Endogenous Cost Lobbying: Theory and Evidence

John M. de Figueiredo
UCLA Anderson School of Management and NBER
110 Westwood Plaza #D508
Los Angeles, CA 90095-1481
jdefig@anderson.ucla.edu

Charles M. Cameron
Princeton University Woodrow Wilson School
and New York University School of Law
305 Robertson Hall
Princeton, NJ 08544
ccameron@princeton.edu

July 24, 2006

We thank seminar participants at UCLA, Stanford, the University of Palermo, and the World Bank Conference on Governance for their comments. We particularly thank Konstantin Sonin, Tim Groseclose, and Keith Krehbiel for detailed comments on earlier drafts.

Abstract

Special interests attempt to influence lawmakers through campaign contributions and through informational lobbying. Both avenues have been explored extensively in theoretical models but only the former has received much empirical scrutiny. We provide the first empirical tests of a major class of models of costly legislative 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, special interest groups increase lobbying expenditures when the legislature is controlled by "enemies" rather than "friends." In addition, lobbying expenditures vary across states with different budgeting institutions in ways predicted by the model. Overall, the results provide substantial support for the PWGH class of lobbying models.

I. Introduction

One of the primary instruments that special interests use to influence lawmakers is information. Information about the likely popularity, efficacy, distributional impact, cost, and legality of programs is extremely valuable to re-election-oriented legislators. Not surprisingly, multitudes of professional lobbyists gather whenever legislatures convene, whether in Washington or in state capitols.

As a practical matter lobbying requires the expenditure of money to pay lobbyists, maintain offices, commission studies, hire experts, and so on. In addition, as discussed below, such expenditures can enhance the credibility of information. Thus, one may gain at least a rough measure of the significance of lobbying by examining the volume of lobbying expenditures. At the U.S. federal level, annual lobbying expenditures in the late 1990s totaled about $1.5 billion. By way of comparison, in the same period expenditures on campaign contributions totaled about $300 million annually (Milyo et al 2000). Perhaps surprisingly, lobbying, not campaign contributions, absorbs the bulk of "influence dollars" spent by special interest groups.

The theoretical foundations of both campaign contributions and lobbying have been explored extensively; we review the latter shortly. But only campaign contributions have been investigated in much depth empirically. Notable papers testing models of campaign contributions include (inter alia) Goldberg and Maggi (1999) and Snyder (1992).[1] In contrast, very few papers test formal models of informational lobbying.[2]

[1] There are numerous studies examining the impact of campaign contributions on policy outcomes (see Ansolabehere et al 2003). However, most of these do not explicitly test formal models.

Perhaps most prominently, Austen-Smith and Wright (1994) tests a model of cheap-talk lobbying, using data on lobbying activity during a single Supreme Court nomination. To the best of our knowledge, no empricial paper investigates the predictions of models of endogenous cost lobbying.

In this paper we empirically test predictions from the most prominent model of endogenous cost lobbying, the Potters-van Winden-Grossman-Helpman (PWGH) model. To do so, we employ some of the most extensive data yet collected on lobbying expenditures by special interest groups, distinct from campaign contributions. The data were collected from ethics commissions in the American states and include time series of aggregate 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 group-specific effects.

As we discuss below, the PWGH model predicts that special interest groups increase lobbying expenditures when the legislature is controlled by "enemies" rather than by "friends." When extended to incorporate biennial budgeting, the model predicts that a group's expenditures will be (weakly) higher in the budget years of biennial states,

---

[2] There is an extensive descriptive literature on legislative lobbying, ranging from how-to manuals (Krasnow, Siddall, and Berg 2001), to qualitative case studies (Hrebenar and Thomas 1993), to statistical analysis of the number of lobbyist registrations across the states (Lowery and Gray 2000) or counts of federal lobbying reports filed with the Clerk of the House (Leech et al 2005). de Figueiredo and Silverman (2006) examine the returns to lobbying by universities at the federal level.

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. 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.

We find strong empirical support for most of these 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.

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 a state 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.[3]

****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 (see Table A1).[4] Each state averages just over 4,000 observations.

[3] For idiosyncratic reasons, three states have series that stop in 2001. The Center for Public Integrity maintains a data base of this kind, but with much shorter panels (none before 1995). We have also found significant inconsistency in the data within some states in the CPI data.

[4] 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.

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.[5] There are 600 interest groups which meet these criteria. This sample frame is largely driven by the theory, which is discussed below.

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.

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

[5] In order to create congruence with the classification of campaign contributors used 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

The figure suggests a close relationship between lobbying 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 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. 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 1992, 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 state data reveal 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. First differences eliminates the non-stationarity in each and every state.[6] Thus, the reported regressions are differences-in-differences regressions.[7]

We employ a number of independent variables (Table A2 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****

[6] The results of the ADF tests on the levels and differenced data are available from the authors.

[7] 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, and d) differences on differences using dummies for session and special session instead of number of days. 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 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, is by far the more extensive.[8] 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.[9] 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 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.[10] Data on groups' lobbying expenditures appears well-suited for testing this type of model, with one caveat. The base case in the endogenous spending framework

---

[8] Krishna and Morgan 2001 and Battaglini 2004 illustrate recent analyses and provide citations to key papers.

[9] See inter alia Lohmann 1993, Grossman and Helpman 2001 (Section 5.1), Bennedsen and Feldmann 2002, and Battaglini and Benabou 2003.

[10] 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.

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 room 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.[11] 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, we do need to extend the PWGH framework to encompass rational lobbying when the status quo receives only periodic reconsideration.

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.

---

[11] Battaglini and Benabou 2003 takes a step in this direction.

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 θ. A special interest group (SIG) has preferences over θ 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 θ, signals its private information to the decision maker by expending money on lobbying. In the basic framework, G sets policy *p de novo*, based upon its beliefs about θ after observing the SIG's expenditure.

The policy space is the non-negative real line with $p \in P = \Re_+$. 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 δ, which is common knowledge, making the SIG's ideal point $\theta + \delta$. Thus, if δ is positive the SIG wishes a somewhat higher policy than does the policymaker for any state of the world (positive bias), but if δ 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 θ using common knowledge distribution $F(\theta)$; 2) the SIG (costlessly) learns θ 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, $l:\Theta \to \Re_+$. A strategy for the policy maker is a function mapping expenditures into policy, $r:\Re_+ \to P$. An obvious but important point is that, in any equilibrium, the policy maker will set *p* to θ if it knows it.

The following proposition summarizes Grossman's and Helpman's analysis.[12]

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

$$l(\theta;\delta,\theta_{\min},\theta_{\max}) = \begin{cases} 2\delta(\theta-\theta_{\min}) \; if \;\; \delta \geq 0 \\ 2\delta(\theta-\theta_{\max}) \; if \;\; \delta < 0 \end{cases}$$

$$p(l;\delta,\theta_{\min},\theta_{\max}) = \begin{cases} \theta_{\min} + \dfrac{l}{2\delta} \; if \;\; \delta \geq 0 \\ \theta_{\max} + \dfrac{l}{2\delta} \; if \;\; \delta < 0 \end{cases}$$

Beliefs are determined by Bayes Rule whenever possible.

---

[12] See Grossman and Helpman pp. 164-166 for the case of positive bias. The extension to negative bias is straight forward.

The intuition behind the result is simple. The gain to the SIG if G's belief about θ is slightly higher is $\frac{\partial}{\partial p}U(.) = -2(p - \theta - \delta)$. 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 θ. That is, $2\delta = l'$, implying $l(\theta) = 2\delta\theta$. In addition, lobbying expenditures must be non-negative and equal to zero if $\theta = \theta_{\min}$ for the case of positive bias, and equal to zero if $\theta = \theta_{\max}$ 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 θ_1, we assume the state of the world in the second period, θ_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 θ_2, it would not legislate unless θ_2 were sufficiently far from p_1. If the policy maker alters policy knowing θ_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 $\theta_2 \in \left\lfloor p_1 - \sqrt{k_2}, p_1 + \sqrt{k_2} \right\rfloor$. In essence, there is a "hole" in the θ_2 space and the policy maker will not wish to legislative if θ_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 θ_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.[13] In contrast, in low k_2 states there are some realizations of θ_2 that would lead the legislature to act, if the value became known. Recalling that θ_2 is uniform on $\left[\theta_1 - \frac{1}{2}, \theta_1 + \frac{1}{2}\right]$, it show later that

[13] In practice, we 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 in already session, the cost of calling a special session is much higher.

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 θ_2. In low k_2 states this inequality is reversed, a condition assuring part of the support of θ_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 θ_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 θ_2 if it is outside the "hole" and otherwise indicate that θ_2 lies in the "hole." The policy maker sets $p_2 = \theta_2$ if θ_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 θ_2. 2) *Low-k_2 states*:

$$l_2(\theta_2) = \begin{cases} \left.\begin{array}{l} 2\delta(\theta_2 - \theta_{2\min}) \text{ if } \theta_2 \notin \left[p_1 - \sqrt{k}, p_1 + \sqrt{k}\right] \\ 2\delta(p_1 - \theta_{2\min}) - k \text{ if } \theta_2 \in \left[p_1 - \sqrt{k}, p_1 + \sqrt{k}\right] \end{array}\right\} \delta > 0 \\ \left.\begin{array}{l} 2\delta(\theta_2 - \theta_{2\max}) \text{ if } \theta_2 \notin \left[p_1 - \sqrt{k}, p_1 + \sqrt{k}\right] \\ 2\delta(p_1 - \theta_{2\max}) - k \text{ if } \theta_2 \in \left[p_1 - \sqrt{k}, p_1 + \sqrt{k}\right] \end{array}\right\} \delta < 0 \end{cases}$$

And

$$p_2(l_2) = \begin{cases} p_1 \text{ if } \begin{cases} \delta > 0 \text{ and } l_2 = 2\delta(p_1 - \theta_{2\min}) - k \\ \delta < 0 \text{ and } l_2 = 2\delta(\theta_{2\max} - p_1) - k \end{cases} \\ \theta_{2\min} + \dfrac{l_2}{2\delta} \text{ if } \delta > 0 \text{ and } l_2 \neq 2\delta(p_1 - \theta_{2\min}) - k \\ \theta_{2\max} + \dfrac{l_2}{2\delta} \text{ if } \delta < 0 \text{ and } l_2 \neq 2\delta(\theta_{2\max} - p_1) - k \end{cases}$$

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:

$$l_1(\theta_1; \delta, \theta_{1\min}, \theta_{1\max}) = \begin{cases} 4\delta(\theta_1 - \theta_{1\min}) \text{ if } \delta \geq 0 \\ 4\delta(\theta_1 - \theta_{1\max}) \text{ if } \delta < 0 \end{cases}$$

$$p_1(l; \delta, \theta_{\min}, \theta_{\max}) = \begin{cases} \theta_{\min} + \dfrac{l}{4\delta} \text{ if } \delta \geq 0 \\ \theta_{\max} + \dfrac{l}{4\delta} \text{ if } \delta < 0 \end{cases}$$

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, θ_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, θ_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 θ_1 and θ_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).[14] 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

[14] We assume θ_1 is uniformly distributed on $\left[\theta_{1\min}, \theta_{1\max}\right]$. Earlier we assumed θ_2 is uniformly distributed on $\left[\theta_1 - \frac{1}{2}, \theta_1 + \frac{1}{2}\right]$; we further assume $\theta_{1\min} \geq \frac{1}{2}$, so all realizations of θ_2 are greater than zero.

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.[15]

Figure 2 illustrates the second through fourth groups of hypotheses. As shown, a SIG's level of expenditures in budget years of biennial states is predicted to be higher than in annual states; its level of expenditures in off-budget years of biennial states is predicted to be lower than in annual states; and these differences are predicted to increase as k_2 increases.

INSERT FIGURE 2 ABOUT HERE

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 intra- or within-institutional predictions in high *k* and low *k* states over the budget cycle.

[15] We thank Tim Groseclose for pointing out this hypothesis to us.

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. 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 appears 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, δ, 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.[16] 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

[16] Note that this coding imposes the restriction that the expenditure function slope is the same for a given group between unified opposed and divided government, and between divided government and unified supporting government.

number of days the legislature is in special session. In some specifications, 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.

*** INSERT TABLE 5 HERE ***

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.

In Models 6 through 10, we replicate the five earlier models using a differences-in-differences estimator.[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

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

coefficient on Distance is somewhat larger than Model 5. It suggests a 79% increase in lobbying by firms (unions) when the government switches from being unified Republican (Democratic) to unified Democratic (Republican). There is only a 6% 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 127 session days to the legislative calendar. The effect for special sessions is the same as the effect of regular sessions in this specification.

One concern is that while the PWGH model focuses on one group, it does not address the question of strategic behavior (for example, free-riding) when there are multiple groups. As discussed earlier, we do not model the strategic interaction between groups. However, empirically, we can examine whether the number of groups in an issue area makes a difference to a group's lobbying. We replicate Table 4, Model 5 including a variable for the number of interest groups lobbying in the same issue area.[18] In this specification, the coefficient on this new variable is positive but not statistically significant.

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, each with advantages and drawbacks. The first utilizes the individual business-labor data of the previous section. The second utilizes aggregate state level lobbying expenditures from 38 states.

[18] Gray et al 2002 have classified each registered lobbyist in each state according to one of twenty areas of interest, as of 1997. We update this and classify all interest groups in the dataset using their classification system and we also add ten categories to further refine the analysis.

The individual level data seem the obvious choice to test the model's predictions. But they present a difficulty: because we are interested in the effect of unvarying state characteristics (namely the states' budgetary institutions) we cannot use state fixed effects to control for the different lobbying expenditure reporting requirements in the states. Instead, we must rely on a less satisfactory "lax regulations" dummy variable. Although the aggregate data operate at one-step-removed from the group-legislature theory, we can estimate state fixed effects with these data, 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, δ, we utilize the same distance variable. We retain group fixed effects and year fixed effects, but of necessity we drop the state fixed effects. Instead, we employ several dummy variables. To analyze the size of *k* in the second period, we categorize states into three groups. 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 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. This is the

omitted category in the statistical analysis.[19] 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.

In order to 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).

[19] This categorization was made by the National Council of State Legislatures. See the data description in the Appendix A2.

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 136% (Model 1) to 181% (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 1.81 times that 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: $L_A = L_{B_1}^{low\ k}$, $L_{B_1}^{high\ k} = 2L_A$, $L_{B_1}^{high\ k} = 2L_{B_1}^{low\ k}$.

Model 2 replicates Model 1 but uses Sample Frame 2 to test these off-budget year hypotheses. 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). However, in our view the estimated coefficient may be implausibly small as it suggests groups in low *k* states undertake only 28% of the lobbying expenditures in the off-budget years relative to annual state lobbying expenditures. 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 2b. 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 2c.

Overall, the individual level data show broad support for the theory's predictions. However, the absence of state fixed effects suggests care in interpreting the results. The lack of stronger controls for varying reporting requirements may present a problem in the off-budget years in particular. Spending levels are much lower in those years, making it more difficult to estimate the separate effects reliably.

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. The disadvantage of the aggregate data, however, is that we must impose additional assumptions on interest groups behavior. In particular, 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.[20]

Table A3 provides the results of the two first stage regressions (one for budget years, the other for off-budget years). Thirty-five state fixed effects are estimated for budget years and thirty-two for off-budget years.[21] 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. (Definitions of all variables may be found in Appendix A2.) 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 ($L_A < L_{B_1}^{high\ k}$ and $L_A = L_{B_1}^{low\ k}$). As shown in Table 4, the theory further predicts that expenditures in a high-*k* state will be twice that in an annual state ($2L_A = L_{B_1}^{high\ k}$). The point estimate of the coefficient on Biennial High *k* indicates that a high *k* state has 71% higher lobbying expenditures relative to annual

[20] 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.

[21] We lose a handful of state fixed effects when we difference the data in the first stage because of short series.

budget states in the budget years, and an F-test cannot reject the possibility that $2L_A = L_{B_1}^{high\ k}$ at the 95% level of confidence. Finally, the coefficients on Biennial Low *k* and Biennial High *k* display the same relationship ($L_{B_1}^{high\ k} = 2L_{B_1}^{low\ k}$, 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 $L_{B_2}^{low\ k} > L_{B_2}^{high\ k}$). 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 strong support for the core hypothesis and five of the six predictions in the second and third clusters of predictions.

Table 7 can also be used to examine the fifth type of hypotheses: 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, $L_{B_1}^{high\ k} > L_{B_2}^{high\ k}$ and $L_{B_1}^{low\ k} > L_{B_2}^{low\ k}$). 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 12% in budget years for biennial budgeting low *k* states, and Model 2 demonstrates that it also increases 12% 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 $L_{B_2}^{low\ k} \big/ L_A = L_{B_2}^{low\ k} \big/ L_{B_1}^{low\ k}$: 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 $L_{B_2}^{low\ k} / L_A = .79$ while $L_{B_2}^{low\ k} / L_{B_1}^{low\ k} = .89$. 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.

V. Discussion and Conclusion

In this paper we have examined some of the most extensive data yet collected on lobbying in the American states. We used the data to explore the predictions of the most prominent model of endogenous cost 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 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.

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 expenditures actually assist 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 system, 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 Idaho.

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

Ansolabehere, Steven, John M. de Figueiredo, and James Snyder. 2003. "Why Is There So Little Money in U.S. Politics?" *Journal of Economic Perspectives* 17(1): 93-120.

Arnold, R. Douglas. 1990. *The Logic of Congressional Action*. New Haven: Yale University Press.

Austen-Smith, David. 1995. "Campaign Contributions and Access," *American Political Science Review* 89(3):566-581.

---- and John Wright. 1994. "Counteractive Lobbying," *American Journal of Political Science* 38:25-44.

Battaglini, Marco. 2004. "Policy Advice with Imperfectly Informed Experts," *Advances in Theoretical Economics* 4(1).

Battaglini, Marco, and Roland Benabou. 2003. "Trust, Coordination, and the Industrial Organization of Political Activism," *Journal of the European Economic Association*, 1(4): 851-889.

Baumgartner Frank and Bryan D. Jones. 1993. *Agendas and Instability in American Politics*. Chicago: University of Chicago Press.

Bennedsen, Morten and Sven Feldman. 2002. "Lobbying Legislatures," *Journal of Political Economy*, 110(4):919-946.

Card, David and Alan B. Krueger. 1992. "Does School Quality Matter? Returns to Education and the Characteristics of Public Schools in the United States." *Journal of Political Economy*, 100(1): 1-40.

Crawford, V., and J. Sobel. 1982. "Strategic Information Transmission." *Econometrica*, 50(6): 1431-1451.

de Figueiredo, John M. and Brian S. Silverman. 2006. "Academic Earmarks and the Returns to Lobbying," *Journal of Law and Economics*, forthcoming

Gray, Virginia, David Lowery, Todd McNoldy, Adam Newmark, and Jennifer Wolak. 2002. "Much of Politics is Still Local: Multi-State Lobbying in State Interest Communities." *Legislative Studies Quarterly* 27(4):527-556.

Grossman, Gene and Elhanan Helpman. 2001. *Special Interest Politics*. Cambridge, MA: The MIT Press.

Hrebenar, Ronald J. and Clive S. Thomas. 1993. *Interest Group Politics in theNortheastern States*. University Park, PA: Penn State Press.

Krasnow, Erwin G., David R. Siddall, and Michael D. Berg. 2001. *FCC Lobbying: A Handbook of Insider Tips and Practical Advice*. Washington, D.C.: Telecommunications Reports International.

Krehbiel, Keith. 1998. *Pivotal Politics: A Theory of U.S. Lawmaking.* Chicago: University of Chicago Press.

Krishna, Vijay and John Morgan. 2001. "A Model of Expertise," *Quarterly Journal of Economics* 116:747-775.

Goldberg, Penelope, and Giovanni Maggi. 1999. Protection for Sale: An Empirical Investigation," *American Economic Review* 89: 1135-1155.

Leech, Beth L., Baumgartner, Frank R., Timothy La Pira, and Nicholas A. Semanko. 2005. "Drawing Lobbyists to Washington: Government Activity and Interest-Group Mobilization." *Political Research Quarterly* 58, 1 (March 2005): 19–30.

Lohmann, Suzanne. 1993. "A Signaling Model of Informative and Manipulative Political Action," *American Political Science Review* 87: 319-333.

Lowery, David, and Virginia Gray. 2000. *The Population Ecology of Interest Representation: Lobbying Communities in American States*. Ann Arbor: Univeristy of Michigan Press.

Mayhew, David. 1991. *Divided We Govern*. New Haven: Yale University Press.

Milyo, Jeffrey, David Primo and Timothy Groseclose. 2000. "Corporate PAC Campaign Contributions in Perspective," *Business and Politics* 2(1): 75-88.

Primo, David. 2003. "Stop Us Before We Spend Again: Institutional Constraints on U.S. State Spending." University of Rochester, Department of Political Science Working Paper.

Primo, David, and Jeff Milyo. 2004. "Campaign Finance and Political Efficacy: Evidence from the States," University of Chicago, Harris School Working Paper.

Potters, Jan and Frans Van Winden. 1992. "Lobbying and Asymmetric Information," *Public Choice* 74: 269-92.

Snyder, James M. 1990. "Campaign Contributions as Investments: The U.S. House of Representatives 1980-1986," *Journal of Political Economy* 98(6): 1195-1227.

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 $\theta_2 \notin \left[p_1 - \sqrt{k}, p_1 + \sqrt{k}\right]$ the lobbying expenditure function indicated in Proposition One induces revelation of θ_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 θ_2 outside the hole and θ_2' inside the "hole," it must be better for the SIG to indicate θ_2 and receive $p_2 = \theta_2$ than indicate θ_2' and receive $p_2 = p_1$. Second, for any actual θ_2 within the hole and any θ_2' outside the hole, it must be better for the SIG to indicate θ_2 is in the hole and receive $p_2 = p_1$ than indicate θ_2' and receive $p_2 = \theta_2'$.

Formally, in the case of positive bias we require

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

$$U\left(\bar{l}, p_2(\bar{l}), \theta_2', \delta\right) = -(p_1 - \theta_2 - \delta)^2 - \bar{l}$$

$$\forall \theta_2, \theta_2', \ \theta_2 \notin \left[p_1 - \sqrt{k}, p_1 + \sqrt{k}\right] \text{ and } \theta_2' \in \left[p_1 - \sqrt{k}, p_1 + \sqrt{k}\right] \qquad \text{(A1)}$$

and

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

$$-\left(\theta_2{}' - \theta_2 - \delta\right)^2 - 2\delta\left(\theta_2{}' - \theta_{2\min}\right)$$

$$\forall \theta_2, \theta_2{}',\ \theta_2 \in \left[p_1 - \sqrt{k}, p_1 + \sqrt{k}\right] \text{ and } \theta_2{}' \notin \left[p_1 - \sqrt{k}, p_1 + \sqrt{k}\right] \qquad \text{(A2)}$$

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 θ_2 while $U\left(\bar{l}, p_2(\bar{l}), \theta_2{}', \delta\right)$ 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

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

$$\Rightarrow \bar{l} \geq 2\delta\left(p_1 - \theta_{2\min}\right) - k \qquad \text{(A3a)}$$

Now consider (A2). When $\theta_2 \in \left[p_1 - \sqrt{k}, p_1 + \sqrt{k}\right]$, 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 $\theta_2' \geq p_1 + \sqrt{k}$.[22] So it is sufficient to check (2) at those values. Thus, at at $\theta_2' = p_1 - \sqrt{k}$ and $\theta_2' = p_1 + \sqrt{k}$ we require

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

$$\Rightarrow \bar{l} \leq 2\delta(p_1 - \theta_{2\min}) - k \qquad \text{(A3b)}$$

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 θ_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 θ_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 θ_2 space so $p_2 = p_1$ and no legislating costs are incurred. The policy maker's maximand is

---

[22] This follows from $\frac{\partial}{\partial \theta_2'} U(l(\theta_2'), p_2(l); \theta_2', \delta) = -2\left(\theta_2' - \theta_2\right) <> 0 \text{ as } \theta_2' >< \theta_2$.

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

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

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 θ_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 θ_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 θ_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 θ_2 falls outside the "hole," the SIG reveals θ_2 to the policy maker who then sets $p_2 = \theta_2$. Consequently the policy maker's maximand becomes

$$-(p_1 - \theta_1)^2 - \int_{p_1-\sqrt{k}}^{p_1+\sqrt{k}} (p_1 - \theta_2)^2 f(\theta_2) d\theta_2 - k\left(1 - 2\sqrt{k}\right)$$

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

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

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 θ_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 θ_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:

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

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

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

Solving each integral and combining terms yields

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

Note that the value of the second period is independent of the policy set in the first period, conditional on θ_1 being revealed (which is quite different from the case in the high k_2 states). Consequently, the lobbying expenditure function that forces revelation of θ_1 in the first period is identical to that in annual budgeting states.

Derivation of Expected Expenditure Functions

Using Propositions 1 and 3, $L_A = L_{B1}^{Low\,k} = \int_{\theta} 2\delta\left(\theta-\theta_{\min}\right)f(\theta)d\theta = 2\delta\left(E(\theta)-\theta_{\min}\right) =$

$2\delta\left(\frac{\theta_{\max}+\theta_{\min}}{2}-\theta_{\min}\right) = \delta\left(\theta_{\max}-\theta_{\min}\right)$. Using Proposition 3, $L_{B1}^{High\,k} =$

$\int_{\theta_1} 4\delta\left(\theta_1-\theta_{1\min}\right)f(\theta_1)d\theta_1 = 2\delta\left(\theta_{1\max}-\theta_{1\min}\right)$. From Proposition 2, $L_{B2}^{High\,k} = 0$.

Finally, consider $L_{B2}^{Low\,k}$, 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 θ_2 and θ_1, $\left(\theta_1,\theta_2\right)$. From Proposition 2, if θ_2 falls outside the "hole" the SIG's expenditures are $2\delta\left(\theta_2-\theta_{2\min}\right) = 2\delta\left(\theta_2-\theta_1+\frac{1}{2}\right)$ (focusing on positive bias). If θ_2 falls inside the "hole," the SIG's expenditure is $2\delta\left(p_1-\theta_{2\min}\right)-k = \delta-k$ (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 θ_2 simple so we integrate over θ_2 first. Putting the pieces together:

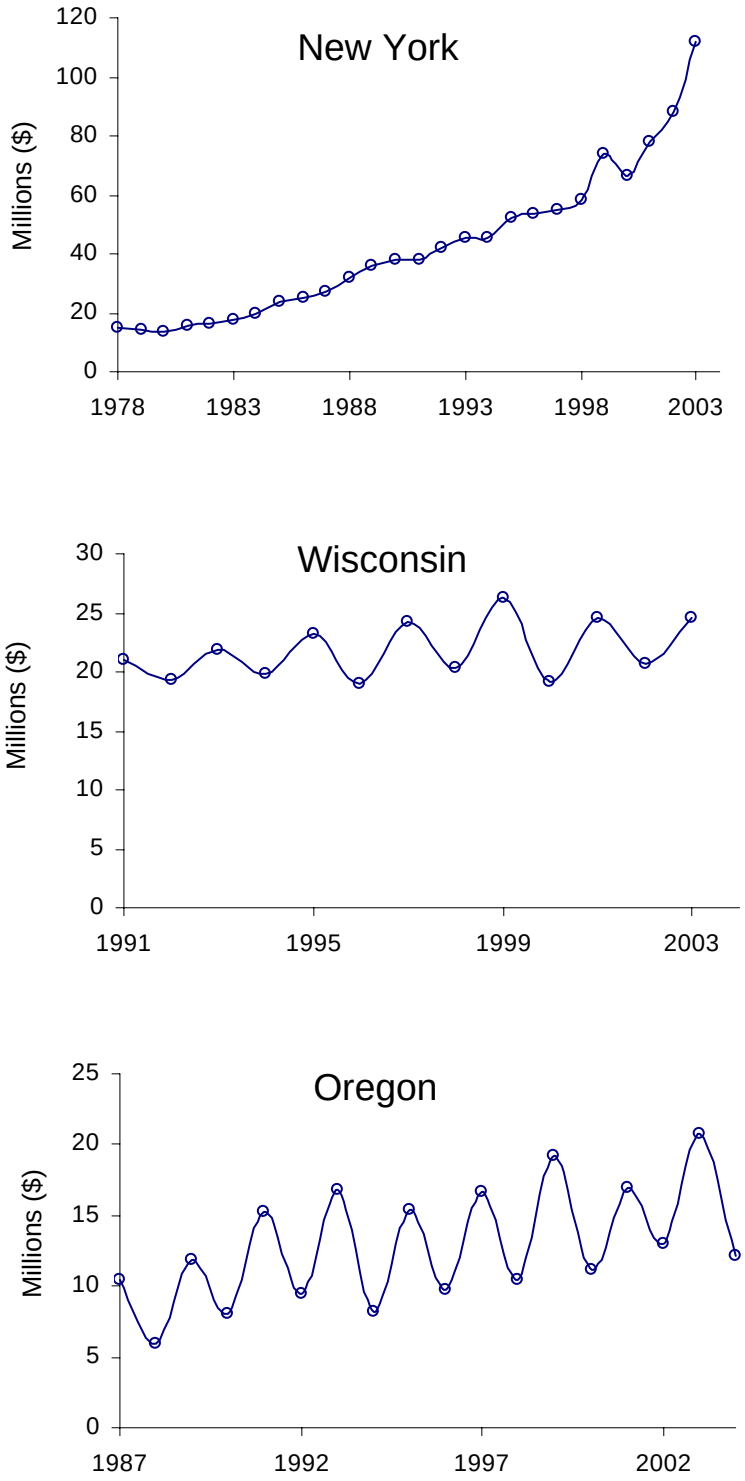
$$L_{B2}^{Low\,k} = \int_{\theta_{1\min}}^{\theta_{1\max}} \left(\int_{\theta_1 - \frac{1}{2}}^{\theta_1 - \sqrt{k}} 2\delta\left(\theta_2 - \theta_1 + \frac{1}{2}\right) d\theta_2 + \int_{\theta_1 + \sqrt{k}}^{\theta_1 + \frac{1}{2}} 2\delta\left(\theta_2 - \theta_1 + \frac{1}{2}\right) d\theta_2 + 2\sqrt{k}(\delta - k) \right) f(\theta_1) d\theta_1$$

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

$$= \int_{\theta_{1\min}}^{\theta_{1\max}} \left(\delta - 2k^{\frac{3}{2}}\right) f(\theta_1) d\theta_1$$

$$= \left(\delta - 2k^{\frac{3}{2}}\right)\left(\theta_{1\max} - \theta_{1\min}\right)$$

Figure 1: Lobbying Expenditures in States



All graphs in 2000 constant dollars.

Figure 2: Predictions of the Extended Model

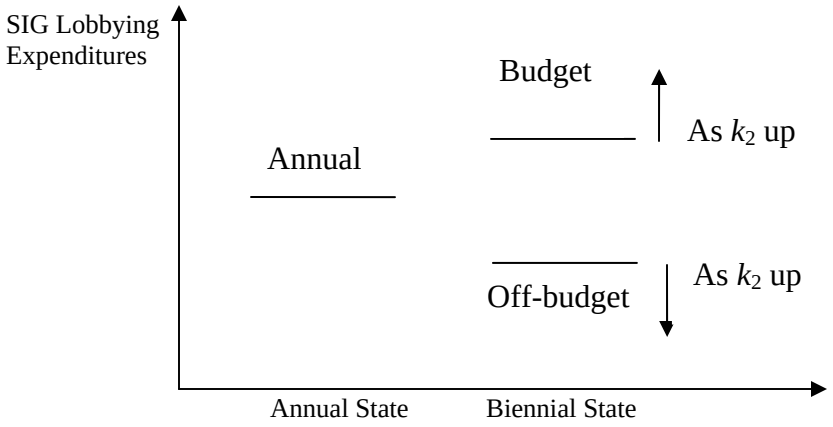


TABLE 1: DESCRIPTIVE STATISTICS FORAGGREGATE ANNUAL STATE LOBBYING EXPENDITURES

State	Mean Reported Lobbying Expenditures*	Minimum Reported Annual Lobbying Expenditures*	Maximum Annual Reported Lobbying Expenditures*	First Year Data Available	Last Year Data Available	Biennial Budgeting State
Alaska	$9,098,812	$4,297,268	$12,200,000	1978	2004	No
Arizona**	$2,371,891	$1,506,335	$3,156,176	1995	2004	No
California	$161,000,000	$142,000,000	$189,000,000	1991	2003	No
Colorado	$18,000,000	$17,100,000	$19,300,000	2001	2003	No
Connecticut	$15,900,000	$2,624,827	$35,400,000	1978	2003	Yes
Delaware	$152,093	$131,649	$177,082	2002	2004	No
Florida	$4,912,494	$4,091,011	$6,818,084	1997	2001	No
Georgia	$574,220	$315,283	$675,404	1997	2003	No
Hawaii	$3,322,758	$2,707,086	$3,917,630	1996	2003	Yes
Idaho	$408,472	$298,667	$482,954	1997	2003	No
Illinois	$1,147,851	$960,528	$1,437,774	1995	2003	No
Indiana	$15,500,000	$11,100,000	$19,100,000	1996	2001	Yes
Kansas	$626,738	$364,223	$978,735	1975	2003	No
Kentucky**	$6,785,246	$2,590,579	$9,879,419	1994	2003	Yes
Louisiana	$452,757	$362,303	$681,486	1997	2003	No
Massachusetts	$42,400,000	$27,100,000	$55,200,000	1995	2003	No
Maryland	$19,900,000	$13,700,000	$28,500,000	1988	2003	No
Maine	$3,316,610	$2,030,087	$4,420,563	1989	2003	Yes
Michigan	$23,400,000	$22,300,000	$24,900,000	2001	2003	No
Minnesota***	$5,082,912	$1,070,697	$10,900,000	1980	2004	Yes
Mississippi	$6,875,722	$4,331,805	$9,371,824	1995	2003	No
Montana	$2,733,623	$18,255	$5,154,875	1993	2001	Yes
North Carolina	$9,151,968	$7,999,181	$10,500,000	2001	2004	Yes
Nebraska	$8,133,817	$6,423,631	$9,161,878	2000	2003	Yes
New Jersey	$18,100,000	$14,800,000	$25,000,000	1993	2003	No
New York	$42,400,000	$13,800,000	$112,000,000	1978	2003	No
Ohio	$510,581	$346,473	$765,245	1999	2004	Yes
Oregon	$12,900,000	$5,948,027	$20,700,000	1987	2004	Yes
Pennsylvania	$48,400,000	$46,800,000	$50,100,000	2000	2001	No
South Carolina	$13,900,000	$13,200,000	$14,300,000	1998	2001	No
Texas	$4,792,169	$768,337	$15,000,000	1993	2001	Yes
Utah	$159,194	$105,123	$245,998	1995	2003	No
Virginia	$10,500,000	$8,293,575	$15,800,000	1996	2003	Yes
Vermont	$4,859,556	$4,414,832	$5,182,520	1998	2004	No
Washington	$29,200,000	$22,300,000	$39,000,000	1993	2004	Yes
Wisconsin	$21,800,000	$18,900,000	$26,200,000	1991	2003	Yes
West Virginia	$267,579	$212,544	$394,445	1992	2003	No
Wyoming	$262,105	$127,916	$496,434	2000	2003	Yes

* All reports are in 2000 real dollars

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

*** Has separate procedures for capital budgeting.

TABLE 2: LOBBYING IN THE STATES

	Model 1	Model 2
Dependent Variable	Ln(Lobbying Per Capita)	Ln(Lobbying)
Method	Differences in Differences	Differences in Differences
Variable		
Budget Year	0.215***	0.215***
	(0.06)	(0.06)
Session Days	0.006***	0.006***
	(0.00)	(0.00)
Special Session Days	0.002	0.002
	(0.00)	(0.00)
Election Year	-0.039	-0.039
	(0.04)	(0.04)
Republican Government	0.228	0.228
	(0.13)	(0.13)
Democratic Government	-0.015	-0.016
	(0.11)	(0.11)
Ln(Per Capita Income)	1.415	1.440
	(1.20)	(1.20)
Constant	-0.040	-0.031
	(0.06)	(0.06)
State Fixed Effects	Yes	Yes
Total R-squared	0.344	0.343
F-stat	22.968	22.937
n	352	352

Two-sided t-tests: ** p<.05 *** p<.01

Note: Dependent variables and method used are noted. An observation is a state-year.

TABLE 3: EXPECTED LOBBYING EXPENDITURE FUNCTIONS

	ANNUAL BUDGETING STATE	BIENNIAL BUDGETING STATE – LOW k_2	BIENNIAL BUDGETING STATE – HIGH k_2
Period 1	A. $L_A = \delta(\theta_{\max} - \theta_{\min})$	B. $L_{B_1}^{low\ k} = \delta(\theta_{1\max} - \theta_{1\min})$	C. $L_{B_1}^{high\ k} = 2\delta(\theta_{1\max} - \theta_{1\min})$
Period 2	D. $L_A = \delta(\theta_{\max} - \theta_{\min})$	E. $L_{B_2}^{low\ k} = \left(\delta - 2k^{\frac{3}{2}}\right)(\theta_{1\max} - \theta_{1\min})$	F. $L_{B_2}^{high\ k} = 0$

TABLE 4: EMPIRICAL PREDICTIONS IMPLIED BY THE EXPECTED LOBBYING EXPENDITURE FUNCTIONS

CLUSTERS OF PREDICTIONS	HYPOTHESES
1. Core hypothesis: Effect of SIG bias on lobbying expenditures	$\frac{\partial L}{\partial \delta} \geq 0$
2. Lobbying expenditures in budget years, across institutions	a) $L_A = L_{B_1}^{low\ k}$; b) $L_{B_1}^{high\ k} = 2L_A$; c) $L_{B_1}^{high\ k} = 2L_{B_1}^{low\ k}$
3. Lobbying expenditures in off-budget years, across institutions	a) $L_A > L_{B_2}^{low\ k}$; b) $L_A > L_{B_2}^{high\ k}$; c) $L_{B_2}^{low\ k} > L_{B_2}^{high\ k}$
4. Lobbying expenditures over the budget cycle, biennial budgeting states	a) $L_{B_1}^{low\ k} > L_{B_2}^{low\ k}$; b) $L_{B_1}^{high\ k} > L_{B_2}^{high\ k}$ c) $\frac{L_{B_2}^{low\ k}}{L_{B_1}^{low\ k}} = \frac{L_{B_2}^{low\ k}}{L_A}$
5. Effect of legislative size on lobbying expenditure	$\frac{\partial L}{\partial n} = 0$

"n" denotes the number of members in the state legislature. All hypotheses are per SIG, holding bias constant.

TABLE 5: INTERST GROUP LEVEL ANALYSIS FOR MULTI-STATE GROUPS

Variable	Levels on Levels					Differences in Differences				
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9	Model 10
Distance	0.542***	0.566***	0.614***	0.254***	0.268***	0.578***	0.561***	0.616***	0.617***	0.581***
	(0.15)	(0.08)	(0.09)	(0.10)	(0.11)	(0.18)	(0.09)	(0.09)	(0.10)	(0.10)
Ln(Population)			0.167***	2.576	1.929			-0.345***	-0.271**	-0.270**
			(0.06)	(1.55)	(1.90)			(0.07)	(0.09)	(0.09)
Ln(Per Capita Income)			1.905***	0.274	1.498			4.851***	4.767***	4.689***
			(0.16)	(0.38)	(1.28)			(0.23)	(0.30)	(0.30)
Session Days			0.007***	0.004***	0.005***			0.005***	0.005***	0.005***
			(0.00)	(0.00)	(0.00)			(0.00)	(0.00)	(0.00)
Special Session Days			0.005***	0.003**	0.004***			0.009***	0.007***	0.006***
			(0.00)	(0.00)	(0.00)			(0.00)	(0.00)	(0.00)
Constant	9.072***	9.059***	-13.504***	-38.191	-39.558	-0.002	-0.002	-0.111***	-3.394***	-3.876***
	(0.09)	(0.05)	(1.49)	(21.27)	(35.63)	(0.01)	(0.03)	(0.03)	(0.14)	(0.64)
Group Fixed Effects	No	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes
State Fixed Effects	No	No	No	Yes	Yes	No	No	No	Yes	Yes
Year Fixed Effects	No	No	No	No	Yes	No	No	No	No	Yes
Total R-squared	0.006	0.006	0.052	0.364	0.368	0.008	0.008	0.126	0.260	0.267
F-stat	12.26	47.48	110.42	287.54	188.17	10.01	42.41	171.21	154.28	101.95
n	7,052	7,052	7,052	7,052	7,052	6,431	6,431	6,431	6,431	6,431

Two-sided t-tests: ** p<.05 *** p<.01

Note: The sample frame is interest groups that engage in multi-state lobbying in 12 states under analysis. The dependent variable is the log of lobbying expenditures by an interest group lobbying in a state-year. Models 1-5 are level on level regression; Models 6-10 are differences on differences regressions. Standard errors, statistical significance, and use of fixed effects are noted. Models 1 and 6 report standard errors clustered on interest group.

TABLE 6: ESTIMATION OF INTER-INSTITUTIONAL EFFECTS USING INTEREST GROUP DATA

	Model 1	Model 2
Dependent Variable	Ln(Lobbying)	Ln(Lobbying)
Method	Levels on Levels	Levels on Levels
Sample Frame	Budget Years for All States	Non-Budget Years for Biennial States Budget Years for Annual States
Variable		
Distance	1.033*** (0.10)	0.859*** (0.12)
Biennial High k	0.596*** (0.11)	-0.321** (0.14)
Biennial Low k	0.030 (0.14)	-1.276*** (0.17)
Session Days	0.002*** (0.00)	0.002*** (0.00)
Special Session Days	-0.001*** (0.00)	-0.003 (0.00)
Ln(Population)	-1.014*** (0.08)	-0.356*** (0.11)
Ln(Per Capita Income)	3.294*** (0.48)	-0.006 (0.59)
Lax Regulations	-3.219*** (0.14)	-4.253*** (0.17)
Constant	-8.247 (4.30)	14.920*** (4.85)
Group Fixed Effects	yes	yes
Year Fixed Effects	yes	yes
State Fixed Effects	no	no
Total R-squared	0.4082	0.4218
F-stat	215.20	214.04
n	4,966	4,703

Two-sided t-tests: *** p<.01, **p<.05

TABLE 7: DECOMPOSITION OF STATE FIXED EFFECTS FROM FIRST STAGE REGRESSIONS

	Model 1	Model 2
Dependent Variable	Fixed Effect from Ln(Lobbying)	Fixed Effect from Ln(Lobbying)
Method	Cross Sectional OLS	Cross Sectional OLS
First Stage Sample Frame	Budget Years	Off-Budget Biennial Budget Annual
Variable		
Biennial High k	0.534***	-0.232***
	(0.18)	(0.06)
Biennial Low k	0.138	-0.238**
	(0.15)	(0.09)
Budget Caps	0.247	0.002
	(0.20)	(0.07)
Term Limits	0.131	-0.128
	(0.17)	(0.06)
Total Number of Legislators	0.000	-0.001
	(0.00)	(0.00)
Veto Override Requirement	-0.966	1.263
	(1.36)	(0.75)
Professionalization Index	-0.020	-0.002
	(0.02)	(0.00)
Compensation	0.082	0.113*
	(0.19)	(0.06)
Constant	0.699	-0.480
	(0.92)	(0.50)
R-squared	0.431	0.611
n	35	32

Two-sided t-tests: *** p<.01, **p<.05

Note: The dependent variable is the state fixed effect calculated from the first stage regressions in Table A4. Robust standard errors are used and statistical significance is noted.

TABLE 8: TEMPORAL PATTERNS IN LOBBYING IN BIENNIAL STATES

	Model 1	Model 2
Dependent Variable	Ln(Lobbying)	Ln(Lobbying)
Method	Differences in Differences	Differences in Differences
Sample	Low k States	High k States
Variable		
Budget Year	0.117**	0.113***
	(0.06)	(0.04)
Session Days	0.009***	0.012***
	(0.00)	(0.00)
Special Session Days	-0.007	0.005
	(0.01)	(0.00)
Republican Government	0.358	1.069**
	(0.40)	(0.46)
Democratic Government	-0.145	0.064
	(0.13)	(0.26)
Ln(Per Capita Income)	2.458	5.361
	(2.02)	(3.85)
Constant	-0.072	-0.218
	(0.09)	(0.20)
State Fixed Effects	Yes	Yes
Total R-squared	0.641	0.457
F-stat	13.3	12.32
n	58	98

Two-sided t-tests: ** p<.05 *** p<.01

Note: Dependent variables, method, and sample frame are noted. An observation is a state-year. The coefficient on budget year indicates that in both high k and low k states, there is a statistically significant increase in lobbying in the budget years relative to the off-budget years.

TABLE A1: TOTAL AVERAGE ANNUAL LOBBYING EXPENDITURES BY INTEREST GROUP CATEGORY

	Firms	Trade Associations	Unions	Membership Groups	Government
Georgia	$203,087 35.03%	$337,992 58.30%	$5,861 1.01%	$14,066 2.43%	$18,788 3.24%
Idaho	$106,992 26.86%	$248,792 62.46%	$7,333 1.84%	$34,038 8.54%	$1,193 0.30%
Indiana	$7,410,237 51.26%	$5,381,184 37.23%	$402,977 2.79%	$479,810 3.32%	$780,632 5.40%
Kentucky	$3,112,450 47.60%	$2,874,744 43.96%	$199,902 3.06%	$204,986 3.13%	$147,242 2.25%
Maryland	$8,629,497 53.30%	$6,072,596 37.51%	$254,010 1.57%	$1,053,157 6.51%	$179,949 1.11%
Massachusetts	$24,500,000 68.03%	$9,065,445 25.17%	$973,783 2.70%	$953,398 2.65%	$520,111 1.44%
Montana	$1,159,269 32.82%	$1,670,386 47.30%	$130,734 3.70%	$313,453 8.88%	$257,908 7.30%
New Jersey	$14,300,000 77.09%	$3,667,637 19.77%	$380,041 2.05%	$201,421 1.09%	$0 0.00%
Oregon	$4,806,318 34.68%	$6,282,698 45.34%	$565,691 4.08%	$1,010,955 7.30%	$1,192,322 8.60%
Virginia	$4,281,013 39.31%	$4,531,930 41.61%	$108,179 0.99%	$920,756 8.45%	$1,049,186 9.63%
Washington	$11,100,000 43.92%	$9,931,242 39.30%	$1,556,676 6.16%	$1,502,012 5.94%	$1,182,857 4.68%
Wisconsin	$7,168,874 34.61%	$10,200,000 49.25%	$796,687 3.85%	$1,478,579 7.14%	$1,068,476 5.16%

Notes: Data is for all available years for each state. Table A2 figures may differ from Table 1 figures because the time period covered in each table is different. Firms and trade associations comprise on average 88% of lobbying expenditures in every state, and no less than 80% of lobby expenditures in any state. Some large figures have been rounded.

TABLE A2: VARIABLE DEFINITIONS AND SOURCES

Ln(Lobbying Per Capita)	State Aggregate Lobbying Expenditures Divided by the Population of the State in a given year, logged (Ethics Commission of Each State where data is available; includes 38 states. Most data is obtain from official disclosures provided.) Population Data from Census and Bureau of Economic Analysis (BEA).
Ln(Lobbying)	State Aggregate Lobbying Expenditures in a given year, logged. (Ethics Commission of Each State where data is available; includes 38 states. Most data is obtain from official disclosures provided.)
Interest Group Lobbying Data and Categories	For twelve states, annual lobbying expenditures by registered interest group by year. Categorization of each interest group into each of five categories: corporate, trade association, membership organization, union, and government; for each state for each year. (Ethics Commission of Each State. Most data is obtain from official disclosures provided. N > 50,000)
Budget Year	Equal to 1 if the state budget is legally mandated to be created in the year; 0 otherwise. (National Council of State Legislatures--NCSL)
Session Days	The number of legislative days the legislature was in session in that year. For those that reported in calendar days, we divided the number of calendar days by 2.5 to retrieve an approximate number of legislative days. This ratio was determined from a subset of data where both total days and legislative days were reported for the same state-year. Session Dummy is a dummy variable = 1 if the legislature is in regular session and 0 otherwise (Book of the States)
Special Session Days	The number of legislative days the legislature was in session in that year. For those that reported in calendar days, we divided the number of calendar days by 2.5 to retrieve an approximate number of legislative days. This ratio was determined from a subset of data where both total days and legislative days were reported for the same state-year. Special Session Dummy is a dummy variable = 1 if the legislature is in regular session and 0 otherwise (Book of the States)
Election Year	Equal to 1 if the legislature holds regularly scheduled election in that year; = 0 otherwise (NCSL)
Republican Government	Equal to 1 when the Republican Party holds the governorship, state senate, and state house; = 0 otherwise (Book of the States)
Democratic Government	Equal to 1 when the Democratic Party holds the governorship, state senate, and state house; = 0 otherwise (Book of the States)
Ln(Per Capita Income)	Log of Per Capita Personal Income of the State in a given year (Bureau of Economic Analysis, Department of Commerce (BEA))
Ln(Population)	Log of Population of the State (Census and BEA)
Year	Year
Biennial	Equal to 1 if a state budgets biennially; = 0 otherwise (NCSL)
Biennial High k	Equal to 1 if a state budgets biennially and either does not meet in the off-year, or has limitations on budget bills it can consider in the off-year; = 0 otherwise (NCSL)
Biennial Low k	Equal to 1 if a state budgets biennally and meets in the off-year with no restrictions on budget bills that can be introduced; = 0 otherwise (NCSL)
Lax Regulations	Equal to 1 if a state in the 12-state dataset has extremely low reporting requirements, not requiring compensation or other standard disclosure requirements; the states are GA, ID, and MT
Budget Caps	Equal to 1 if the state has budget caps; =0 otherwise (Primo, 2003)
Term Limits	Equal to 1 if the state has legislative term limits; = 0 otherwise (Primo and Milyo 2004)
Total Number of Legislators	The total number of legislators in the state senate and house combined (Book of the States)
Veto Override Requirement	The percentage of legislators that must vote for an override of the governor's veto in a given state (Book of the States)
Professionalization Index	A measure of the degree of professionalization of the legislature. This measure is comprised of a rating of the length of the sessions of the legislature, the compensation of legislators, and the amount of staff they have. (Kurtz, NCSL)
Compensation	Equal to 1 if the state has a rule regarding the disclosure of lobbyist compensation; = 0 otherwise (Book of the States)
Distance	A measure of the ideological distance of the interest group to the median of the government. It is = 1 if the interest group is a firm (union), and there is Democratic (Republican) unified government. It is = .5 if the interest group is a firm (union), and there is divided government. It is equal to 0 if the interest group is a firm (union) and there is Republican (Democratic) unified government.

TABLE A3: FIRST-STAGE REGRESSION ON STATE TIME-VARYING VARIABLES

	Model 1	Model 2
Method	Differences in Differences	Differences in Differences
Dependent Variable	Ln(Lobbying)	Ln(Lobbying)
Sample	Budget Years for All States	Non-Budget Years for Biennial States Budget Years for Annual States
Variable		
Ln(Per Capita Income)	0.6359 (0.70)	1.1654 (0.76)
Days in Session	0.0005 (0.00)	0.0008 (0.00)
Days in Special Session	-0.0006 (0.00)	0.0013 (0.00)
Election Year	-0.0270 (0.02)	-0.0326 (0.02)
Republican Unified Govt	0.1735** (0.07)	0.0208 (0.09)
Democratic Unified Govt	-0.0484 (0.06)	0.0117 (0.09)
Constant	0.1237*** (0.04)	-0.1305*** (0.04)
State Fixed Effects	Yes	Yes
Total R-squared	0.1028	0.1356
F-stat	1.66	0.95
n	278	273

Two-sided t-tests: ** p<.05 *** p<.01

Note: The dependent variable is the log of total aggregate lobbying expenditures in the state in a year. The sample frames, standard errors, statistical significance, and use of fixed effects are noted.

REFEREE TABLE R1: ROBUSTNESS CHECKS OF LOBBYING IN THE STATES

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
Dependent Variable	Ln(Lobbying Per Capita)	Ln(Lobbying)	Ln(Lobbying Per Capita)	Ln(Lobbying)	Ln(Lobbying Per Capita)	Ln(Lobbying)	Ln(Lobbying Per Capita)	Ln(Lobbying)
Method	Levels on Levels (Only Stationary States)	Levels on Levels (Only Stationary States)	AR-1 Corrected Fixed Effects	AR-1 Corrected Fixed Effects	Arellano-Bond Dynamic Panel Estimation	Arellano-Bond Dynamic Panel Estimation	Differences on Differences	Differences on Differences
Variable								
Budget Year	0.356***	0.356***	0.320***	0.323***	0.302***	0.310***	0.173***	0.173***
	(0.12)	(0.12)	(0.08)	(0.08)	(0.07)	(0.09)	(0.05)	(0.05)
Session Days	0.007***	0.007***	0.003***	0.003***	0.003*	0.003*		
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)		
Session Dummy							1.044***	1.043***
							(0.09)	(0.09)
Special Session Days	0.006*	0.006*	0.001	0.001	0.001	0.000		
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)		
Special Session Dummy							0.057	0.056
							(0.04)	(0.04)
Election Year	0.015	0.019	-0.014	-0.017	-0.019	-0.010	-0.04	-0.04
	(0.08)	(0.08)	(0.05)	(0.05)	(0.02)	(0.02)	(0.03)	(0.03)
Republican Government	0.311**	0.300**	0.032	0.032	-0.018	-0.043	0.229**	0.229**
	(0.14)	(0.14)	(0.09)	(0.09)	(0.18)	(0.14)	(0.11)	(0.11)
Democratic Government	-0.002	-0.02	-0.111*	-0.115*	-0.113*	-0.177**	-0.01	-0.011
	(0.09)	(0.09)	(0.07)	(0.07)	(0.06)	(0.07)	(0.09)	(0.09)
Ln(Per Capita Income)	0.917	0.928	0.894***	1.061***	1.517**	1.591**	1.587	1.612
	(1.52)	(1.52)	(0.09)	(0.09)	(0.69)	(0.67)	(1.07)	(1.07)
Year	12.152*	12.248*						
	-6.364	-6.374						
$Year^2$	-0.003*	-0.003*						
	-0.002	-0.002						
Constant	-1.21e+04*	-1.22e+04*	-9.074***	4.227***	-0.032*	-0.024	-0.045	-0.036
	(6386.13)	(6396.06)	(0.88)	(0.88)	(0.02)	(0.02)	(0.05)	(0.05)
State Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Total R-squared	0.44	0.47	.	.	.	.	0.48	0.48
F-stat	12.91	14.60	27.50	34.32	.	.	40.64	40.61
n	178.00	178.00	352.00	352.00	313.00	313.00	351.00	351.00

Two-sided t-tests: * p<.10 ** p<.05 *** p<.01

Note: Dependent variables and method used are noted. An observation is a state-year.