

# Informational Lobbying and Counter-Lobbying over Budgets

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Preliminary and Incomplete: Please Do Not Disseminate

May 5, 2015

## Abstract

We present a simple model of informational lobbying by competing interest groups. In the model, lobbying effort is costly and endogenous while information revelation is explicit and strategic. We examine the impact on lobbying expenditures of 1) partisan policy bias in the legislature, 2) differential party control over proposal power and veto power, and 3) two different budgetary institutions (annual and biannual budgeting). Many of the predictions are new to the literature. We then test the model's predictions with lobbying expenditure data from 590 firms and unions operating in 12 states. The predicted patterns are clearly present in the data.

## 1 Introduction

We propose a new theory of informational lobbying, focusing on lobbying during the appropriations process. The theory features competing special interest groups (SIGs), costly lobbying, and strategic information revelation. It also incorporates important institutional features of real lobbying environments, including partisan control of the legislature and executive (so there are "in-groups" and "out-groups"); partisan divisions of legislative proposal and veto power including unified party government, divided party government with an executive veto, and split party control of the legislature; and different budgetary institutions, especially annual budgeting and biannual budgeting. The model makes definite and often novel predictions about the impact of each of those institutional features on lobbying expenditures. We test many of the predictions using newly collected data on lobbying expenditures from 590 firms and unions operating in twelve states. With few exceptions the data display the predicted patterns and do so very clearly.

The theoretical literature to which we contribute is large and complex but one of its key lessons is the importance of distinguishing between *giving politicians information* and *giving politicians money*. The

theoretical literature on giving politicians money typically focuses on "policy for sale," often employing menu auctions or all-pay auctions as a short-hand for a policy bazaar. A quite distinct theoretical literature studies giving politicians information, informational lobbying. This literature examines strategic information transmission and addresses the role of expenditures in creating and conveying information.

Reflecting the ready availability of federal contributions data, a huge empirical literature studies giving politicians money. And, some of the empirical literature takes the theoretical literature seriously (e.g., Snyder 1990, Goldberg and Maggi 1999, Gawand and Pandayopdhay 2000, Bombardini and Trebbi 2007). Such studies create a dialogue between theory and empirics, leading (one hopes) to improvements in both. In contrast with the voluminous empirical literature on campaign contributions, the empirical literature on informational lobbying is much smaller (Hrebendar and Thomas 1993, Lowery and Gray 2000, de Figuieriedo and Silverman 2006, Burstein and Hirsh 2007, and Baumgartner et al 2009). This dearth reflects the paucity of ready data and the difficulty of collecting new data. In addition, very few of the existing empirical studies have tight links to the very substantial theoretical literature (Austen-Smith and Wright 1994 is the sole exception with which we are familiar.) Empirical studies of informational lobbying thus constitute a relatively "undertilled field," in Arnold's phrase.

It is worth noting that Milyo et al 2000 provides estimates of the magnitudes of campaign contributions and informational lobbying expenditures at the federal level in the late 1990s. Expenditures on congressional campaign contributions totaled about \$300 million annually. During the same time period, annual expenditures on congressional lobbying totaled about \$1.5 billion. Thus, lobbying expenditures were approximately half an order of magnitude larger than campaign contributions. If one uses sheer size as a metric, informational lobbying seems to be where the bulk of the "money action" lies in contemporary American politics.

This paper studies expenditures on informational lobbying. As explained in detail below, the lobbying expenditure data we use result from reporting requirements imposed on lobbyists by state ethics commissions. The data capture salaries for lobbyists, rent for their offices, and other expenditures made in connection with legislative lobbying in the state capitols. Excluded are monies paid to politicians by individuals, corporations, parties, or political action committees either directly in the form of campaign contributions or indirectly in the form of independent campaign expenditures. The lobbying expenditure data constitute some of the most extensive ever collected on informational lobbying.

The theory focuses on lobbying during budgeting because data on aggregate lobbying expenditures in the states demonstrate a close link between the two (de Figuieriedo 2005). This link has gone unremarked at the national level because the federal government employs annual budgeting. However, many states employ biannual budgeting. In these states, lobbying expenditures zoom in budget years and plummet in off-budget years, even if the legislature is in session. de Figuieriedo 2005 shows this relationship is robust to many control variables and a variety of estimation strategies. By focusing on the states, we can investigate the lobbying-budgeting link by exploiting cross-state variation in budgetary institutions, as well as intra-state

variation in partisan control of legislatures and the executive. We are also able to exploit the presence of firms and unions that lobby in multiple states. We thus join other recent studies that use the states as laboratories for studying the American political economy (Besley and Case 2003, Alt, Lassen and Rose 2006, *inter alia*).

Broad summary of predictions and findings. In the unified party government scenarios, the in-group is allied with a party controlling both proposal power and veto power. In the divided government scenarios, the in-group is allied with the party controlling proposal power while the out-group is allied with the party controlling veto power. The model predicts that these proposal-power/veto-power alignments are extremely consequential for lobbying strategy. Organization of paper.

## 2 Theory

Broadly speaking, the theoretical literature on informational lobbying examines the following distinctions: 1) non-verifiable vs. verifiable information, with a further distinction between costless verifiability and costly verifiability, 2) costless vs. costly production of messages, with a further distinction between flat exogenous "access" or participation fees and fully endogenous production costs; 3) single vs. multiple lobbyists, with a further distinction between multiple lobbyists who compete with one another vs. multiple lobbyists who act as allies, and 4) single vs. multiple targets of lobbying. The model we present involves verifiable information with costless verification, fully endogenous costly production of information, two competing strategic lobbyists, and (in the divided government and split chamber scenarios) two receivers of lobbying messages, either a legislature with proposal power and an executive with veto power or one chamber controlled by one party and the other chamber controlled by the other.<sup>1</sup> We believe these assumptions capture a recognizable aspect of much legislative lobbying. In addition, the resulting framework easily incorporates additional institutional detail such as different budgeting procedures.

Formally our model most closely resembles that in Bennedson and Feldman 2006. This model involves verifiable information with costless verification, flat information search fees, two competing, strategic lobbyists, and a single target of lobbying. It abstracts from the institutional detail we incorporate (partisan bias and thus "in-groups" and "out-groups," divided party government and split chamber government, and budgetary institutions). Hence, it is not immediately appropriate for structuring an empirical analysis of the state lobbying expenditure data. On the other hand, Bennedson and Feldman address the interactions between giving politicians money and giving politicians information. We do not consider such effects here, but return to them in the Conclusion. Aside from Bennedson and Feldman 2006, relevant earlier papers include Austen-Smith and Wright 1992 and 1994, Austen-Smith 1994, Lohmann 1995, Dahm and Poreiro 2003, and Cotton 2007. When possible, we specifically compare the predictions of our model with those

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<sup>1</sup>Restricting the model to a single in-group or out-group lobbyist is straightforward. Also simple is consideration of two rival in-group lobbyists or two rival out-group lobbyists. But here we focus on an in-group lobbyist competing with an out-group lobbyist. We do so for reasons of intrinsic importance and ready portability to the state data.

of Austen-Smith and Wright, a model which also has been taken to data. Also relevant in terms of theory are models of "certification games" (Bolton and Dewatrimont 2005, Chapter 5) particularly Milgrom and Roberts 1982; note as well studies of "evidence games" (Daughety and Reinganum, Sanchirico, others). Because we assume the SIGs are interested parties, less relevant are pure Spence-type signaling models such as Potters and van Winden 1994 and Grossman and Helpman 2001 (but see de Figueriedo and Cameron 2008). Less relevant yet are models from the very large literature on cheap talk advice games or debate games (references, including some AS models).

In the model, budgeting takes place around competing "projects" with uncertain attributes. Examples of "projects" include: build new schools, build a new prison, or build neither; fund one new weapon system, fund an alternative new weapon system, or fund neither; increase subsidies for agriculture, increase subsidies for mass transit, or retain both at the previous level; deliver a new service using public sector union members, deliver the same service using private contractors, or do not deliver the new service; place a new facility in an urban area, place it in a rural area, do not build the new facility; raise taxes and reduce hikes in public university tuition rates, reduce taxes and raise tuition rates, do neither. Hence, the notion of "projects" is both broad and flexible.

## 2.1 The Model

There are potentially five players: a lower chamber H (the House), an upper chamber S (the Senate), an executive G (the governor), and two special interest groups, SIG 1 and SIG 2. However, when H and S have identical preferences (as in unified or pure divided party government) for simplicity and without loss of generality we combine them into a single player, the legislature L. And when the executive has identical preferences with one or both chambers (as in split chamber and unified party government, respectively) so that G is always willing to sign any bill that the legislature or both chambers are willing to enact, we ignore it as a player. Hence, in the unified government configuration, there are three players (L, SIG 1, and SIG 2); in the divided configuration there are four players (L, G, SIG 1 and SIG 2); and in the split chamber configuration there are four players (H, S, SIG 1 and SIG 2).

The legislature has proposal power: it makes an appropriations decision concerning two different projects or programs. L may fund one project or the other, or it may fund neither (the status quo). It cannot fund both, however. Following the legislature's choice of project, the governor either signs the bill, thereby confirming L's choice as policy, or she vetoes the bill, forcing policy to the status quo. Thus, G has veto power.

We model L's appropriation decision  $d_L$  as the compound binary decisions  $a_0 \in A_0 = \{0, 1\}$ , indicating a decision to depart from the status quo of no project ( $a_0 = 1$ ), and conditional on a departure from the status quo  $a_1 \in A_1 = \{0, 1\}$ , indicating a decision to fund project 1 ( $a_1 = 1$ ) or project 2 ( $a_1 = 0$ ). Thus,  $d_L \in D_L = \{0, (1, 1), (1, 0)\}$  connoting respectively, retain the status quo, choose project 1, and choose project 2. We model G's signing decision as  $d_G \in \{0, 1\}$  where 1 connotes "sign" and 0 connotes "veto."

Each project has a value or *attribute*,  $\theta_i$  ( $i = (1,2)$ ), its social value or net present value to society. A project may be “bad” or “good,” so that  $\theta_i \in \{-1, 1\}$ . Implicitly, the status quo also has an attribute whose value is normalized to 0.

The Legislature’s utility is primarily but not fully contingent on the attribute of the chosen alternative:

$$u_L(d_L, d_G; \theta_1, \theta_2, \beta) = d_G a_0 [a_1(\theta_1 + \beta) + (1 - a_1)\theta_2] \quad (1)$$

Thus, L receives 0 with certainty if it funds neither project and retains the status quo or if the governor vetoes an appropriations bill funding a project. It receives  $\theta_2$  if it funds project 2 and G signs the bill; however, it receives  $\theta_1 + \beta$  if it funds project 1 and G signs the bill.  $\beta$  represents a *partisan bias* on the part of the legislature for project 1 (e.g., prisons over schools, bridges over welfare programs, lower taxes over lower university fees, etc.) irrespective of the project’s actual social value.<sup>2</sup> Partisan bias may reflect an inherent ideological predilection or it may be rooted in the distributional consequences of the projects across constituencies. In either case, we assume  $\beta$  is “small” in the sense that if the Legislature is indifferent or nearly indifferent between the two projects based on information about the project attributes, its partisan bias acts as a tie-breaker; otherwise, perceptions of the attributes guide legislative decision making (this will be made precise in a minute). If, contrary to this assumption, partisan bias were so large that appropriation decisions were impervious to information about the attributes, informational lobbying could play no meaningful role.

G’s utility is similar. More precisely, under *unified party government*, the legislature and the governor share the same partisan bias. However, under *divided party government*, they have the opposite partisan bias. Let  $z \in Z = \{0, 1\}$  connote divided or unified party government, with 1 indicating unified party government and 0 indicating divided party government. Consequently G’s utility is:

$$u_G(d_G, d_L; \theta_1, \theta_2, \beta) = d_G a_0 [a_1(\theta_1 + z\beta) + (1 - a_1)(\theta_2 + (1 - z)\beta)] \quad (2)$$

Hence, under unified government, G’s utility function is exactly the same as L’s. Under divided government, G receives a partisan bonus from Project 2 rather than Project 1.

We assume that prior to lobbying, the legislature and governor do not know a project’s attributes with certainty. More particularly, we assume ex ante a project is “good” with probability  $\frac{1}{2}$ , and this probability is common knowledge among the players. So, absent lobbying, the two projects’ expected social values are the same (and equal to zero, the value of the status quo). We focus on this prior as the natural base case, as in Bennedsen and Feldman 2006. A “biased” prior would effectively modify L and G’s partisan bias, raising or lowering it.

Each SIG has a limited and differential ability to investigate the project attributes and learn  $\theta_1$  and  $\theta_2$ . In particular, SIG  $i$  can investigate  $\theta_i$  at finite cost; it cannot investigate  $\theta_j$  ( $j \neq i$ ) at finite cost. A SIG’s lobbying operation or “effort,” undertaken at scale  $q_i \in Q = [0, 1]$ , generates a signal  $\sigma_i \in \Sigma = \{\theta_i, \emptyset\}$ . More specifically, SIG  $i$  receives hard verifiable information about attribute  $i$  with probability  $q_i$ ; with probability

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<sup>2</sup>In their empirical studying of lobbying in 98 randomly selected issue areas at the federal level, Baumgartner and his associates found “few” neutral lobbying targets (2009:8). Rather, most “clearly had a preferred side in the debate.”

$1 - q_i$  SIG  $i$  fails to uncover hard verifiable information about attribute  $i$ , that is,  $\sigma_i = \emptyset$ . For reasons that will become clear shortly, we refer to  $\sigma_i = 1$  as “good news” for SIG  $i$ ,  $\sigma_i = 0$  as “bad news” for SIG  $i$ , and  $\sigma_i = \emptyset$  as “no news” for SIG  $i$ .

The assumption about informational advantages with respect to “their” project seems essential in some settings, for instance, rival defense contractors developing new weapons systems. But it is also plausible in many other settings. For example, one can associate the SIGs with different geographical areas competing over a project that supplies a local public good, so that residents of one area understand their local situation very well but know little about that elsewhere. Or, one may associate the SIGs with very different kinds of projects, where operational experience brings an informational advantage. For instance, civil engineering companies may know a lot about the costs of maintaining bridges, but know little about the difficulties of providing health insurance for the poor. The latter, however, may be well-understood by insurance companies or Medicaid bureaucrats. Many other examples may occur to the reader.

We assume the SIG’s utility is not tied to the merits of their project but only to whether it receives funding or not. In other words, they are “interested parties” in Milgrom and Robert’s phrase. More specifically, for SIG 1:

$$v_1(a_0, a_1, q_1) = d_G a_0 a_1 - c(q_1) \tag{3}$$

And for SIG 2:

$$v_2(a_0, a_1, q_2) = d_G a_0 (1 - a_1) - c(q_2) \tag{4}$$

Where  $c(q_i)$  denotes the cost of the group’s lobbying effort. Hence, unless the legislature funds its project and the governor signs the bill, the SIG receives nothing, and it must pay its lobbying cost.<sup>3</sup> As a result, SIG 1 favors project 1 irrespective of its actual attributes and SIG 2 favors project 2, irrespective of its actual attributes. For concreteness and tractability we assume quadratic effort costs,  $c(q_i) = (q_i)^2$ .

Because L’s partisan bias makes project 1 more attractive *ceteris paribus*, we say SIG 1 is L-affiliated or, the “in-group” and SIG 2 is L-opposed or the “out-group.” Obviously, there is a mirror case in which L has a partisan bias for project 2 so SIG 2 is the in-group and SIG 1 is the out-group.

The sequence of play is shown in Figure 1. It proceeds as follows:

1. Nature chooses  $\theta_1$  and  $\theta_2$  using (in both cases) common-knowledge probability  $\frac{1}{2}$ ;
2. The SIGs simultaneously set their lobbying efforts  $q_1$  and  $q_2$ ;
3. The SIGs receive signals  $\sigma_1$  and  $\sigma_2$ , respectively, and simultaneously send lobbying messages  $m_1$  and  $m_2$ , respectively;

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<sup>3</sup>A simple variant imposes a loss on a SIG from the selection of the rival project. This variation raises the stakes of losing. Not surprisingly, the effect is to increase equilibrium lobbying levels. Qualitatively, however, the equilibrium is similar to that discussed below.

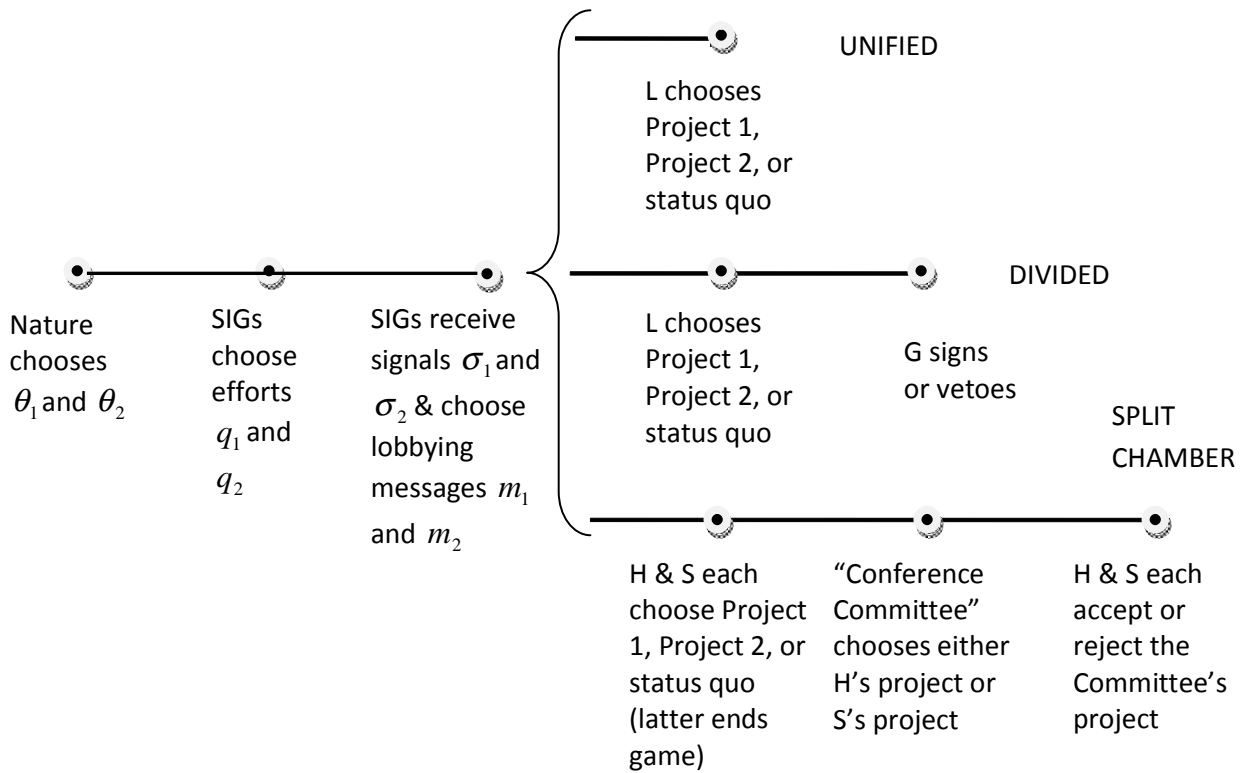


Figure 1: Sequence of Play

4. The legislature chooses Project 1, Project 2, or the status quo; and
5. The governor makes a signing decision, either accepting or vetoing the bill.

In states with annual budgeting, all parties then receive payoffs. In states with biannual budgeting, play repeats in a second period. In this second period, with probability  $\pi$  steps 1-5 repeat: there is a special session and the projects are again on the legislative agenda in the special session. But with probability  $1 - \pi$  policy is "stuck" – there is no special session or the projects are not on the agenda for the special session. Players in biannual states receive payoffs based on play in each period.

Given the sequence of play we define *effort strategies* and *message strategies* for the SIGs, an *appropriations strategy* for L, and a *signing strategy* for G. We focus on the annual budgeting game; we consider strategies in the biannual game in Section 2.3.

An effort strategy is simply  $\xi_i : Z \rightarrow Q$ , mapping unified/divided government into a lobbying effort level for each SIG. Because the in-group/out-group distinction is important, effort strategies are conditioned on this status. A message strategy is  $\mu_i : Z \times Q^2 \times \Sigma \rightarrow M$ . (In fact, the groups only condition their message on their signals). An appropriations strategy is  $\delta_L : Z \times Q_1 \times Q_2 \times M_1 \times M_2 \rightarrow D_L$ . Finally, a signing strategy is  $\delta_G : Z \times M_1 \times M_2 \times Q_1 \times Q_2 \times D_L \rightarrow D_G$ .

We assume each SIG employs a “sanitation” message strategy (Shin 2002): if a SIG has received “good news” ( $\sigma_i = \theta_i = 1$ ) it reveals it ( $m_i(1) = 1$ ), providing L with hard verifiable information; but if it has received “bad news” ( $\sigma_i = \theta_i = 0$ ) it conceals it as “no news” ( $m_i(0) = \emptyset$ ). Of course, if it has failed to uncover any hard information ( $\sigma_i = \emptyset$ ) then  $m_i(\emptyset) = \emptyset$ . Formally, a sanitation strategy is

$$\mu_i(\sigma_i) = \begin{cases} \sigma_i & \text{if } \sigma_i = 1 \\ \emptyset & \text{otherwise} \end{cases} \quad (5)$$

//NOTE: Can this be a lemma rather than an assumption?? As it appears to be a weakly dominant strategy.//

Just to be clear, on this account informational lobbying entails a search for, and strategic revelation of, verifiable information that will be convincing to policy makers. Strategic information revelation follows from the fact that a SIG is not obliged to reveal anything and may choose to conceal persuasive information that is unfavorable to its cause. We assume a SIG cannot forge hard verifiable information that does not exist (but see Sanchirico for somewhat similar models in which forging is possible.)

Given sanitation message strategies, L’s posterior beliefs that  $\theta_i = 1$  follow from Bayes Rule and are:

$$p_i(m_i, q_i) = \begin{cases} 1 & \text{if } m_i = 1 \\ \frac{1-q_i}{2-q_i} & \text{if } m_i = \emptyset \end{cases} \quad (6)$$

Note that after a message of “no news,” L’s belief that  $\theta_i = 1$  is equal to the prior if  $q_i = 0$  (no lobbying effort by the group), declines toward 0 if  $q_i > 0$ , and equals 0 if  $q_i = 1$ . The latter reflects what Milgrom and Roberts call “unraveling”: if the group is definitely informed about an attribute but stands silent, then



$(m_1, m_2)$	probability	$p_1(m_1)$	$p_2(m_2)$	$E(\theta_1)$	$E(\theta_2)$
$(1, 1)$	$\frac{q_1 q_2}{4}$	1	1	1	1
$(1, \emptyset)$	$\frac{q_1(2-q_2)}{4}$	1	$\frac{1-q_2}{2-q_2}$	1	$-\frac{q_2}{2-q_2}$
$(\emptyset, 1)$	$\frac{q_2(2-q_1)}{4}$	$\frac{1-q_1}{2-q_1}$	1	$-\frac{q_1}{2-q_1}$	1
$(\emptyset, \emptyset)$	$\frac{(2-q_1)(2-q_2)}{4}$	$\frac{1-q_1}{2-q_1}$	$\frac{1-q_2}{2-q_2}$	$-\frac{q_1}{2-q_1}$	$-\frac{q_2}{2-q_2}$

Table 1: Some Useful Facts about Messages

surely it observed bad news. It will be seen that mounting a larger lobbying effort is a two-edged sword for a SIG: on the one hand, it increases the probability of finding verifiable persuasive “good news”; on the other, it makes inferences after a report of “no news” more damaging to the SIG.

The following simple relations prove useful. First, define the expected value of an attribute following lobbying. Recall that  $\theta_i \in \{-1, 1\}$ . Hence:

$$E(\theta_i) = p_i(m_i, q_i)(1) + (1 - p_i(m_i, q_i))(-1) = 2p_i(m_i, q_i) - 1 \quad (7)$$

Second, with sanitation strategies only four message pairs  $(m_1, m_2)$  are utilized:  $(1, 1)$ ,  $(1, \emptyset)$ ,  $(\emptyset, 1)$ ,  $(\emptyset, \emptyset)$ . Third, assuming sanitation strategies in lobbying,

- the probability of  $(m_1, m_2) = (1, 1)$  is  $\frac{q_1}{2} \frac{q_2}{2} = \frac{q_1 q_2}{4}$ ;
- the probability of  $(m_1, m_2) = (1, \emptyset)$  is  $\frac{q_1}{2} (1 - q_2 + \frac{q_2}{2}) = \frac{q_1(2-q_2)}{4}$
- the probability of  $(m_1, m_2) = (\emptyset, 1)$  is  $(1 - q_1 + \frac{q_1}{2}) \frac{q_2}{2} = \frac{q_2(2-q_1)}{4}$ ;
- and, the probability of  $(m_1, m_2) = (\emptyset, \emptyset)$  is  $(1 - q_1 + \frac{q_1}{2}) (1 - q_2 + \frac{q_2}{2}) = \frac{(2-q_1)(2-q_2)}{4}$

Table 1 gathers together these useful facts about messages.

In each partisan configuration and budgeting institution, we seek a perfect Bayesian equilibrium (PBE) in which the SIGs employ mutual best responses in lobbying efforts and then lobby the Legislature using sanitation message strategies, the Legislature and Governor update their beliefs about project attributes using Bayes’s Rule whenever possible, the Legislature appropriates based upon its beliefs about the projects’ attributes and its partisan bias, and the Governor signs or vetoes based on the legislature’s actions as well as her own partisan bias and her beliefs about the projects’ attributes. The "bad news" message ( $m_i(0) = 0$ ) is not used in a sanitation strategy and therefore beliefs following its receipt are not defined by Bayes’s Rule in any PBE in which the SIGs use sanitation strategies. We assume the receiver believes bad news after hearing it ( $p_i(m_i = 0, q_i) = 0$ ), which seems the only sensible belief given hard costlessly verifiable information. But this out-of-equilibrium belief plays no important role in what follows. //DOUBLE CHECK//

## 2.2 Annual Budgeting and Unified Party Government

Under unified party government ( $z = 1$ ), L and G have the same utility function. For brevity, we abstract from G's signing strategy since G will wish to sign any bill passed by L (barring a mistake on L's part).

Contingent on its funding choice, L's expected utility following lobbying is:

$$Eu_L(m_1, m_2, q_1, q_2, \beta) = a_0 (a_1 [E(\theta_1) + \beta] + (1 - a_1)E(\theta_2)) \quad (8)$$

Maximizing 8 implies the following decision rule with respect to expected attributes:

$$d_L(p_1, p_2, \beta) = \begin{cases} (1, 1) & \text{if } E(\theta_1) + \beta > E(\theta_2) \text{ \& } E(\theta_1) + \beta > 0 \\ (1, 0) & \text{if } E(\theta_1) + \beta < E(\theta_2) \text{ \& } E(\theta_2) > 0 \\ (0) & \text{otherwise} \end{cases} \quad (9)$$

In words, the Legislature funds project 1 if it appears better than project 2 and the status quo (taking into account L's partisan bias); funds project 2 if 2 appears better than project 1 (taking into account partisan bias) and better than the status quo; but otherwise chooses the status quo.

Using the information in Table 1 and equation 9 we can straight-forwardly derive L's appropriations strategy.

**Lemma 1** *Legislature's Appropriation Strategy (Annual Budgeting, Unified Government). If the SIGs employ sanitation message strategies and  $0 < \beta < 1$*

$$\delta_L(m_1, m_2, q_1, q_2, \beta) = \begin{cases} (1, 1) & \text{if } \begin{cases} m_1 = 1 \\ (m_1, m_2) = (\emptyset, \emptyset) \text{ and } q_1 \leq \frac{2\beta}{1+\beta} \end{cases} \\ (1, 0) & \text{if } (m_1, m_2) = (\emptyset, 1) \\ (0) & \text{otherwise } ((m_1, m_2) = (\emptyset, \emptyset) \text{ and } q_1 > \frac{2\beta}{1+\beta}) \end{cases}$$

**Proof.** All parts of the strategy involve simple comparisons of the three alternatives, using the values in Table 1 and the logic of equation 9. If  $(m_1, m_2) = (1, 1)$ ,  $1 + \beta > 1 > 0$  for all  $\beta > 0$ , so that Project 1 is the best choice. If  $(m_1, m_2) = (1, \emptyset)$ , Project 1 dominates the status quo and Project 2 ( $1 + \beta > 0 \geq -\frac{q_2}{2-q_2}$ ). If  $(m_1, m_2) = (\emptyset, \emptyset)$ , for all values of  $q_2$  the value of the status quo is greater than or equal to the value of Project 2 ( $0 \geq -\frac{q_2}{2-q_2}$ ). Hence the critical comparison is the value of Project 1 and the value of the status quo. Project 1 will be superior if and only if  $\beta - \frac{q_1}{2-q_1} > 0 \iff q_1 < \frac{2\beta}{1+\beta}$ . If this condition does not hold, unravelling is too severe – L's beliefs about Project 1 are too pessimistic given silence despite the observed level of  $q_1$ , so the status quo is the better choice. This eventuality is the "otherwise" condition in the Lemma. Note that since the critical comparison is between Project 1 and the status quo, the level of lobbying by SIG 2 does not enter the condition. Finally, if  $(m_1, m_2) = (\emptyset, 1)$  then Project 2 is clearly better than the status quo ( $1 > 0$ ) and is better than Project 1 if and only if  $1 > \beta - \frac{q_1}{2-q_1}$ . If  $\beta < 1$  this condition is always satisfied so that "good news" from SIG 2 always "beats" silence from SIG 1. This is the critical condition such that lobbying can be influential. ■

We now turn to the expected utilities of the SIGs and derive their best response functions to each other's lobbying efforts.

Given the probabilities in Table 1 and the appropriation strategy in Lemma 1, the expected utility of a given lobbying effort for SIG 1 is<sup>4</sup>:

$$\begin{aligned} E(v_1(q_1; q_2)) &= \frac{q_1 q_2}{4}(1) + \frac{q_1(1 - q_2)}{4}(1) + \frac{q_2(2 - q_1)}{4}(0) + \frac{(2 - q_1)(2 - q_2)}{4}(1) - (q_1)^2 \\ &= 1 - \frac{q_2(2 - q_1)}{4} - (q_1)^2 \end{aligned} \quad (10)$$

Similarly for SIG 2:

$$\begin{aligned} E(v_2(q_2; q_1)) &= \frac{q_1 q_2}{4}(0) + \frac{q_1(1 - q_2)}{4}(0) + \frac{q_2(2 - q_1)}{4}(1) + \frac{(2 - q_1)(2 - q_2)}{4}(0) - (q_2)^2 \\ &= \frac{q_2(2 - q_1)}{4} - (q_2)^2 \end{aligned} \quad (11)$$

Best response functions and lobbying efforts are easily derived.

**Lemma 2** *SIG Best Responses and Lobbying Effort (Annual, Unified).* *If the SIGs employ sanitation message strategies and  $L$  employs the appropriation strategy in Lemma 1*

$$q_1(q_2; z = 1) = \frac{q_2}{8} \quad (12)$$

$$q_2(q_1; z = 1) = \frac{2 - q_1}{8} \quad (13)$$

and  $(q_1^*(z = 1), q_2^*(z = 1)) = (\frac{2}{65}, \frac{16}{65})$ .

**Proof.** The BR functions follow from manipulation of the first order conditions for equations 10 and 11. The equilibrium levels of lobbying effort follow from simultaneous solution of the two best response functions. ■

Figure 2 shows the two best-response functions in the  $q_1 - q_2$  space.

**Proposition 3** *(Annual Budgeting and Unified Government).* *If the SIGs employ sanitation lobbying strategies (equation 5), then the unique PBE in the lobbying game is given by the appropriations strategy in Lemma 1, the lobbying effort best responses in Lemma 2, and the equilibrium lobbying efforts in Lemma 2.*

**Proof.** Follows from the Appropriations Lemma and Lobbying Lemma. ■

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<sup>4</sup>This formulation assumes  $q_1 \leq \frac{2\beta}{1+\beta}$ . If not,  $E(u_1(q_1; q_2)) = \frac{q_1}{2} - (q_1)^2$ . But this expected utility is always (weakly) lower than 10 for all levels of  $q_1$  and  $q_2$ . So SIG 1's lobbying effort will satisfy  $q_1 \leq \frac{2\beta}{1+\beta}$ .

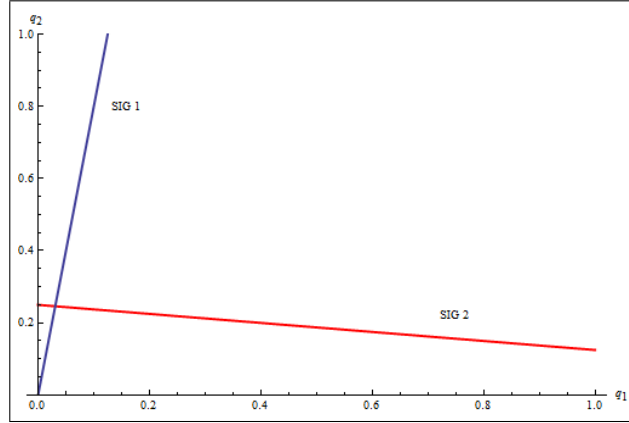


Figure 2: Best Responses in Lobbying Efforts (Annual Budgeting, Unified Government)

### 2.2.1 Discussion

Strikingly, the model predicts that the *out-group lobbies much more than the in-group*.<sup>5</sup> This is a consequence of the legislature's partisan bias – SIG 1 always prevails except in one circumstance: SIG 2 presents compelling evidence that its project is better than the alternative, while SIG 1 stands silent. Because of this unlevel playing field, SIG 2 has a strong incentive to search hard; at the same time, unravelling has no bite for SIG 2 since silence brings defeat anyway. In contrast, SIG 1 has little positive incentive to lobby, which after all is costly. In addition, searching can actually be counter-productive for SIG 1, due to unraveling. SIG 1's incentive to lobby arises from the sole circumstance in which the legislature picks Project 2, namely, when SIG 2 reports good news and SIG 1 reports no news. To offset this possibility SIG 1 must "counter-lobby" somewhat, in the face of SIG 2's lobbying. Given this logic, it is not surprising that lobbying by SIG 2 stimulates counter-lobbying by SIG 1 (strategic complements) while counter-lobbying by SIG 1 decreases lobbying by SIG 2 (strategic substitutes).

Discuss the fact that this prediction is *not* novel. See footnote on spence-type models. See discussion of Austen-Smith and Wright on - 236 in M&M. For us, if only one group exists, if its the in-group then there is no lobbying; if its the out-group, there is lobbying. So if only one group is active, it should be the out-group, just as in ASW. Also, as in their model, lobbying by the in-group is purely counter-active. Unlike in Austen-Smith and Wright, however, lobbying by the out-group is affected by lobbying of the in-group, in fact, it falls when SIG 1 lobbies more.

Using the probabilities of messages and posterior beliefs in Table 1, and the optimal funding actions given

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<sup>5</sup>A similar prediction arises in Spence-type signaling models of lobbying, see Potters and van Winden, Grossman and Helpman, and de Figueiredo and Cameron. However, the logic is quite different. In those models, sender and receiver share a state-contingent utility function, distinguished by a "bias" between sender and receiver. As the bias increases, the sender must "burn more money" in order to establish the credibility of the message.

messages detailed in Lemma 1, it is straightforward to calculate L’s expected utility from the lobbying game:

$$\begin{aligned} Eu_L(\delta_L) &= \frac{q_1 q_2}{4}(1 + \beta) + \frac{q_1(1 - q_2)}{4}(1 + \beta) + \frac{q_1(1 - q_2)}{4}(1) + \frac{(2 - q_1)(2 - q_2)}{4} \left( \beta - \frac{q_1}{2 - q_1} \right) \\ &= \beta + \frac{q_2}{2} - \frac{(2 - q_1)q_2}{4}\beta \end{aligned}$$

Given optimal lobbying efforts, this is approximately  $.12 + .88\beta$ . Absent SIG lobbying, L would always fund Project 1, yielding expected utility of  $\beta$ . Hence, lobbying improves L’s expected utility (note that  $\frac{q_2}{2} \geq \frac{(2 - q_1)q_2}{4}\beta$  for  $0 < \beta < 1$  assuring that expected utility with lobbying is greater than without). Lobbying effort by both SIGs improves L’s expected utility, but lobbying by SIG 2 is much more valuable. This is because SIG 2’s lobbying sometimes prevents L from choosing Project 1 when L actually prefers Project 2. SIG 1’s counter-lobbying is valuable only in that it sometimes allows L to (correctly) choose Project 1, thereby gaining  $\beta$ , when otherwise it would choose Project 2 based on SIG 2’s lobby report.

Despite lobbying, L and G overwhelmingly favor the choice bringing a partisan advantage – they choose Project 1 about 88% of the time.<sup>6</sup> We note that this fact makes empirically estimating the impact of lobbying on policy choices a challenge. In particular, SIG 2 will be observed to lobby intensely, yet almost always lose; while SIG 1 will lobby very modestly but almost always win. Hence, SIG 1’s lobbying will appear very consequential and SIG 2’s very inconsequential. But in fact, SIG 2’s lobbying is sometimes very consequential while SIG 1’s rarely is.

### 2.3 Annual Budgeting and Divided Party Government

We now consider annual budgeting under divided party government ( $z = 0$ ). Consequently, G receives a partisan “bonus” if Project 2 is funded but none from Project 1 (see equation 2). L continues to receive a partisan bonus only if Project 1 prevails. It is important to note that vetoing a project ( $d_G = 0$ ) forces policy back to the status quo. If the Legislature refuses to fund a project, a gubernatorial veto cannot create funding for it. In this sense, there is a fundamental asymmetry in appropriations vetoes, as noted by Kiewiet and McCubbins 1988.

Extended to expectations about attributes, equation 2 implies the following decision rule for G when  $z = 0$ , conditional on L’s funding decision:

$$d_G = \begin{cases} 0 & \text{if } \begin{cases} a_0 = a_1 = 1 \text{ but } E(\theta_1) \leq 0 \text{ (equiv. } p_1 \leq \frac{1}{2}) \\ a_0 = 1 \ \& \ a_1 = 0 \text{ but } E(\theta_2) + \beta \leq 0 \text{ (equiv. } p_2 \leq \frac{1 - \beta}{2}) \end{cases} \\ 1 & \text{otherwise} \end{cases}$$

In words, G accepts projects she believe better than the status quo (taking into account her partisan bias) but otherwise vetoes them. Although straightforward, this rule has the following implication. Suppose both Project 1 and Project 2 both appear better than the status quo and the Legislature funds Project 1.

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<sup>6</sup>Project 2 is selected only when  $(m_1, m_2) = (\emptyset, 1)$ , which happens with probability  $\frac{q_2(2 - q_1)}{4}$  (see Table 1). Given equilibrium lobbying efforts (see Lemma 2) this is about .12.

		L Passes –		
		0 (status quo)	Project 1	Project 2
	(1, 1)	sign	sign*	sign
Lobbying	(1, ∅)	sign	sign*	sign if $q_2 < \frac{2\beta}{1+\beta}$ , veto otherwise
Messages	(∅, 1)	sign	veto	sign*
	(∅, ∅)	sign	veto*	sign if $q_2 < \frac{2\beta}{1+\beta}$ , veto otherwise
*Indicates L's appropriations decision under unified government				

Table 2: Signing Decisions After Lobbying and Appropriations

Because of partisan bias, G may prefer project 2 to project 1 – but there is nothing she can do to secure Project 2. Vetoing the appropriations bill is just self-defeating. So G signs it.

The decision rule implies the following signing strategy in response to lobbying messages and appropriations decisions by L:

**Lemma 4** *Governor's Signing Strategy (Annual, Divided).* *if the SIGs employ sanitation message strategies then*

$$\delta_G(d_L, m_1, m_2, q_1, q_2; z = 0) = \begin{cases} 0 & \text{if } d_L = \begin{cases} (1, 1) \text{ and } m_1 = \emptyset \\ (1, 0) \text{ and } m_2 = \emptyset \text{ and } q_2 > \frac{2\beta}{1+\beta} \end{cases} \\ 1 & \text{otherwise} \end{cases}$$

**Proof.** Suppose L funds project 2 after  $m_2 = \emptyset$ . Then the expected value of signing is  $\beta - \frac{q_2}{2-q_2}$  while the value of vetoing is 0. Hence, veto if  $q_2 > \frac{2\beta}{1+\beta}$ . All other cases are similar and follow from simple case-by-case calculations of utility. ■

Table 2 indicates G's willingness to sign appropriations bills, given L's possible funding decisions and the lobbyists' possible messages. The critical feature to note in Table 2 is that in only one circumstance does executive veto power have actual bite: when both lobbyists search but report nothing about the projects' attributes. In that case, the legislature would enact Project 1 under unified party government (provided SIG 1 has not engaged in "excessive" search). However, given silence by the lobbyists, the Governor prefers the status quo to Project 1. Accordingly, G will veto appropriations for Project 1. As noted in the following lemma, G's response to mutual silence precludes L from choosing Project 1 when both SIGs stand silent.

**Lemma 5** *Legislature's Appropriations Strategy (Annual, Divided).* *If the SIGs employ sanitation message strategies and G employs the signing strategy in Lemma 4*

$$\delta_L(m_1, m_2, q_1, q_2; z = 0) = \begin{cases} (1, 1) & \text{if } m_1 = 1 \\ (1, 0) & \text{if } (m_1, m_2) = (\emptyset, 1) \\ (0) & \text{otherwise } ((m_1, m_2) = (\emptyset, \emptyset) ) \end{cases}$$

**Proof.** G's veto has bite only when  $(m_1, m_2) = (\emptyset, \emptyset)$ . So in all other cases, the logic of the earlier Appropriations Lemma holds. In the case of  $(\emptyset, \emptyset)$ , from the Signing Lemma 4 G will veto Project 1 but

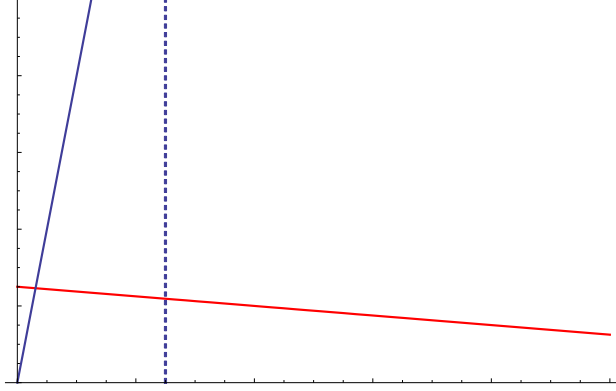


Figure 3: Best Responses in Lobbying Efforts (Annual, Divided)

would sign Project 2 if  $q_2 < \frac{2\beta}{1+\beta}$ . However, for any  $q_2 > 0$  L prefers the status quo to Project 2 (and if  $q_2 = 0$  L is indifferent between Project 2 and the status quo). Hence L chooses the status quo. ■

The expected utility from lobbying effort for SIG 1 becomes:

$$\begin{aligned} E(v_1(q_1; q_2)) &= \frac{q_1 q_2}{4}(1) + \frac{q_1(2 - q_2)}{4}(1) + \frac{q_2(2 - q_1)}{4}(0) + \frac{(2 - q_1)(2 - q_2)}{4}(0) - (q_1)^2 \\ &= \frac{q_1}{2} - (q_1)^2 \end{aligned} \quad (14)$$

Similarly for SIG 2:

$$\begin{aligned} E(v_2(q_2; q_1)) &= \frac{q_1 q_2}{4}(0) + \frac{q_1(2 - q_2)}{4}(0) + \frac{q_2(2 - q_1)}{4}(1) + \frac{(2 - q_1)(2 - q_2)}{4}(0) - (q_2)^2 \\ &= \frac{q_2(2 - q_1)}{4} - (q_2)^2 \end{aligned} \quad (15)$$

Note that SIG 1's expected utility differs from that under unified government (see equation 10), depending now only on its own effort. But the expected utility of SIG 2 is exactly the same as before (equation 11). The following lemma indicates the SIG's best response functions and equilibrium lobbying efforts.

**Lemma 6** *SIG Best Responses and Lobbying Effort (Annual, Divided). If the SIGs employ sanitation message strategies, G employs the signing strategy in Lemma 4, and L employs the appropriation strategy in Lemma 5*

$$q_1(q_2; z = 0) = \frac{1}{4} \quad (16)$$

$$q_2(q_1; z = 0) = \frac{2 - q_1}{8} \quad (17)$$

and  $(q_1^*(z = 0), q_2^*(z = 0)) = (\frac{1}{4}, \frac{7}{32})$ .

**Proof.** From FOC for equations 14 and 15. ■

The best response functions are shown in Figure 3. In the figure the dotted line shows SIG 1's best response function under divided party government, relative to that under unified party government (the nearly vertical solid line).

**Proposition 7** *.Annual Budgeting and Divided Government. If the SIGs employ sanitation strategies (equation 5) then the unique PBE in the divided government annual budgeting lobbying game is given by the signing strategy in Lemma 4, the appropriations strategy in Lemma 5, and the lobbying effort best responses and lobbying levels in Lemma 6.*

**Proof.** Follows from the lemmata. ■

### 2.3.1 Discussion

Divided party government implies *a large increase in lobbying by the in-group*. This novel prediction is somewhat surprising, since one might have argued that "gridlock" should bring a decrease in lobbying. However, the intuition is the following. Divided party government somewhat levels the playing field between the in-group and the out-group. As a result, the in-group must work much harder than before – it now wins only if it uncovers "good news." Moreover, given this fact, unravelling no longer inhibits the in-group from a high effort since silence implies defeat anyway. The out-group still wins only if it uncovers good news while the in-group does not. This situation is the same as under unified government, hence its incentives remain unchanged. However, the large expansion in in-group lobbying implies a small decrease in out-group lobbying since the chance of in-group silence falls.

The expected utility of L and G both increase in the lobbying efforts of both SIGs. To see this, use Proposition (above) and the probabilities in Table 1 to derive:

$$Eu_G(z = 0) = \frac{q_1}{2} + \frac{q_2(1 - q_1)}{4}(1 + \beta)$$

$$Eu_L(z = 0) = \frac{q_1}{2}(1 + \beta) + \frac{q_2(1 - q_1)}{4}$$

Both expected utilities increase in both  $q_1$  and  $q_2$ .<sup>7</sup> Not surprisingly, informational lobbying assists the decision makers.

If we assume that absent lobbying, G signs only bills better for her than the status quo, then breaking gridlock depends entirely on the SIG's informational lobbying.

## 2.4 Biannual Budgeting Under Unified Government

We now consider biannual budgeting. Under biannual budgeting, the parties budget in the "normal" fashion in the first year. Then, in the second year they may or not may not get a chance to revisit the first year's decision – doing so requires both a special session of the legislature and agenda status for the projects during the special session. We denote the probability this occurs by  $\pi$ . Given unified government, we again abstract from the veto. We use superscripts to denote periods.

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<sup>7</sup>For G, expected utility increases in  $q_1$  only if  $\beta < \frac{2 - q_2}{q_2}$ , which is assured if  $\beta < 1$ .



**Lemma 8** (*Second period play: biannual, unified*). In the second period of biannual budgeting during unified government, if there is a special session and the projects are on its agenda, equilibrium play is given by Proposition 1. Ex ante expected lobbying efforts are  $E(q_1^2(z=1)) = \pi q_1^*(z=1)$ ,  $E(q_2^2(z=1)) = \pi q_2^*(z=1)$ .

**Proof.** In the eventuality of a special session and agenda status for the projects, play in the first round is "sunk." Strategically the second round is thus identical to that in annual budgeting. Hence, the players play as they do there. Absent a special session with agenda status for the projects, SIG lobbying effort is zero. Expected lobbying effort is thus  $(1-\pi)0 + \pi q_i^2(z=1)$ . For example, in the case of the in-group, this is  $\frac{2}{65}\pi$  (using Lemma 2). ■

Given the second period lemma, L's expected utility following lobbying in the first period is straightforward (we use  $EU(2)$  to denote expected utility from play in the second period if the projects are on the agenda in a special session):

$$d_B a_0 [a_1 (E(\theta_1^1) + \beta + (1-\pi)(E(\theta_1^2) + \beta)) + (1-a_1)(E(\theta_1^1) + (1-\pi)(E(\theta_2^2)))] + \pi EU_L(2)$$

Noting that  $E(\theta_1^2) = E(\theta_2^2) = 0$  this becomes:

$$d_B a_0 [a_1 (E(\theta_1^1) + (2-\pi)\beta) + (1-a_1)(E(\theta_1^1))] + \pi EU_L(2)$$

In turn, this implies first period appropriations.

**Lemma 9** *Legislature's Appropriation Strategy (First Period, Biannual, Unified Government)*. If the SIGs employ sanitation message strategies and  $0 < \beta < \frac{1}{2}$

$$\delta_L^1(m_1^1, m_2^1, q_1^1, q_2^1; z=1) = \begin{cases} (1, 1) & \text{if } \begin{cases} (m_1^1, m_2^1) = (1, 1) \\ (m_1^1, m_2^1) = (1, \emptyset) \\ (m_1^1, m_2^1) = (\emptyset, \emptyset) \text{ and } q_1^1 \leq \frac{2\beta(2-\pi)}{1+\beta(2-\pi)} \end{cases} \\ (1, 0) & \text{if } (m_1^1, m_2^1) = (\emptyset, 1) \\ (0) & \text{otherwise } ((m_1^1, m_2^1) = (\emptyset, \emptyset) \text{ and } q_1^1 > \frac{2\beta(2-\pi)}{1+\beta(2-\pi)}) \end{cases}$$

**Proof.** All parts of the strategy involve simple comparisons of the three alternatives, using the values in Table 1. If  $(m_1^1, m_2^1) = (1, 1)$ ,  $1 + \beta(2-\pi) > 1 > 0$  for all  $\beta > 0$ , so that Project 1 is the best choice. If  $(m_1^1, m_2^1) = (1, \emptyset)$ , Project 1 dominates the status quo and Project 2 ( $1 + \beta(2-\pi) > 0 \geq -\frac{q_2^1}{2-q_2^1}$ ). If  $(m_1^1, m_2^1) = (\emptyset, \emptyset)$ , for all values of  $q_2^1$  the value of the status quo is greater than or equal to the value of Project 2 ( $0 \geq -\frac{q_2^1}{2-q_2^1}$ ). Hence the critical comparison is the value of Project 1 and the value of the status quo. Project 1 will be superior if and only if  $\beta(2-\pi) - \frac{q_1^1}{2-q_1^1} > 0 \iff q_1^1 < \frac{2\beta(2-\pi)}{1+\beta(2-\pi)}$ . If this condition does not hold, unravelling is too severe – L's beliefs about Project 1 are too pessimistic given silence despite the observed level of  $q_1^1$ , so the status quo is the better choice. This eventuality is the "otherwise" condition in the Lemma. Note that since the critical comparison is between Project 1 and the status quo, the level of lobbying by SIG 2 does not enter the condition. Finally, if  $(m_1^1, m_2^1) = (\emptyset, 1)$  then Project 2 is clearly better than the status quo ( $1 > 0$ ) and is better than Project 1 if and only if  $1 > (2-\pi)\beta - \frac{q_1^1}{2-q_1^1} \implies \beta < \frac{2}{(2-q_1^1)(2-\pi)}$ .

If  $\beta < \frac{1}{2}$  this condition is always satisfied (even if  $\pi = 0$  and  $q_1^1 = 0$ ) so that "good news" from SIG 2 always "beats" silence from SIG 1. This is the critical condition such that lobbying can be influential. ■

Because policy can get "stuck" in period 1, Project 1 becomes more attractive to the legislature: a "stuck" Project 1 delivers a partisan bonus in both years while a "stuck" Project 2 does not. Nonetheless, if partisan bias isn't too large ( $\beta < \frac{1}{2}$ ), L reacts to messages exactly as it did under annual budgeting.

Expected utilities for the SIGs also reflect the possibility that policy can get stuck in the first period.

$$\begin{aligned}
E(v_1(q_1; q_2)) &= \frac{q_1^1 q_2^1}{4} (2 - \pi) + \frac{q_1^1 (1 - q_2^1)}{4} (2 - \pi) + \frac{q_2^1 (2 - q_1^1)}{4} (0) + \frac{(2 - q_1^1) (2 - q_2^1)}{4} (2 - \pi) - (q_1^1)^2 \\
&\quad + \pi EV_1(2) \\
&= \left(1 - \frac{q_2^1 (2 - q_1^1)}{4}\right) (2 - \pi) - (q_1^1)^2 + \pi EV_1(2)
\end{aligned} \tag{18}$$

Similarly for SIG 2:

$$\begin{aligned}
E(v_2(q_2; q_1)) &= \frac{q_1^1 q_2^1}{4} (0) + \frac{q_1^1 (1 - q_2^1)}{4} (0) + \frac{q_2^1 (2 - q_1^1)}{4} (2 - \pi) + \frac{(2 - q_1^1) (2 - q_2^1)}{4} (0) - (q_2^1)^2 \\
&\quad + \pi EV_2(2) \\
&= \left(\frac{q_2^1 (2 - q_1^1)}{4}\right) (2 - \pi) - (q_2^1)^2 + \pi EV_2(2)
\end{aligned} \tag{19}$$

Best responses in lobbying effort are immediate.

**Lemma 10** *SIG Best Responses and Lobbying Effort (First Period, Biannual, Unified).* If the SIGs employ sanitation message strategies and L employs the appropriation strategy in Lemma 9

$$q_1^1(q_2^1; z = 1) = \frac{q_2^1}{8} (2 - \pi) \tag{20}$$

$$q_2^1(q_1^1; z = 1) = \frac{2 - q_1^1}{8} (2 - \pi) \tag{21}$$

and  $(q_1^{1*}(z = 1), q_2^{1*}(z = 1)) = \left(\frac{2(2-\pi)^2}{68-4\pi+\pi^2}, \frac{16(2-\pi)}{68-4\pi+\pi^2}\right)$ .

**Proof.** The BR functions follow from manipulation of the first order conditions for equations 18 and 19. The indicated levels of lobbying effort follow from simultaneous solution of the two best response functions.

■

**Proposition 11** *Biannual Budgeting with Unified Government.* If the SIGs employ sanitation strategies (equation 5) then the unique PBE in the unified government biannual budgeting lobbying game is given in the second period by Lemma 8, the first period appropriations strategy in Lemma 9, and the lobbying effort best responses and lobbying levels in Lemma 10.

**Proof.** Follows from the lemmata. ■

### 2.4.1 Discussion

The model predicts that biannual budgeting shifts lobbying effort out of the second period and into the first period: first period lobbying increases dramatically (upto twice) while expected second period lobbying falls. The intuition is straight-forward: because policy can get stuck in the first period, the stakes from lobbying are much higher in the first period. Consequently, lobbying effort jumps. Expected lobbying in the second period falls for the simple reason that policy often does get stuck, and if so, lobbying is pointless. As in annual budgeting, the out-group lobbies much harder than the in-group, and for the same reason: the unlevel playing field created by partisan bias.

## 2.5 Biannual Budgeting, Divided Government

SIG 1 is allies with legislature, SIG 2 is allied with G. Second period play: Just like annual divided. Expected lobbying falls.

**Lemma 12** (*Second period play: biannual, divided*). *In the second period of biannual budgeting during divided government, if there is a special session and the projects are on its agenda, equilibrium play is given by Proposition 2. Ex ante expected lobbying efforts are  $E(q_1^2(z=0)) = \pi q_1^*(z=0)$ ,  $E(q_2^2(z=0)) = \pi q_2^*(z=0)$ .*

**Proof.** Identical to the proof of Lemma 8. Expected lobbying effort is  $(1-\pi)0 + \pi q_i^2(z=0)$ . For example, in the case of the in-group, this is  $\frac{1}{4}\pi$  (using Lemma 2). ■

It will be seen that G's signing strategy in the first period is quite similar to that in the second period. However, approving project 2 is somewhat more attractive since, if policy becomes stuck in period 1, Project 2 affords G her partisan bias  $\beta$  twice.

**Lemma 13** *Governor's Signing Strategy (first period, Biannual, Divided)*. *if the SIGs employ sanitation message strategies then*

$$\delta_G^1(d_L^1, m_1^1, m_2^1, q_1^1, q_2^1; z=0) = \begin{cases} 0 & \text{if } d_L^1 = \begin{cases} (1, 1) \text{ and } m_1^1 = \emptyset \\ (1, 0) \text{ and } m_2^1 = \emptyset \text{ and } q_2^1 > \frac{2\beta(2-\pi)}{1+\beta(2-\pi)} \end{cases} \\ 1 & \text{otherwise} \end{cases}$$

**Proof.** Suppose L funds project 1 after  $m_1^1 = \emptyset$ . Then signing the bill yields:  $\frac{-q_1^1}{2-q_1^1} + (1-\pi)0 + \pi Eu_G^2$ . Vetoing the bill yields  $0 + (1-\pi)0 + \pi Eu_G^2$ . The latter is superior. Suppose L funds project 2 after  $m_2^1 = \emptyset$ . Then signing the bills yields  $\beta - \frac{q_2^1}{2-q_2^1} + (1-\pi)\beta + \pi Eu_G^2$ . Vetoing is superior if  $q_2^1 > \frac{2\beta(2-\pi)}{1+\beta(2-\pi)}$ . All other cases involve similar comparisons. ■

Legislature's appropriation strategy. What will L propose? Essentially the same as period 2. Because of the potentially double bias-benefit from Project 1, L would be more willing to propose that project after no news. But G's veto strategy precludes that.

Lemma

SIG lobbying.

$$\begin{aligned} E(v_1^1(q_1^1; q_2^1)) &= \frac{q_1^1 q_2^1}{4}(2 - \pi) + \frac{q_1^1(1 - q_2^1)}{4}(2 - \pi) + \frac{q_2^1(1 - q_1^1)}{4}(0) + \frac{(2 - q_1^1)(2 - q_2^1)}{4}(0) - (q_1^1)^2 + \pi E v_1(2) \\ &= \frac{q_1^1}{4}(2 - \pi) - (q_1^1)^2 + \pi E v_1(2) \end{aligned}$$

$$\begin{aligned} E(v_1^1(q_1^1; q_2^1)) &= \frac{q_1^1 q_2^1}{4}(0) + \frac{q_1^1(1 - q_2^1)}{4}(0) + \frac{q_2^1(1 - q_1^1)}{4}(2 - \pi) + \frac{(2 - q_1^1)(2 - q_2^1)}{4}(0) - (q_2^1)^2 + \pi E v_2(2) \\ &= \frac{q_2^1(1 - q_1^1)}{4}(2 - \pi) - (q_2^1)^2 + \pi E v_2(2) \end{aligned}$$

Best response functions are immediate.

**Lemma 14** *SIG Best Responses and Lobbying Effort (First Period, Biannual, Divided Party Government).*

*If the SIGs employ sanitation message strategies and L employs the appropriation strategy in Lemma \_\_*

$$\begin{aligned} q_1^1(q_2^1; z = 0) &= \frac{1}{8}(2 - \pi) \\ q_2^1(q_1^1; z = 0) &= \frac{1 - q_1^1}{8}(2 - \pi) \end{aligned}$$

and  $(q_1^{1*}(z = 0), q_2^{1*}(z = 0)) = \left(\frac{1}{8}(2 - \pi), \frac{12 - 4\pi - \pi^2}{64}\right)$ .

**Proof.** The BR functions follow from manipulation of the first order conditions for equations \_\_ and \_\_.

The indicated equilibrium lobbying efforts follow from simultaneous solution of the two BR functions. ■

### 2.5.1 Discussion

## 2.6 Split Party Legislatures

Up to this point, we have treated L as a unitary actor. Now we consider a bicameral legislature in which one chamber (H) is controlled by one party and the other chamber (S) by the other party. In this configuration, both chambers have proposal power. But both have a degree of veto power as well. Veto power can arise in two ways: either by refusing to enact legislation at all (thereby forcing the outcome to the status quo) or by refusing to accede to the other chamber's proposal in a conference committee.

Play of game: the lobbyists simultaneously search and issue messages. The two chambers simultaneously propose projects. If both chambers propose the same project, the project is enacted. If one or both chambers fail to propose a project, the status quo prevails. If both chambers propose projects but different projects, the two chambers proceed to a "conference committee." Here, both chambers simultaneously veto or decline to veto each other's project. If neither project survives the vetoes, the status quo prevails. If both projects

survive the vetoes, they are paired against one another in a lottery. If only one project survives, it is paired against the status quo in a lottery. In the former case, H's proposal is enacted with probability  $\rho$  and S's proposal with probability  $1 - \rho$ . In the latter case, the non-vetoed proposal is enacted with probability  $\rho$  and the status quo is enacted with probability  $1 - \rho$ . The lotteries are meant as a stylized rendition of unstructured bargaining in conference.

### 2.6.1 Annual Budgeting

Conference Veto strategy: Veto the opposing chamber's proposal if and only if it is not supported by "good news."

Proposal strategy: If a chamber  $i$ 's preferred project is supported by good news, chamber  $i$  proposes it regardless of the message about the other project's preferred project. If chamber  $i$ 's preferred project is not supported by good news, chamber  $i$  does not propose it. If the other chamber's preferred option is supported by good news and its own preferred project is not supported by good news, the chamber proposes the other chamber's preferred project.

Equilibrium enactments: Given the above proposal and veto strategies and assumptions about conference enactments, the following occurs for each lobby message pair.  $(\emptyset, \emptyset)$ : neither chamber proposes, status quo prevails.  $(1, \emptyset)$ : both chambers propose project 1, which is enacted with certainty.  $(\emptyset, 1)$ : both chambers propose project 2, which is enacted with certainty.  $(1, 1)$ : H proposes project 1, S proposes project 2, the former is enacted with probability  $\rho$ , the latter with probability  $1 - \rho$ . The latter has an expected value of  $\rho$  for H and  $(1 - \rho)$  for S. The "natural" case is  $\rho = \frac{1}{2}$ .

Note that neither chamber has an incentive to deviate from the prescribed strategies. In particular, neither has an incentive to propose a project unless there is good news, since such a project will not survive a conference. More critically, neither has an incentive to veto a project with good news. This is clearly true if one's preferred project has no news and the other project has good news. Then vetoing the good news project forces a payoff of zero (given the other player's veto strategy); not vetoing leads to a lottery between the good news project and the status quo, which is better than the status quo's value of zero. If both projects in conference have good news, then deviating and vetoing the other project forces a lottery between 0 and  $1 + \beta$  instead of the same lottery between 1 and  $a + \beta$ . The latter is obviously better. Finally, neither has an incentive not to veto a project about which there is no news, if such a project were offered (which it won't be). to see this, consider the first case of two no-news projects. Vetoing the opposing no-news project forces the outcome to the status quo (since the other chamber will veto one's own no-news project); while deviating and not vetoing the opposing no-news project forces a lottery between the status quo and the opposing no-news project, a worse alternative. In the second case, an opposing no-news project faces one owns good-news project. Vetoing the opposing no-news project forces a lottery between the status quo and one owns good-news project, which is superior to a lottery between the opposing no-news project and one's own good-news project.

	Annual		Biannual			
	Unified	Divided	Uni. - yr 1	Uni. - yr 2	Div. -yr 1	Div. - yr 2
<b>In-</b>	$q_1(z=1)$	$q_1(z=0)$	$q_1^1(z=1)$	$Eq_1^2(z=1)$	$q_1^1(z=0)$	$Eq_1^2(z=0)$
<b>group</b>	$= \frac{2}{65}$	$= \frac{1}{4}$	$= \frac{2(2-\pi)^2}{68-4\pi+\pi^2}$	$= \frac{2}{65}\pi$	$= \frac{1}{8}(2-\pi)$	$= \frac{1}{4}\pi$
<b>Out-</b>	$q_2(z=1)$	$q_2(z=0)$	$q_2^1(z=1)$	$Eq_2^2(z=1)$	$q_2^1(z=0)$	$Eq_2^2(z=0)$
<b>group</b>	$= \frac{16}{65}$	$= \frac{7}{32}$	$= \frac{16(2-\pi)}{68-4\pi+\pi^2}$	$= \frac{16}{65}\pi$	$= \frac{12-4\pi-\pi^2}{64}$	$= \frac{7}{32}\pi$

Table 3: Predictions about Lobbying Expenditures

We can now consider optimal lobbying strategies, given the above enactments. In what follows we assume H is allied with project 1 and hence SIG 1, and S is allied with Project 2 and hence SIG 2; of course there is the obvious mirror case as well.

Expected utility for SIG 1:

$$\begin{aligned}
E(v_1(q_1; q_2)) &= \frac{q_1 q_2}{4}(\rho) + \frac{q_1(2-q_2)}{4}(1) + \frac{q_2(2-q_1)}{4}(0) + \frac{(2-q_1)(2-q_2)}{4}(0) - (q_1)^2 \\
&= \frac{q_1(1-q_2(1-\rho))}{4} - (q_1)^2
\end{aligned}$$

Expected utility for SIG 2:

$$\begin{aligned}
E(v_2(q_2; q_1)) &= \frac{q_1 q_2}{4}(1-\rho) + \frac{q_1(2-q_2)}{4}(0) + \frac{q_2(2-q_1)}{4}(1) + \frac{(2-q_1)(2-q_2)}{4}(0) - (q_2)^2 \\
&= \frac{q_2(1-q_1\rho)}{4} - (q_2)^2
\end{aligned}$$

The respective BR functions are:

$$q_1(q_2) = \frac{1-q_2(1-\rho)}{8}$$

$$q_2(q_1) = \frac{1-q_1\rho}{8}$$

In the natural case where  $\rho = \frac{1}{2}$ , these reduce to  $q_1(q_2) = \frac{2-q_2}{16}$  and  $q_2(q_1) = \frac{2-q_1}{16}$ . Solving simultaneously yields  $q_1^* = \frac{7-\rho}{64-\rho(1-\rho)}$  and  $q_2^* = \frac{8+\rho}{64-\rho(1-\rho)}$ . In the natural case where  $\rho = \frac{1}{2}$ , the BR functions reduce to  $q_1(q_2) = \frac{2-q_2}{16}$  and  $q_2(q_1) = \frac{2-q_1}{16}$ , and  $q_1^* = q_2^* = \frac{2}{17}$ .

## 2.6.2 Biannual Budgeting

The second period strategies are, as ever, simply the annual budgeting strategies.

First period veto in conference.

Budgeting	Configuration	Year	SIG 1's Lobbying	SIG 2's Lobbying
Annual	Unified	1 & 2	$q_1(z = 1) = \frac{2}{65}$	$q_2(z = 1) = \frac{16}{65}$
	Divided	1 & 2	$q_1(z = 0) = \frac{1}{4}$	$q_2(z = 0) = \frac{7}{32}$
	Split Chamber	1 & 2	$q_1(z = -1) = \frac{7+\rho}{64-\rho(1-\rho)}$	$q_2(z = -1) = \frac{8-\rho}{64-\rho(1-\rho)}$
Biannual	Unified	1	$q_1^1(z = 1) = \frac{2(2-\pi)^2}{68-\pi(4-\pi)}$	$q_2^1(z = 1) = \frac{16(2-\pi)}{68-\pi(4-\pi)}$
		2	$Eq_1^2(z = 1) = \frac{2}{65}\pi$	$Eq_2^2(z = 1) = \frac{16}{65}\pi$
	Divided	1	$q_1^1(z = 0) = \frac{1}{8}(2 - \pi)$	$q_2^1(z = 0) = \frac{12-4\pi-\pi^2}{64}$
		2	$Eq_1^2(z = 0) = \frac{1}{4}\pi$	$Eq_2^2(z = 0) = \frac{7}{32}\pi$
	Split Chamber	1	$q_1^1(z = -1) =$	$q_2^1(z = -1) =$
		2	$Eq_1^2(z = -1) = \frac{7+\rho}{64-\rho(1-\rho)}\pi$	$Eq_2^2(z = -1) = \frac{8-\rho}{64-\rho(1-\rho)}\pi$

Note: With unified and divided government, SIG 1 is the "in-group" and SIG 2 is the "out-group"

Table 4: Predicted Lobbying Expenditures

Configuration	Budgeting	Year	SIG 1	SIG 2
<i>Unified</i>	annual	1 & 2	$q_1(z = 1) = \frac{2}{65}$	$q_2(z = 1) = \frac{16}{65}$
	biannual	1	$q_1^1(z = 1) = \frac{2(2-\pi)^2}{68-\pi(4-\pi)}$	$q_2^1(z = 1) = \frac{16(2-\pi)}{68-\pi(4-\pi)}$
	biannual	2	$Eq_1^2(z = 1) = \frac{2}{65}\pi$	$Eq_2^2(z = 1) = \frac{16}{65}\pi$
<i>Divided</i>	annual	1 & 2	$q_1(z = 0) = \frac{1}{4}$	$q_2(z = 0) = \frac{7}{32}$
	biannual	1	$q_1^1(z = 0) = \frac{1}{8}(2 - \pi)$	$q_2^1(z = 0) = \frac{12-4\pi-\pi^2}{64}$
	biannual	2	$Eq_1^2(z = 0) = \frac{1}{4}\pi$	$Eq_2^2(z = 0) = \frac{7}{32}\pi$
<i>Split Chamber</i>	annual	1 & 2	$q_1(z = -1) = \frac{7+\rho}{64-\rho(1-\rho)}$	$q_2(z = -1) = \frac{8-\rho}{64-\rho(1-\rho)}$
	biannual	1		
	biannual	2	$Eq_1^2(z = -1) = \frac{7+\rho}{64-\rho(1-\rho)}\pi$	$Eq_2^2(z = -1) = \frac{8-\rho}{64-\rho(1-\rho)}\pi$

Table 5: Summary of Empirical Hypotheses

## 2.7 Summary of Empirical Predictions

The theory makes predictions about the levels of lobbying effort. These predictions are summarized in the below:

1. *Out-groups lobby more than in-groups (the out-group effect)*
  - a. The out-group effect holds in states with annual budgeting:
  - b. The out-group effect holds in budgeting years (year 1) in states with biannual budgeting:
  - c. The out-group effect holds in off-budget years (year 2) in states with biannual budgeting:
2. *Biannual budgeting boosts lobbying effort in budgeting years, relative to that under annual budgeting (the biannual budget-year effect)*
  - a. The biannual budget year effect holds for out-groups:
  - b. The biannual budget year effect holds for in-groups:
3. *Biannual budgeting dampens lobbying effort in off-budget years, relative to that under annual budgeting (the biannual off-year effect)*
  - a. The biannual off-year effect holds for out-groups:
  - b. The biannual off-year effect holds for in-groups:
4. *Under biannual budgeting, out-groups increase their lobbying effort more in budget years relative to off-budget years, than do in-groups (the biannual increasing differences effect)*
  - a. The increasing differences effect.

## 3 Empirical Analysis

### 3.1 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 our data sets. We have collected a detailed data set consisting 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. For reasons that will be elucidated later, we use only the firm and union interest groups that lobby in multiple



states. It consists of a panel of just over 7,752 interest group-state-year observations. In order to be included in this sample, the interest group must be a firm or union and must have lobbied in more than one budget year in multiple states in the panel. There are 600 interest groups which meet these criteria.

To test this, we use as our dependent variable the log of lobbying expenditures for group  $i$ , in state  $j$ , at time  $t$ , by firms and unions as reported by state ethics commissions. We determine whether the state is a biennial budgeter or annual budgeter and, for biennial budgeters, which years are the budget years, from the Council on State Governments. The political alignment of the House, Senate and Governor is determined by the Book of the States. In the analysis that follows, we examine only instances of unified government in the data. We do this so we can determine the “in” and “out” groups more clearly. If there is a Democratic unified government, we call unions the “in” group and firms the “out” group. However, if there is a Republican unified government, we call firms the “in” group and unions the “out” group.

In addition to these variables, we include other control variables, such as the number of days in a legislative session, number of days in a special session, the log of population, and the log of per capita income in the state. Group fixed effects, state fixed effects, and year fixed effects are used.

The data contain 2,337 observations. Descriptive statistics are provided in Table X. The dummy variables represent the states labeled in Figure 5. So State 1 corresponds to the “1” on Figure 5, State 2 corresponds to the “2” on Figure 5, etc., through State 5. In the descriptive statistics table, the states are described. The data for these states represents the proportion of the data points in which interest groups are in these states.

### 3.2 Results

The results for unified government are presented in Table Y. The coefficients are presented with their standard errors below. These results are still preliminary. Each state has a coefficient attached to it which represents how much lobbying increases or decreases relative to the omitted category, State 0. Note that each of the coefficients is statistically different from State 0 at the 99% level of confidence, except for State 5, which is statistically different from zero at 90% level of confidence.

The theory, however, contains more refined predictions as presented above. To test these predictions, we conducted a series of F-tests. The results of these tests are provided in Table Z. Note that all F-tests are statistically significant at the 99.99% level of significance except for one.

## 4 Discussion

Model makes some clear predictions: under unified govt, out-groups lobby more; under divided, in-group lobbying increases dramatically and almost equalizes that of the out-group; consequently, overall lobbying is much higher under divided. Biannual budgeting is predicted to increase lobbying during budget years (relative to annual budgeting) but decrease it in off-years. The data show these patterns very clearly.

Giving politicians information is not bad. In fact, it is good from the perspective of SIGs, L, and G. What about from the perspective of a neutral citizen, interested only in selection of good projects? Under unified govt, lobbying by out-group is good as it prevents the selection of some bad projects. Under divided, lobbying is very good as it allows the selection of good projects where otherwise none get selected.

Anything to say about annual vs biannual? Trade-off between the costs of getting stuck vs all the lobbying and effort costs of changing projects that should be changed.

Access fees as shake-downs? SIGs would be willing to pay to convey information, access fees are a way to make them do it. But, would L or G really want to ignore SIG information from a SIG who hasn't paid an access fee? No. So, could be a screening device. But does SIG have info at time of fee? Maybe not ... so what is it?

## 5 Conclusion

## 6 References

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