two-stage procedure is its superior ability to control for varying lobby disclosure laws via the state fixed effects, while still allowing tests of the predictions. However, in order to employ aggregate data, we must assume that the effect of the second stage variables (low \( k \), high \( k \), biennial, total legislatures, etc.) is the same across all interest groups across time.\(^\text{20}\) Thirty-five state fixed effects are estimated for budget years and thirty-two for off-budget years.\(^\text{21}\)
PLEASE SEE REFEREE TABLE A2 FOR THE RESULTS OF THE FIRST STAGE REGRESSIONS.

These fixed effects become the dependent variables for the second stage regressions.

The results of the second stage estimation are shown in Table 7. In addition to the Biennial, Biennial High $k$, and Biennial Low $k$ variables, the second stage regressions include controls for whether the state has legislative term limits or budget caps, the size of the legislature, the veto override majority requirements, and an index that describes the degree of professionalization of the legislature. (Table A1 includes definitions of all variables.) Model 1 examines budget year expenditures while Model 2 examines off-budget years. Both models split the states into High $k$ and Low $k$ states.

We first consider the cluster of hypotheses about expenditures in budget years with Model 1. The coefficient on Biennial High $k$ is positive and statistically significant, and the coefficient on Biennial Low $k$ is not statistically different from zero. These results conform to the predictions of the theory in Hypotheses 2a and 2b ($L_A < L_{B1}^{high k}$ and $L_A = L_{B1}^{low k}$). As shown in Table 4, the theory further predicts that expenditures in a high-$k$ state will be twice that in an annual state as in Hypothesis 2b ($2L_A = L_{B1}^{high k}$).

The point estimate of the coefficient on Biennial High $k$ indicates that a high $k$ state has 70% higher lobbying expenditures relative to annual budget states in the budget years, and an F-test cannot reject the possibility that $2L_A = L_{B1}^{high k}$ at the 95% level of confidence. Finally, the coefficients on Biennial Low $k$ and Biennial High $k$ display the same relationship ($L_{B1}^{high k} = 2L_{B1}^{low k}$, as predicted in Hypothesis 2c) at the 92% level of confidence, despite only 35 observations.

*** INSERT TABLE 7 HERE ***

We now turn to the hypotheses concerning off-budget year expenditures. Model 2 indicates that both low $k$ states and high $k$ biennial budgeting states have less lobbying in off-budget years than do annual budgeting states, as predicted by the Hypotheses 3a and 3b of the theory. Both low $k$ and high $k$ states have 21% less lobbying during these periods. The data appear to reject the prediction that low $k$ states have greater lobbying than high $k$ states in the off-budget years. (That is, we can reject the
prediction in Hypothesis 3c \( L_{B_1}^{low} > L_{B_2}^{high} \). Thus, we find support for two of the model’s three predictions about expenditures in the off-budget years. Overall, the two estimation methods found in this sub-section, derive qualitatively the same results, finding support for the core hypothesis and five of the six predictions in the second and third clusters of predictions in both the micro and macro analyses. Only Hypothesis 3c fails to find support in the analyses.

Table 7 can also be used to examine the fifth hypotheses \( \partial L / \partial n = 0 \): the size of the legislature does not affect the amount of lobbying that occurs. An examination of the coefficients on Total Number of Legislators in all of our models shows that the size of the legislature does not matter to the amount of lobbying that occurs. This stands in contrast to the standard vote-buying models, which argue that the contributions are apt to increase with the size of the legislature.

C. Intra-Institutional Predictions: The Effects of the Budget Cycle on Lobbying

Hypothesis 4a and 4b predicts that in states with biennial budgeting, expected lobbying expenditures by SIGs is strictly lower in off-budget years relative to budget years. (That is, \( L_{B_1}^{high} > L_{B_2}^{high} \) and \( L_{B_1}^{low} > L_{B_2}^{low} \). As this observation motivated the construction of the extended model we do not regard these predictions as a strictly valid test of the model. However, the analyses in Table 8 confirm that the pattern holds in both low-\( k \) and high-\( k \) biennial budgeting states. Model 1 demonstrates that lobbying increases 17% in budget years for biennial budgeting low \( k \) states, and Model 2 demonstrates that it also increases 44% in budget year for biennial budgeting high \( k \) states, relative to budget years. In addition, as the number of days in a legislative session increases, so does the amount of lobbying by SIGs. These results are consistent with the first two intra-institutional hypotheses.

*** INSERT TABLE 8 HERE ***

Table 4, however, notes an additional and more subtle prediction about the magnitude of lobby expenditures over the budget cycle. In particular, the model predicts in Hypothesis 4c
\[ L_{B_2}^{\text{low } k} / L_A = L_{B_2}^{\text{low } k} / L_{B_1}^{\text{low } k} \]: the ratio of off-budget year expenditures in low-\(k\) states to expenditures in annual states, should be the same as the ratio of off-budget year expenditures in low-\(k\) states to budget year expenditures in low-\(k\) states. We can use the results in Tables 7 and 8 together to test this prediction from the model. The tables together indicate that \( L_{B_2}^{\text{low } k} / L_A = .79 \) while \( L_{B_2}^{\text{low } k} / L_{B_1}^{\text{low } k} = .86 \). An F-test, however, cannot reject the hypothesis that the two ratios are equal to one another, at the 95% level of confidence. Thus, the data support this more subtle prediction about expenditures over the budget cycle found in the fourth prediction of the model.

**V. Discussion and Conclusion**

In this paper we have examined some of the most extensive data yet collected on lobbying expenditures (as distinct from campaign contributions) in the American states. We used the data to explore the predictions of the most prominent model of endogenous cost informational lobbying, the Potters-van Winden-Grossman-Helpman (PWGH) model. The central prediction of the PWGH model is that a group’s lobbying expenditures will rise as its preferences move out of alignment with those of the legislature – intuitively, biased groups must work harder to convince the legislature about policy relevant conditions. Across a variety of alternative specifications using both aggregate and group specific measures, the data strongly support this prediction.

We also extended the basic PWGH model to encompass biennial budgeting, in which policies set in the budget year are somewhat or very likely to remain in place in the non-budget year. The extended model makes a variety of fine-grained predictions about lobbying expenditures across the three institutional designs of annual budgeting, biennial budgeting with low legislation costs in the off-year (low-\(k\)), and biennial budgeting with high legislation costs in the off-year (high-\(k\)). For example, the model predicts that when the likelihood of policy change in the off-years is small (high \(k\) biennial budgeting), lobbying expenditures shift from non-budget years into budget years. In fact, the model predicts that, as a consequence of this displacement, expenditures in the budget year of such biennial states should be twice
that in annual states, where the displacement does not occur. This prediction, and most of the other cross-institutional predictions, finds support in the data. Indeed, ten of the eleven predictions generated from the model, and found in Table 4, find support in the empirical analysis. The only prediction that does not find support is Hypothesis 3c, that low- \( k \) states have higher lobbying than high- \( k \) states in off-budget years.

It is worth highlighting the theoretical and empirical differences between vote-buying models and informational lobbying models. First and foremost, vote-buying models involve the transfer of money from an interest group to a political campaign or politician; lobbying expenditures do not. In fact, none of the expenditures studied in this paper involved the transfer of money from interest group to politician or campaign. Second, the revealed temporal patterns of spending are distinctly different. While most campaign contributions occur in the 12 months before an election, while lobbying expenditures occur in budget years, independent of the electoral cycle. Moreover, the temporal pattern of lobbying expenditures responds to the details of the budget cycle in ways predicted by the extended model. Thus, although some of the predictions of the vote buying and informational signaling models are superficially similar—especially those related to ideological distance—hypotheses 2a-2c, 3a-3c, 4a-4c, and 5 are quite different between the two models. In sum, the domains of the models (contributions versus lobbying expenditures) are different; their logic is dissimilar; and their empirical implications are distinct.

Given the apparent empirical relevance of the PWGH model, it is worth discussing the model’s normative and policy implications. First, the normative implications of PWGH-type models are quite different from those of vote-buying models of campaign contributions. In the latter, contributions are pay-offs to legislators who sell out their constituents’ interests. In contrast, in the former, lobbying expenditures help legislators learn about policy relevant conditions. Thus, lobbying actually assists legislators in pursuing the interests of their constituents. Particularly attractive are lobbying expenditures from groups aligned with the legislature, as a mutual agreement on desirable policy allows information transmission to occur more cheaply.

This view of lobbying expenditures may be unduly benign, but it clarifies the point that all money in politics is not the same thing: information dollars (as it were) are quite different from bribes. And, information dollars may be good, not bad.
The extended PWGH model also has implications about the normative properties of different budgeting systems, but these are complex and not explored in any depth here. For instance, in contrasting annual budgeting with low-\(k\) biennial budgeting, there is a trade-off between policy losses due to lock-in followed by drift in the off-year in the biennial design, and expenditures on information transmission in the annual design that may not be particularly valuable in the absence of changes in policy relevant conditions. Low rates of drift and low lock-in costs will tend to favor the low-\(k\) biennial design; high rates of drift and high lock-in costs will favor the annual design. However, biennial budgeting with high-\(k\) appears inefficient in the context of our simple model, because lobbying expenditures simply shift into the budget year while policy lock-in necessarily occurs in the off-year. Additional modeling specifically directed at these and related issues could help clarify the potential costs and benefits of the competing institutional designs.

The policy implications that we can draw are relatively straightforward. First, arbitrary caps on lobbying expenditures are a poor policy prescription, since caps may preclude the transmission of valuable information. This is especially true when a lobbying group is out-of-step with the legislature, since the group may need to spend considerably in order to convince a skeptical legislature. Second, restrictions on the nature of expenditures may well be justified, particularly if the restrictions keep lobbying expenditures directed at information transmission rather than leaking into what are effectively bribes. Heuristically, expenditures on informative studies are good; expenditures on lavish golf vacations bad. Third, reporting requirements for lobbying expenditures – including relatively rigorous requirements – appear useful. Not only do reporting requirements help verify expenditure levels; they may make more difficult the diversion of (good) information dollars into (bad) bribe money. Thus, tough reporting requirements like those in Wisconsin appear superior to no or nominal requirements like those in Mississippi or Rhode Island.

In conclusion, it is often claimed that the development of theoretical models in political economy has out-stripped progress in empirically testing the models. It is perhaps notable, then, when a relatively simple theoretical model affords demonstrable leverage on extensive data concerning a phenomenon of genuine political significance. Such appears to the case with the PWGH model.
REFERENCES


Appendix

Proposition 2

Lobbying and policy in the off-budget year in high $k_2$ states are discussed in the text. Here we discuss lobbying and policy in low $k_2$ states.

If $\theta_2 \not\in \left[p_1 - \sqrt{k}, p_1 + \sqrt{k}\right]$ the lobbying expenditure function indicated in Proposition Two induces revelation of $\theta_2$ (this follows from Proposition One). So suppose $\theta_2 \in \left[p_1 - \sqrt{k}, p_1 + \sqrt{k}\right]$. In this case, the policy maker wishes to leave policy unchanged. Consequently, the policy maker cannot force the lobby to distinguish among such states, implying that the lobbying expenditure function is flat for states of the world in the “hole.” Call this level of lobbying $\bar{l}$.

The following incentive compatibility constraints are critical. First, for any actual $\theta_2$ outside the hole and $\theta_2'$ inside the “hole,” it must be better for the SIG to indicate $\theta_2$ and receive $p_2 = \theta_2$ than indicate $\theta_2'$ and receive $p_2 = p_1$. Second, for any actual $\theta_2$ within the hole and any $\theta_2'$ outside the hole, it must be better for the SIG to indicate $\theta_2$ is in the hole and receive $p_2 = p_1$ than indicate $\theta_2'$ and receive $p_2 = \theta_2'$.

Formally, in the case of positive bias we require

$$U(l(\theta_2), p_2(l); \theta_2, \delta) = -(\delta)^2 - 2\delta(\theta_2 - \theta_{2\text{min}}) \geq U(\bar{l}, p_2(\bar{l}); \theta_2', \delta) = -(p_1 - \theta_2 - \delta)^2 - \bar{l}$$

$$\forall \theta_2, \theta_2', \theta_2 \not\in \left[p_1 - \sqrt{k}, p_1 + \sqrt{k}\right] \text{ and } \theta_2' \in \left[p_1 - \sqrt{k}, p_1 + \sqrt{k}\right]\quad(A1)$$

and
\[
U(\bar{l}, p_2(\bar{l}), \theta_2, \delta) = - (p_1 - \theta_2 - \delta)^2 - \bar{l} \geq U(l(\theta_2'), p_2(l); \theta_2', \delta) = - \left( \theta_2' - \theta_2 - \delta \right)^2 - 2\delta \left( \theta_2' - \theta_{2\min} \right)
\]

\[\forall \theta_2, \theta_2', \delta \in [p_1 - \sqrt{k}, p_1 + \sqrt{k}] \text{ and } \theta_2' \notin [p_1 - \sqrt{k}, p_1 + \sqrt{k}] \quad (A2)\]

First consider (A1). When \(\theta_2 \leq p_1 - \sqrt{k}\), it will be observed that the greatest temptation to deviate occurs when \(\theta_2 = p_1 - \sqrt{k}\) as \(U(l(\theta_2), p_2(l); \theta_2, \delta)\) is larger for all other values of \(\theta_2\) while \(U(l(\theta_2'), p_2(l); \theta_2', \delta)\) is smaller. Similarly when \(\theta_2 \geq p_1 + \sqrt{k}\), the greatest temptation to deviate occurs at \(\theta_2 = p_1 + \sqrt{k}\). Hence, it is sufficient to check (A1) at those two values. To wit, at \(\theta_2 = p_1 - \sqrt{k}\) and \(\theta_2 = p_1 + \sqrt{k}\) we require

\[-(-\delta)^2 - 2\delta(\theta_2 - \theta_{2\min}) \geq - (p_1 - \theta_2 - \delta)^2 - \bar{l}
\]

\[\Rightarrow \bar{l} \geq 2\delta(p_1 - \theta_{2\min}) - k \quad (A3a)\]

Now consider (A2). When \(\theta_2 \in [p_1 - \sqrt{k}, p_1 + \sqrt{k}]\), it will be observed that the most attractive \(\theta_2' \leq p_1 - \sqrt{k}\) is \(\theta_2' = p_1 - \sqrt{k}\) as \(U(l(\theta_2'), p_2(l); \theta_2', \delta)\) is smaller for all other values of \(\theta_2' \leq p_1 - \sqrt{k}\), and similarly \(\theta_2' = p_1 + \sqrt{k}\) is the most attractive \(\theta_2'\) to deviate to when \(\theta_2' \geq p_1 + \sqrt{k}\). So it is sufficient to check (2) at those values. Thus, at \(\theta_2' = p_1 - \sqrt{k}\) and \(\theta_2' = p_1 + \sqrt{k}\) we require

\[-(p_1 - \theta_2 - \delta)^2 - \bar{l} \geq - \left( \theta_2' - \theta_2 - \delta \right)^2 - 2\delta \left( \theta_2' - \theta_{2\min} \right)
\]

\[\Rightarrow \bar{l} \leq 2\delta(p_1 - \theta_{2\min}) - k \quad (A3b)\]

Combining (A3a) and (A3b) yields \(\bar{l} = 2\delta(p_1 - \theta_{2\min}) - k\), for the case with positive bias. A similar analysis in the case of negative bias yields \(\bar{l} = 2\delta(p_1 - \theta_{2\max}) - k\).
**Proposition 3**

The maximand for the policy maker, conditional on truthful revelation of $\theta_1$ and optimal play in the second period, is a policy loss in the first period, an expected policy loss in the second period given optimal legislating, and a legislating cost in the second period conditional on $\theta_2$ falling outside the “hole.” The maximand for the SIG is composed of a policy loss and associated lobby expenditures in the first period, and an expected policy loss and associated lobby expenditures in the second period.

*High $k_2$ states.* In these states the policymaker anticipates that the “hole” will encompass the entire $\theta_2$ space so $p_2 = p_1$ and no legislating costs are incurred. The policy maker’s maximand is

$$
-(p_1 - \theta_1)^2 - \int_{\theta_1 - \frac{1}{2}}^{\theta_1 + \frac{1}{2}} (p_1 - \theta_2)^2 f(\theta_2) d\theta_2
$$

$$
= -(p_1 - \theta_1)^2 - (p_1 - E(\theta_2))^2 - \text{var}(\theta_2)
$$

Noting that $E(\theta_2) = \theta_1$ and $\text{var}(\theta_2) = \frac{1}{12}$, this expression is $-2(p_1 - \theta_1)^2 - \frac{1}{12}$

Clearly, the best first period policy for the policy maker is $p_1 = \theta_1$, so that “high $k_2$ states” are those where $k_2 \geq \frac{1}{4}$.

In the high $k_2$ states, lobbying in the second period is zero ($l_2(\theta_2) = 0$). Therefore SIG’s maximand is

$$
-(p_1 - \theta_1 - \delta)^2 - l_1(\theta_1) - \int_{\theta_1 - \frac{1}{2}}^{\theta_1 + \frac{1}{2}} (p_1 - \theta_2 - \delta)^2 f(\theta_2) d\theta_2
$$

$$
= -(p_1 - \theta_1 - \delta)^2 - (p_1 - E(\theta_2) - \delta)^2 - \text{var}(\theta_2) - l_1(\theta_1)
$$

$$
= -2(p_1 - \theta_1 - \delta)^2 - \frac{1}{12} - l_1(\theta_1)
$$
The marginal gain to the SIG of a higher belief by the policy maker about the value of $\theta_1$ is twice what it is in states with annual budgeting. Consequently, the lobbying expenditure function must be twice as steep to induce truthful revelation of $\theta_1$: $l_1(\theta_1; \delta, \theta_{1\min}, \theta_{1\max}) = \begin{cases} 4\delta(\theta_1 - \theta_{1\min}) & \text{if } \delta \geq 0 \\ 4\delta(\theta_1 - \theta_{1\max}) & \text{if } \delta < 0 \end{cases}$.$

**Low $k_2$ states.** In this case, the policy maker will alter policy and incur the legislating cost if and only if $\theta_2$ falls outside the “hole,” which may happen if $\theta_{2\max} > p_1 + \sqrt{k}$ and/or $\theta_{2\min} < p_1 - \sqrt{k}$.

Recall from Proposition 2 that if $\theta_2$ falls outside the “hole,” the SIG reveals $\theta_2$ to the policy maker who then sets $p_2 = \theta_2$. Consequently the policy maker’s maximand becomes

$$-(p_1 - \theta_1)^2 - \int_{\theta_{2\min}}^{p_1 + \sqrt{k}} f(\theta_2) \, d\theta_2 - k(1 - 2\sqrt{k})$$

$$= -(p_1 - \theta_1)^2 - \frac{2}{3}k^{\frac{3}{2}} - k(1 - 2\sqrt{k})$$

$$= -(p_1 - \theta_1)^2 - \frac{4}{3}k^{\frac{3}{2}} - k$$

Again, the best first period policy for the policy maker is $p_1 = \theta_1$.

We focus on the case of positive bias for the SIG. From Proposition 2, if $\theta_2$ falls outside the “hole,” the SIG spends $2\delta(\theta_2 - \theta_{2\min}) = 2\delta\left(\theta_2 - \theta_1 + \frac{1}{2}\right)$, the policy maker sets $p_2 = \theta_2$ and the SIG receives a policy loss of $-\delta^2$. If $\theta_2$ falls inside the “hole,” the SIG spends the flat amount $2\delta(p_1 - \theta_{2\min}) - k = 2\delta\left(p_1 - \theta_1 + \frac{1}{2}\right) - k$, the policy maker does not alter policy and the SIG receives a policy loss of $-(p_1 - \theta_2 - \delta)^2$. Consequently

The SIG’s maximand becomes:
\[- \left( (p_1 - \theta_1 - \delta)^2 + l_1(\theta_1) \right) - \int_{\theta_1 - \frac{1}{2}}^{\theta_1 + \frac{1}{2}} \left( (\delta)^2 + 2\delta(\theta_2 - \theta_1 + \frac{1}{2}) + \frac{\theta_2^2}{k^2} \right) f(\theta_2) d\theta_2 \]

\[- \int_{\theta_1 - \frac{1}{2}}^{\theta_1 + \frac{1}{2}} \left( (p_1 - \theta_2 - \delta)^2 + 2\delta(p_1 - \theta_1 + \frac{1}{2}) + \frac{\theta_2^2}{k^2} \right) f(\theta_2) d\theta_2 \]

\[- \int_{\theta_1 - \frac{1}{2}}^{\theta_1 + \frac{1}{2}} \left( \delta^2 + 2\delta(\theta_2 - \theta_1 + \frac{1}{2}) + \frac{\theta_2^2}{k^2} \right) f(\theta_2) d\theta_2 \]

Solving each integral and combining terms yields

\[- \left( (p_1 - \theta_1 - \delta)^2 + l_1(\theta_1) \right) + \frac{4}{3} k^2 - \delta(1 + \delta) \]

Note that the value of the second period is independent of the policy set in the first period, conditional on \( \theta_1 \) being revealed (which is quite different from the case in the high \( k \) states).

Consequently, the lobbying expenditure function that forces revelation of \( \theta_1 \) in the first period is identical to that in annual budgeting states.

**Derivation of Expected Expenditure Functions**

Using Propositions 1 and 3, \( L_{B1}^{\text{Low}} = \int_{\theta} 2\delta(\theta - \theta_{\text{min}}) f(\theta) d\theta = 2\delta(E(\theta) - \theta_{\text{min}}) = 2\delta(\theta_{\text{max}} - \theta_{\text{min}}) \).

Using Proposition 3, \( L_{B1}^{\text{High}} = \int_{\theta_i} 4\delta(\theta_1 - \theta_{1,\text{min}}) f(\theta_1) d\theta_1 = 2\delta(\theta_{1,\text{max}} - \theta_{1,\text{min}}) \).

Finally, consider \( L_{B2}^{\text{Low}} \), the expected lobbying expenditures for SIGs in off-budget years in states with biennial budgeting and low \( k \). In this case, one must consider joint realizations of \( \theta_2 \) and \( \theta_1 \), \( (\theta_1, \theta_2) \). From Proposition 2, if \( \theta_2 \) falls outside the “hole” the SIG’s expenditures are \( 2\delta(\theta_2 - \theta_{2,\text{min}}) = 2\delta(\theta_2 - \theta_1 + \frac{1}{2}) \) (focusing on positive bias). If \( \theta_2 \) falls inside the “hole,” the SIG’s expenditure is
\[ 2\delta(p_1 - \theta_{2\text{min}}) - k = \delta - k \] (recalling that \( p_1 = \theta_1 \)). The latter occurs with probability \( 2\sqrt{k} \). The domain in the \( \theta_1 \times \theta_2 \) space is \( \theta_2 \) simple so we integrate over \( \theta_2 \) first. Putting the pieces together:

\[
I_{B2}^{\text{Low}} = \int_{\theta_{1\text{min}}}^{\theta_{1\text{max}}} \left[ \int_{\theta_{1\text{min}}}^{\theta_{1\text{max}}} 2\delta \left( \theta_2 - \theta_1 + \frac{1}{2} \right) d\theta_2 + \int_{\theta_{1\text{min}}}^{\theta_{1\text{max}}} 2\delta \left( \theta_2 - \theta_1 + \frac{1}{2} \right) d\theta_2 + 2\sqrt{k}(\delta - k) \right] f(\theta_1) d\theta_1
\]

\[
= \int_{\theta_{1\text{min}}}^{\theta_{1\text{max}}} \left( \frac{1}{4} \delta^2(2\sqrt{k} - 1)^2 - \frac{1}{4} \delta(4k + 4\sqrt{k} - 3) + 2\sqrt{k}(\delta - k) \right) f(\theta_1) d\theta_1
\]

\[
= \int_{\theta_{1\text{min}}}^{\theta_{1\text{max}}} \delta - 2k^{\frac{3}{2}} f(\theta_1) d\theta_1
\]

\[
= \left( \delta - 2k^{\frac{3}{2}} \right)(\theta_{1\text{max}} - \theta_{1\text{min}})
\]
All graphs in 2000 constant dollars.
### TABLE 1: DESCRIPTIVE STATISTICS FOR AGGREGATE ANNUAL STATE LOBBYING EXPENDITURES

<table>
<thead>
<tr>
<th>State</th>
<th>Mean Reported Lobbying Expenditures*</th>
<th>Minimum Reported Annual Lobbying Expenditures*</th>
<th>Maximum Annual Reported Lobbying Expenditures*</th>
<th>First Year Data Available</th>
<th>Last Year Data Available</th>
<th>Biennial Budgeting State</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alaska</td>
<td>$9,098,812</td>
<td>$4,297,268</td>
<td>$12,200,000</td>
<td>1978</td>
<td>2004</td>
<td>No</td>
</tr>
<tr>
<td>Arizona**</td>
<td>$2,371,891</td>
<td>$1,506,335</td>
<td>$3,156,176</td>
<td>1995</td>
<td>2004</td>
<td>No</td>
</tr>
<tr>
<td>California</td>
<td>$161,000,000</td>
<td>$142,000,000</td>
<td>$189,000,000</td>
<td>1991</td>
<td>2003</td>
<td>No</td>
</tr>
<tr>
<td>Colorado</td>
<td>$18,000,000</td>
<td>$17,100,000</td>
<td>$19,300,000</td>
<td>2001</td>
<td>2003</td>
<td>No</td>
</tr>
<tr>
<td>Connecticut</td>
<td>$15,900,000</td>
<td>$12,624,827</td>
<td>$35,400,000</td>
<td>1978</td>
<td>2003</td>
<td>Yes</td>
</tr>
<tr>
<td>Delaware</td>
<td>$152,093</td>
<td>$131,649</td>
<td>$177,082</td>
<td>2002</td>
<td>2004</td>
<td>No</td>
</tr>
<tr>
<td>Florida</td>
<td>$4,912,494</td>
<td>$4,091,011</td>
<td>$6,818,084</td>
<td>1997</td>
<td>2001</td>
<td>No</td>
</tr>
<tr>
<td>Georgia</td>
<td>$574,220</td>
<td>$315,287</td>
<td>$675,404</td>
<td>1997</td>
<td>2003</td>
<td>No</td>
</tr>
<tr>
<td>Hawaii</td>
<td>$3,322,758</td>
<td>$2,707,086</td>
<td>$3,917,630</td>
<td>1996</td>
<td>2003</td>
<td>Yes</td>
</tr>
<tr>
<td>Idaho</td>
<td>$408,472</td>
<td>$298,667</td>
<td>$482,954</td>
<td>1997</td>
<td>2003</td>
<td>No</td>
</tr>
<tr>
<td>Illinois</td>
<td>$1,147,851</td>
<td>$960,528</td>
<td>$1,437,774</td>
<td>1995</td>
<td>2003</td>
<td>No</td>
</tr>
<tr>
<td>Indiana</td>
<td>$15,500,000</td>
<td>$11,100,000</td>
<td>$19,100,000</td>
<td>1996</td>
<td>2001</td>
<td>Yes</td>
</tr>
<tr>
<td>Kansas</td>
<td>$626,738</td>
<td>$364,223</td>
<td>$978,735</td>
<td>1995</td>
<td>2003</td>
<td>No</td>
</tr>
<tr>
<td>Kentucky**</td>
<td>$6,785,246</td>
<td>$2,590,579</td>
<td>$9,879,419</td>
<td>1994</td>
<td>2003</td>
<td>Yes</td>
</tr>
<tr>
<td>Louisiana</td>
<td>$452,757</td>
<td>$362,303</td>
<td>$681,486</td>
<td>1997</td>
<td>2003</td>
<td>No</td>
</tr>
<tr>
<td>Massachusetts</td>
<td>$42,400,000</td>
<td>$27,100,000</td>
<td>$55,200,000</td>
<td>1995</td>
<td>2003</td>
<td>No</td>
</tr>
<tr>
<td>Maryland</td>
<td>$19,900,000</td>
<td>$13,700,000</td>
<td>$28,500,000</td>
<td>1988</td>
<td>2003</td>
<td>No</td>
</tr>
<tr>
<td>Maine</td>
<td>$3,316,610</td>
<td>$2,030,087</td>
<td>$4,420,563</td>
<td>1989</td>
<td>2003</td>
<td>Yes</td>
</tr>
<tr>
<td>Michigan</td>
<td>$23,400,000</td>
<td>$22,300,000</td>
<td>$24,900,000</td>
<td>2001</td>
<td>2003</td>
<td>No</td>
</tr>
<tr>
<td>Minnesota***</td>
<td>$5,082,912</td>
<td>$1,070,697</td>
<td>$10,900,000</td>
<td>1980</td>
<td>2004</td>
<td>Yes</td>
</tr>
<tr>
<td>Mississippi</td>
<td>$6,875,722</td>
<td>$4,331,805</td>
<td>$9,371,824</td>
<td>1995</td>
<td>2003</td>
<td>No</td>
</tr>
<tr>
<td>Montana</td>
<td>$2,733,623</td>
<td>$1,825</td>
<td>$5,154,675</td>
<td>1993</td>
<td>2001</td>
<td>Yes</td>
</tr>
<tr>
<td>North Carolina</td>
<td>$9,151,968</td>
<td>$7,999,181</td>
<td>$10,500,000</td>
<td>2001</td>
<td>2004</td>
<td>Yes</td>
</tr>
<tr>
<td>Nebraska</td>
<td>$8,133,817</td>
<td>$6,423,631</td>
<td>$9,161,876</td>
<td>2000</td>
<td>2003</td>
<td>Yes</td>
</tr>
<tr>
<td>New Jersey</td>
<td>$18,100,000</td>
<td>$14,800,000</td>
<td>$25,000,000</td>
<td>1993</td>
<td>2003</td>
<td>No</td>
</tr>
<tr>
<td>New York</td>
<td>$42,400,000</td>
<td>$13,800,000</td>
<td>$112,000,000</td>
<td>1978</td>
<td>2003</td>
<td>No</td>
</tr>
<tr>
<td>Ohio</td>
<td>$510,581</td>
<td>$346,473</td>
<td>$765,245</td>
<td>1999</td>
<td>2004</td>
<td>Yes</td>
</tr>
<tr>
<td>Oregon</td>
<td>$12,900,000</td>
<td>$5,948,027</td>
<td>$20,700,000</td>
<td>1987</td>
<td>2004</td>
<td>Yes</td>
</tr>
<tr>
<td>Pennsylvania</td>
<td>$48,400,000</td>
<td>$46,800,000</td>
<td>$50,100,000</td>
<td>2000</td>
<td>2001</td>
<td>No</td>
</tr>
<tr>
<td>South Carolina</td>
<td>$13,900,000</td>
<td>$13,200,000</td>
<td>$14,300,000</td>
<td>1998</td>
<td>2001</td>
<td>No</td>
</tr>
<tr>
<td>Texas</td>
<td>$4,792,169</td>
<td>$768,337</td>
<td>$15,000,000</td>
<td>1993</td>
<td>2001</td>
<td>Yes</td>
</tr>
<tr>
<td>Utah</td>
<td>$159,194</td>
<td>$105,123</td>
<td>$245,998</td>
<td>1995</td>
<td>2003</td>
<td>No</td>
</tr>
<tr>
<td>Virginia</td>
<td>$10,500,000</td>
<td>$8,293,575</td>
<td>$16,800,000</td>
<td>1996</td>
<td>2003</td>
<td>Yes</td>
</tr>
<tr>
<td>Vermont</td>
<td>$4,859,566</td>
<td>$4,414,832</td>
<td>$5,182,520</td>
<td>1998</td>
<td>2004</td>
<td>No</td>
</tr>
<tr>
<td>Washington</td>
<td>$29,200,000</td>
<td>$22,300,000</td>
<td>$39,000,000</td>
<td>1993</td>
<td>2004</td>
<td>Yes</td>
</tr>
<tr>
<td>Wisconsin</td>
<td>$21,800,000</td>
<td>$18,900,000</td>
<td>$26,200,000</td>
<td>1991</td>
<td>2003</td>
<td>Yes</td>
</tr>
<tr>
<td>West Virginia</td>
<td>$267,579</td>
<td>$212,544</td>
<td>$394,445</td>
<td>1992</td>
<td>2003</td>
<td>No</td>
</tr>
<tr>
<td>Wyoming</td>
<td>$262,105</td>
<td>$127,916</td>
<td>$496,434</td>
<td>2000</td>
<td>2003</td>
<td>Yes</td>
</tr>
</tbody>
</table>

* All reports are in 2000 real dollars

** Switched from annual to biennial or biennial to annual budgeting.

*** Has separate procedures for capital budgeting.
### Table 3: Expected Lobbying Expenditure Functions

<table>
<thead>
<tr>
<th>Period 1</th>
<th>Annual Budgeting State</th>
<th>Biennial Budgeting State – Low $k_2$</th>
<th>Biennial Budgeting State – High $k_2$</th>
</tr>
</thead>
<tbody>
<tr>
<td>A.</td>
<td>$L_A = \delta(\theta_{\text{max}} - \theta_{\text{min}})$</td>
<td>$L_{B_{l_1}}^{low k} = \delta(\theta_{\text{1max}} - \theta_{\text{1min}})$</td>
<td>$L_{B_{l_1}}^{high k} = 2\delta(\theta_{\text{1max}} - \theta_{\text{1min}})$</td>
</tr>
<tr>
<td>Period 2</td>
<td>$L_A = \delta(\theta_{\text{max}} - \theta_{\text{min}})$</td>
<td>$L_{B_{l_2}}^{low k} = \left(\delta - 2k_1^2\right)(\theta_{\text{1max}} - \theta_{\text{1min}})$</td>
<td>$L_{B_{l_2}}^{high k} = 0$</td>
</tr>
</tbody>
</table>

### Table 4: Empirical Predictions Implied by the Expected Lobbying Expenditure Functions

<table>
<thead>
<tr>
<th>Clusters of Predictions</th>
<th>Hypotheses</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Core hypothesis:</td>
<td>$\frac{\partial L}{\partial \delta} \geq 0$</td>
</tr>
<tr>
<td>Effect of SIG bias on</td>
<td></td>
</tr>
<tr>
<td>lobbying expenditures</td>
<td></td>
</tr>
<tr>
<td>2. Lobbying expenditures</td>
<td>$L_A = L_{B_{l_1}}^{low k}$; $L_{B_{l_1}}^{high k} = 2L_A$; c)</td>
</tr>
<tr>
<td>in budget years, across</td>
<td></td>
</tr>
<tr>
<td>institutions</td>
<td></td>
</tr>
<tr>
<td>3. Lobbying expenditures</td>
<td>$L_A &gt; L_{B_{l_2}}^{low k}$; $L_{B_{l_2}}^{low k} &gt; L_{B_{l_2}}^{high k}$;</td>
</tr>
<tr>
<td>in off-budget years,</td>
<td></td>
</tr>
<tr>
<td>across institutions</td>
<td></td>
</tr>
<tr>
<td>4. Lobbying expenditures</td>
<td>$L_{B_{l_1}}^{low k} &gt; L_{B_{l_2}}^{low k}$; $L_{B_{l_1}}^{high k} &gt; L_{B_{l_2}}^{high k}$;</td>
</tr>
<tr>
<td>over the budget cycle,</td>
<td></td>
</tr>
<tr>
<td>biennial budgeting states</td>
<td>$L_{B_{l_2}}^{low k} = L_{B_{l_2}}^{low k}$; $L_{B_{l_2}}^{high k} = L_A$; c)</td>
</tr>
<tr>
<td>5. Effect of legislative</td>
<td>$\frac{\partial L}{\partial n} = 0$</td>
</tr>
<tr>
<td>size on lobbying</td>
<td></td>
</tr>
<tr>
<td>expenditures</td>
<td></td>
</tr>
</tbody>
</table>

“$n$” denotes the number of members in the state legislature. All hypotheses are per SIG, holding bias constant.
Many studies of PAC contributions refer to “lobbying”, but in this paper we draw a sharp distinction between campaign contributions and informational lobbying. See for example (Snyder 1990, Ansolabehere et al 2003).

Despite this ongoing debate, there is consensus on some aspects of targeting in the lobbying literature. Powerful legislators with agenda-setting power (Evans 1996) and that are on issue-relevant or generally powerful and influential committees (Drope & Hansen 2004) are likely to be targeted for lobbying.

Careful testing of model implications that tightly and clearly link theory and testing in a way that can be falsified, can help us to support and reject broad classes of theoretical models (Clarke & Primo 2012).

Gray and Lowery (1996) undertook the first substantial effort to examine cross-state level lobbying data with an analysis of lobbyist registrations.

The Center for Public Integrity (CPI) maintains a data base of this kind, but with much shorter panels (none before 1995). We find significant inconsistency in the data within some states in the CPI data.

Typical data from an ethics commission consisted of expenditures by a lobbyist on behalf of a client (a group). Determining expenditures by group required carefully matching and assembling expenditures across lobbyists, a laborious procedure.

In order to create congruence with the classification of campaign contributors used by the Federal Elections Commission (FEC), we classified groups into four categories: membership organizations (e.g., AARP, ACLU, Sierra Club), firms (e.g., GE, Merck), trade associations (e.g., Pharmaceutical Manufacturers’ Association (PHARMA)), and unions (e.g., United Auto Workers). In addition to these four categories, we identified a fifth category—government—because it is common for governmental organizations (e.g., city and county governments, school districts, sanitation districts) to lobby the state legislature as well. (These groups are not permitted to provide campaign contributions, and hence do not appear in the FEC classification system.) Each group in the data base was classified into one of these five categories, using supplemental information from web searches when necessary.

Corporations and trade associations comprise the vast majority of lobbying expenditures by interest groups (86%) (de Figueiredo 2004). Businesses represent a smaller proportion (30%-54%) of the number of interest groups lobbying (Baumgartner et al. 2009a; Gray & Lowery 1996).

Leech et al (2005) finds a budget effect in the cross-sectional analysis of the federal data by issue; this data cannot compare institutional features of the legislature because of the single political institution being examined.
We have considered a number of different specifications. For each of two dependent variables, log of lobbying per capita in a state, and log of total lobbying in a state, we have run the analysis on a) levels on levels with state fixed effects for only those states with stationary series, b) on all states with state fixed effects with corrections for AR-1, c) on all states using the Arellano-Bond Dynamic Panel estimation techniques, d) differences on differences using dummies for session and special session instead of number of days, and e) limiting the data to 1998-2004 to create a more balanced panel. All of these methods yield remarkably similar results to those presented in Table 2. [NOTE TO REFEREES: PLEASE SEE REFEREE APPENDIX (TABLE R1) FOR A TABLE PROVIDING THE RESULTS OF THESE ALTERNATIVE SPECIFICATIONS.] In addition, we have run a series of analyses with more balanced panel data and these analyses yield statistically significant coefficients on the Budget Year variable of approximately 0.18.

Austen-Smith (1995) differs significantly from the other two models, in that the expenditure is a campaign contribution signaling the group’s preferences rather than any policy-relevant information per se. In the model, the group acquires policy-relevant information subsequent to its costly signal and then engages in cheap talk lobbying. Lyon and Maxwell (2004) examine signal jamming in the context of Grossman and Helpman’s informational lobbying model. Here, a third party with non-state-contingent preferences may obscure a signal for the SIG, either by subsidizing the signal’s production or by paying for its extinction. To the extent signal jamming is a common occurrence, the practice will diminish or extinguish the patterns predicted by the standard Grossman and Helpman informational lobbying model.

The base case in the endogenous spending framework involves a single signaler. In fact, because the signaler is perfectly informed about the policy-relevant information and separating equilibria exist, there is little real need for multiple signalers (see Grossman and Helpman 2001: 163 ff.) Extending the PWGH framework to include partially informed groups who engage in strategic action within and across coalitions of signalers would be a significant theoretical departure (see Battaglini and Benabou (2003) for a step in that direction). Moreover, since our expenditure data is not issue-specific in any event, new propositions would not be testable with current data. Accordingly, in what follows we abstract from strategic interactions within or across coalitions of special interest groups to focus on the core comparative static predictions of the PWGH framework. However, because many state legislatures meet only periodically, we need to extend the PWGH framework to encompass rational lobbying when the status quo receives only periodic reconsideration.

See Grossman and Helpman (2001:164-6) for the case of positive bias. The extension to negative bias is straightforward.
In practice, all states have provisions where the legislature can be called into special session in the off-budget year. However, for states where the legislature is not already in session, the cost of calling a special session is much higher.

We assume \( \theta_1 \) is uniformly distributed on \([\theta_{1\text{min}}, \theta_{1\text{max}}]\). Earlier we assumed \( \theta_2 \) is uniformly distributed on \([\theta_1 - \frac{1}{2}, \theta_1 + \frac{1}{2}]\); we further assume \( \theta_{1\text{min}} \geq \frac{1}{2} \), so all realizations of \( \theta_2 \) are > 0.

One concern that the number of days the legislature is in session is endogenous to the lobbying effort. To address this, we also estimate all models presented in this paper using a dummy variable for the years in which the legislature is in session. This is mandated in each state’s constitution, most at the time of joining the Union, and is unlikely to be influenced by interest groups. The specifications with this variable result in statistically significant coefficients on the distance measure for both the levels regressions (\( \beta = .22; \) t-statistic = 2.0) and the differences on differences regressions (\( \beta = .50; \) t-statistic 5.0). Details are available from the authors.

This specification addresses concerns of non-stationarity of the time series.

In the twelve states examined, none changed their budget timing during the sample period.

This categorization was made by the National Council of State Legislatures. See the data description in the Appendix A1. What is attractive about this characterization of the states is that the frequency of budgeting and the kinds of bills that can be considered in each session is given through each state’s constitution. In most cases, this was set when the state was admitted to the Union. Some of the states did change these rules in the 1960s and 1970s, in response to the influx of population and economic activity in the state. However, these rules are largely exogenous to the lobbying effort in the states today. In the aggregate dataset, only Arizona and Kentucky switch their budgeting status during the sample period. All analysis is robust to dropping these two states from the analysis.

One cannot use this two stage estimation procedure for the interest group level data in Section IVB1 because data is available at the interest group level for only 12 states, leaving only twelve observations for the section stage analysis.

We lose some state fixed effects when we difference the data in the first stage because of short series.

Note that the size of the legislature is uncorrelated with annual budgeting (\( \sigma = -0.03 \)), suggesting that this is a reasonably powered test—larger legislatures are not more likely to budget annually.

This follows from \( \frac{\partial}{\partial \theta_2} U(l(\theta_2'), p_2(l); \theta_2', \delta) = -2 \left( \theta_2' - \theta_2 \right) \rightarrow 0 \) as \( \theta_2' >> \theta_2 \).