Lobbying Legislatures

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Abstract

We analyze informational lobbying in the context of multi-member legislatures. We show that a single decision maker and a decentralized majoritarian legislature provide widely different incentives for interest groups to acquire and transmit policy relevant information.

The paper also shows a difference in the opportunity to affect policy through lobbying between a parliamentary legislature and a legislature with low voting cohesion, such as the U.S. Congress. We show that the incentives to lobby a parliamentary legislature are much lower than to lobby Congress. The results provide a rationale for why lobby groups are more active in the U.S. Congress.

The key institutional feature to explain the different behavior of lobby groups is the vote of confidence procedure, which creates voting cohesion in a parliamentary system across policy issues. We show that the flexibility of creating majorities in the Congress creates an incentive for interest groups to play an active role in the design of policy in the congressional system, while the voting cohesion in the parliamentary system dissuades interest group's incentive to engage in information provision.

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1 Introduction

Studies of interest group influence on legislative decision making fall into two categories. In the first category, interest groups offer campaign contributions or other politically valuable resources in exchange for services or legislative favors. Many of these models study how a group optimally allocates its resources between the various members of the legislature in order to secure the required support (Snyder 1991, Stratmann 1992, Groseclose and Snyder 1996, Baron 1999, Dharmapala 2000).

Papers in the second category study the extent to which interest groups can affect policy outcomes by providing relevant information to the lawmaker. Interest groups have an incentive to offer information if they can influence the outcome in their favor (Calvert 1985, Austen-Smith and Wright 1992, Austen-Smith 1995, Lohmann 1994, 1998, Ball 1995, Laffont 1999, and others).

Informational theories focus conspicuously on a single decision maker and do not address the fact that in a legislature decisions are made by compromise and via (some form of) majority rule. The institutional structure of the legislature, whose importance is extensively studied by the theories of legislative decision making, is absent in all papers of informational lobbying we are aware of.

This paper analyzes informational lobbying in the context of multi-member legislatures. We show that the difference between a single decision maker and a legislature can be crucial for the interest group to provide information at all. As we suggested in an earlier paper (Bennedsen and Feldmann 1998), if an uninformed lobby with known and certain preferences confronts a single decision maker who is uncertain about the state of the world, it prefers not to search for information. The reason is that the benefit of providing positive information from the lobby's point of view is offset by the cost incurred when the policy maker updates her beliefs as the lobby does not provide any information.

An interest group that lobbies a majoritarian institution must be concerned with the effect of its information on the *composition* of the majority that supports a proposal. We show in this paper that the majority coalition may change in response to the information provided, and that the lobby group can internalize the benefit of providing positive information without bearing the cost of negative signals. Therefore, it may be beneficial for a lobby to engage in informational lobbying vis-à-vis a legislature, even if it is not so for a group that faces a single decision maker.

A second focus of the paper is to explain how different *legislative structures* change interest groups' incentives to lobby the legislature. Empirical evidence suggests a significantly different role of private interests in the legislative process in the United States and in European parliamentary democracies. Large and well-entrenched interest groups form important constituencies in European parliamentary decision making. By comparison, however, Capitol Hill teems with lobbying organizations and lobbyists trying to influence political decisions in their favor. Observers of the policy process are often struck by the intensity of lobbying—or lack thereof—in the system on the *other* side of the Atlantic.

Our model allows a comparison of the incentive to lobby a parliamentary legislature versus a legislature with low voting cohesion, such as the U.S. Congress. As others (e.g. Huber 1995) have argued, a crucial difference between the two systems is the vote of confidence procedure, a mechanism that allows the proposer of a bill in the parliamentary system to link the government's survival to the passage of the bill. Diermeier and Feddersen (1998) show that this procedure engenders discipline within the governing coalition and leads to a high degree of voting cohesion in the parliamentary system.

The results derived in our informational lobbying game provide a rationale for the different intensity of legislative lobbying in the two systems. We show that the voting cohesion induced by the confidence procedure diminishes the ability of information to change the policy coalition. As a result the incentive to lobby the legislature in the parliamentary system is reduced, and lobbying activity may be diverted to other parts of the policy process, such as the ministerial level or the bureaucracy. The relative importance of U.S. Members of Congress and their exposure to lobbyists may exactly be a consequence of their low coalitional loyalty.

Our model assumes that legislators care about policy outcomes and update their beliefs rationally, i.e. according to Bayes's Rule. It might be tempting to argue that legislators do not learn from information they *do not* receive, i.e., that they fail to update their beliefs in this situation. This paper takes a game theoretic approach and assumes that all actors make the best use of the information available. Another common caveat is that lobby groups are sometimes thought to be better informed than politicians without any search effort. While we do consider the case where the group can acquire the information costlessly, we believe that becoming informed is a conscious choice for the group, in which case the group considers the consequences of this choice. A model in which lobby groups are simply "born" with the relevant information seems less satisfactory on this account.

Persson and Helpman (1998) and Baron (1999) analyze the importance of legislative structure for interest groups' lobbying behavior. In both papers the means of influence are campaign contributions, or financial incentives. Our analysis extends the comparative institutional analysis of lobbying behavior to interest groups' use of *information* as means of influencing policy outcomes.

The paper is organized as follows. In Section 2 we present the generic structure of the lobbying and legislative game. Section 3 solves the model for a legislature without the vote of confidence procedure ("congressional legislature"). We provide a sufficient condition for the lobby to engage in information transmission and argue that this condition is generally satisfied. We then characterize the optimal search strategy for the lobby group in a large legislature. In Section 4 we introduce the vote of confidence procedure and show how it reduces the lobby group's incentive to search for information. We provide a sufficient condition for the lobby not to search at all. Up to that point the benefit of belonging to the governing coalition is exogenously given. Section 5 presents a simplified dynamic version of the model that determines the benefit of remaining in the governing coalition endogenously. We provide a condition for which the introduction of a vote of confidence procedure strictly decreases the expected benefit from lobbying. Section 6 concludes.

2 A model of lobbying for a public good

We analyze lobbying and the legislative process in a simple model of public goods provision of distributive nature, i.e. goods whose incidence is local to geographic districts while being financed through general taxation. Examples may be local highway construction, environmental clean-up or regional development projects, or grants-in-aid, whose benefits accrue mainly locally and costs are shared through the general tax bill.[1] The benefits accrue directly to the public and are, via the electoral connection, internalized in the representative's decision making. Districts differ in the degree to which their residents value the public good.

A national interest group that benefits from the provision of public goods in all districts seeks to promote its overall provision. Such a group might be the national trade organization of private suppliers or contractors for the projects to be built, or a national public interest organization such as the Sierra Club or organized beneficiaries like the AARP. In order to promote the provision of the public good the group can collect decision-relevant information about the good's positive impact in each district and can transmit this information to the legislators to influence their policy choice. The decision to provide information is naturally strategic.

To be specific, consider a country with n districts of equal size, each represented by one legislator $i = 1 \dots n$. We assume that n is odd and define $N = \{1, \dots, n\}$ as the set of legislators.

The legislature decides on the size and distribution of public goods g_i that are to be built in the districts. Let $\mathbf{g} = (g_1, \dots, g_n)$ be the vector of the

[1] See Lowi (1964) and Wilson (1980) for a discussion of such projects. Weingast, Shepsle and Johnsen (1981) is a classic model of such pork barrel projects.

public good allocation and $\frac{1}{2}G = \sum_{i \in N} g_i$ the total amount of public good provided. The total cost C is increasing in g_i. For simplicity we assume that C is a convex function of the total amount of public good, $C(\mathbf{g}) = \frac{1}{2}G^2$, which reflects the fact that inefficiencies or monitoring cost increase with the size of the federal bureaucracy or that the opportunity cost of taxation increases with the size of tax levied. Costs are shared equally among the districts through lump sum taxation, $t_i = \frac{1}{n}C(\mathbf{g})$.

Each legislator i is interested in net benefits for his or her district and thus has the utility function

$$u_i = r_i\, g_i - \frac{1}{2n}G^2 + b_i \quad i \in N.$$

The benefit of the public good to the district depends on the marginal valuation r_i, which is a random variable that can take on two values, $\underline{r}$ with probability $(1 - p_i^\circ)$ and $\overline{r}$ with probability p_i°, with $\overline{r} > \underline{r}$ (> 0).[2] The superscript '∘' indicates the common *ex ante* beliefs, that is, before any information is generated or transmitted. For simplicity let the beliefs be identical for all districts, $p_i^\circ = p^\circ$. Furthermore, the r_i's are uncorrelated across the districts; the interpretation is that the benefit of the public good to the district depends on some unknown, district specific properties.

Bills, or proposals to allocate the public good, are introduced by a proposer, or agenda setter. The proposer is chosen randomly from a *governing coalition* $M \subset N$.[3] The proposed bill $\mathbf{g}$ passes if a majority of the legislature votes for the bill. We refer to the collection of legislators supporting the bill as *policy coalition*. As will become clear presently, being member of the governing coalition and thus having a chance to be selected as proposer conveys a benefit, b_i. For simplicity we first assume that $b_i = b > 0$ for all $i \in M$ and $b_i = 0$ for all $i \notin M$. In Section 5 we endogenize the value of b_i in a simplified dynamic version of the lobbying game.

[2] Any non-degenerate probability distribution on the positive domain would do.

[3] In the U.S. Congress M is the majority party, in the parliamentary system it is the governing party or coalition. Since we are not concerned with the election and the coalition formation stage, we assume M to be determined exogenously by Nature's move.

The interest group that benefits from the provision of the public good can search for high valuation of the public good in the districts ($r_i = \overline{r}$) and can strategically provide this information to the legislators. We assume that the lobby's decision to search in a district is a long term one, i.e. it is made before the government coalition or the agenda setter are chosen. To make the analysis succinct and relatively straightforward, we assume throughout the paper that the group's search activity can be *observed* by the legislature.[4] Given the symmetry of the model the lobby is indifferent about in which district to search. Its search strategy is therefore simply the number of districts in which to search, s. Furthermore, let $I_s \in \{0, 1\}$ indicate whether $0 < s \leq n$.

With this notation we can now state the lobby group's utility as

$$u_L = G - I_s Z,$$

where $Z \geq 0$ is the lobby's cost of searching for information on the districts' valuations. We think of the search cost as the organizing cost for engaging in information search and transmission, and not as a district specific cost; it is only incurred once when the group decides to search.[5] Note also that the lobby group is risk neutral in the provision of the public good.

When the interest group searches for information about district i's valuation of the public good, it receives a signal σ_i, which with probability q reveals the true benefit, $\sigma_i = r_i$, and with probability $1 - q$ is uninformative, $\sigma_i = \emptyset$. After the proposer (and in the parliamentary system the government coalition) is chosen, the interest group sends messages $\boldsymbol{\mu} = (\mu_1, \ldots, \mu_n)$ to the legislature, where $\mu_i \in \{\sigma_i, \emptyset\}$. In words: the group can transmit the information it found, or pretend it found nothing, but it cannot "lie" by forging information.

After the messages are sent, the proposer makes a policy proposal and submits it to a vote. The only difference between the congressional and the

[4]The insight of the present paper carries over to the case where the group's search activity cannot be monitored, as shown in Bennedsen and Feldmann (1999).

[5]This provides the greatest incentive to search in as many districts as possible and is in no way restrictive.

parliamentary games in our analysis is that in the parliamentary system the proposer has the ability to attach the vote of confidence to the proposed bill. After the proposal the legislature votes on the bill, possibly with vote of confidence attached, by simple majority rule. If a bill with vote of confidence is rejected, no public good is awarded and the government steps down, which results in the loss of b_i for all $i \in M$. If a bill without the vote of confidence is rejected, no public good is awarded and all legislators keep their continuation values.

The time line of the game is as follows, where the option to choose the vote of confidence procedure only exists in the parliamentary system.

3 Lobbying Congress

In this section we consider a legislature without vote of confidence procedure, such as the U.S. Congress. We show that in this case the proposer crafts policy coalitions opportunistically. The proposer, or agenda setter, a, allocates the public goods to districts so as to maximize her utility and therein crafts the most favorable majority among the legislators, irrespective of party affiliation. This is consistent with the empirical observation of low voting cohesion and decentralized proposal power in the hands of committee chairmen in the U.S. Congress.

We proceed by solving for the equilibrium strategies by backward induction. The equilibrium concept is perfect Bayesian Nash. First, we derive the proposer's optimal allocation of public goods to the districts for any given beliefs she might hold about the districts' valuation of the public good. Let $\mathrm{E}r_i$ be the common posterior expectation of r_i for all legislators.

Given her beliefs, the proposer, a, makes a take-it or leave-it policy offer to the other legislators. If the proposal does not receive the support of a majority in the legislature, zero public good is provided. Thus, the proposed allocation must provide at least $m \geq \frac{n+1}{2}$ legislators with non-negative utility. Let $C \subset N$ be the set of coalition partners that support a's proposal, and $\bar{C} = C \cup \{a\}$. Since the benefit to be in the governing coalition, b_i, does not depend on the outcome of the vote in the congressional system, we will drop b_i from the legislators' utility functions in this section. The participation constraint for coalition partner $i \in C$ is,

$$\mathrm{E}r_i\, g_i - \tfrac{1}{2n} G^2 \ \geq \ 0.$$

The problem for the agenda setter a is to choose $\mathbf{g}$ so as to maximize her own (expected) payoff, subject to receiving the support from all legislators in C. First observe that the support of legislators outside of C is not needed to pass the proposal; thus, it is optimal to set $g_j = 0$, $\forall\, j \notin \bar{C}$ and to have the participation constraint binding for each coalition partner:

$$g_i \ = \ \frac{1}{2n\mathrm{E}r_i} G^2, \ \forall\, i \in C. \tag{1}$$

a's problem thus becomes

$$\max_{\mathbf{g}} \ \mathrm{E}r_a \Big(G - \sum_{i \in C} g_i \Big) - \frac{1}{2n} G^2,$$

subject to (1). Since the maximand is decreasing in the number of coalition partners in C, it is clear that a optimally forms a minimum winning coalition, i.e. $|C| = \frac{n-1}{2} = m - 1$. To simplify notation, define for all subsets $C \subseteq N$ the vector $r_C = (r_i)_{i \in C}$, the vector of valuations for all districts in C. Substituting for g_j and G above and differentiating yields the optimal aggregate level of public good as function of the expected marginal valuations in the majority districts:

$$G^{*}(\mathrm{E}r_{\bar{C}}) = \frac{n}{\displaystyle\sum_{j \in \bar{C}} \frac{1}{\mathrm{E}r_j}}. \tag{2}$$

Combining (1) and (2) yields the allocations to each district:

$$g_i = \begin{cases} 0 & \text{for } i \notin \bar{C} \\ \frac{n}{2} \frac{1}{\mathrm{E}r_i (\sum_{j \in \bar{C}} \frac{1}{Er_j})^2} & \text{for } i \in C \\ \frac{n}{2} \frac{\frac{1}{\mathrm{E}r_i} + \sum_{j \in \bar{C}} \frac{1}{Er_j}}{(\sum_{j \in \bar{C}} \frac{1}{Er_j})^2} & \text{for } i = a \end{cases} \tag{3}$$

The proposer's decision internalizes the tax cost imposed on her own district and the supporting legislator's, but not the cost to the legislator who is not member of the supporting majority (Weingast *et al.* 1981).

In addition to knowing the best response allocation it will be useful for our analysis later to know the characteristics of the optimal allocations as functions or the expected marginal benefit. Lemma 1 summarizes the results.

Lemma 1. *Assume the proposer maximizes her own payoff subject to being supported by the majority group C. Then $\mathbf{g}^*$, given by (3), is the optimal proposal given the proposer's beliefs. $G^*(\mathrm{E}r_{\bar{C}})$ is increasing and strictly concave in each argument.*

Proof. Optimality of (3) has been shown above. The first and second derivatives of (2) are:

$$\begin{aligned} \frac{\partial G^*(\mathrm{E}r_{\bar{C}})}{\partial \mathrm{E}r_i} &= \frac{n}{(\mathrm{E}r_i \sum_{j \in \bar{C}} \frac{1}{\mathrm{E}r_j})^2} > 0 \\ \text{and} \quad \frac{\partial^2 G^*(\mathrm{E}r_{\bar{C}})}{\partial \mathrm{E}{r_i}^2} &= \frac{-2n \sum_{j \in \bar{C} \setminus \{i\}} \frac{1}{Er_j}}{(\mathrm{E}r_i \sum_{j \in \bar{C}} \frac{1}{Er_j})^3} < 0. \end{aligned}$$

□

Lemma 1 states that the higher the (expected) marginal benefit in any majority district, the more public good is provided in the aggregate. Furthermore, the proposer's optimal response function is concave, a property that crucially affects the interest group's incentive to search, as will become clear shortly.

We now turn to the lobby's optimal message strategy and the determination of legislators' beliefs and expectations. Given *ex ante* belief p° we denote district i's expected marginal valuation $\mathrm{E}_\circ r_i = (1-p^\circ)\,\underline{r} + p^\circ\,\overline{r} \equiv \mathrm{E}_\circ r$. Suppose this is each districts' expected valuation, then the aggregate level of public good that solves the proposer's problem, as given by (2), is $G_\circ = G^*(\mathrm{E}_\circ r_{\bar{C}}) = \frac{2n}{n+1}\mathrm{E}_\circ r$.

Now suppose an interest group exists and is believed to have searched in district i. First, if the group finds that $\sigma_i = \overline{r}$, it sends message $\mu_i = \overline{r}$ since the optimal level of public good is increasing in $\mathrm{E}r_i$ and the message is credible (verifiable). Second, suppose the group finds $\sigma_i = \underline{r}$. Since G^* is increasing in $\mathrm{E}r_i$, the group withholds this negative information and sends an uninformative message $\mu_i = \emptyset$. Similarly if the search is uninformative, which occurs with probability $1-q$. Thus, when the proposer receives message $\mu_i = \emptyset$ she updates her belief that $r_i = \overline{r}$, which becomes, using Bayes's formula, $p_s = \frac{p-pq}{1-pq}$ (where the subscript s indicates that the group has—or is believed to have—searched). The posterior expectation for r_i is

$$\begin{aligned}\mathrm{E}_s r_i &= (1-p_s)\,\underline{r} + p_s\,\overline{r} \\ &= \frac{1-p}{1-pq}\,\underline{r} + \frac{p-pq}{1-pq}\,\overline{r}.\end{aligned}$$

It is clear that due to Bayesian updating $\mathrm{E}_s r_i < \mathrm{E}_\circ r_i < \overline{r}$. Furthermore, it will be useful to note that $\mathrm{E}_\circ r$ can be written as a linear combination $\mathrm{E}_\circ r = (1-pq)\,\mathrm{E}_s r + pq\,\overline{r}$, which is easy to verify.

Summary of notation:

- $\mathrm{E}r_i$: expectation of r_i (unspecified).
- $\mathrm{E}_\circ r$: *ex ante* expectation of r_i, when lobby has not searched for information.
- $\mathrm{E}_s r$: posterior expectation of r_i when the lobby has searched (or is believed to have searched) for information and has not revealed any positive finding.
- $\mathrm{E}r_C$: vector of expected $\mathrm{E}r_i$ containing all $i \in C \subseteq N$.

Before analyzing the incentive for the interest group to search when facing an entire legislature, let us first derive the incentive for the lobby group *vis-à-vis* a single decision maker.

Lemma 2. *Assume* $n = 1$. *Then the lobby group never gains from searching.*

Proof. The single decision maker a chooses $G = g_a = \mathrm{E}r_a$. The gain from searching is $\Delta u_a = pq\,\overline{r} + (1 - pq)\mathrm{E}_s r - Z - \mathrm{E}_\circ r \leq 0$. □

Lemma 2 shows succinctly the effect of Bayesian updating. The expected benefits of the group's search and its expected cost in form of Bayesian updating average exactly to zero. Thus, for any strictly positive search cost Z the group would strictly prefer not to search for information in the district.

We will now show that the lobby group always has an incentive to search in *some* districts when it lobbies a multi-member congressional legislature. The intuition is that if the agenda setter in the congressional system is strategic in composing the majority that supports her proposal, she will choose to include the districts with highest expected valuation for the provided distributive benefits. Thus, if the group's search in a district is not successful, then this district will simply not be considered for the agenda setter's majority coalition, at no loss to the national interest group.

There are a few wrinkles to this story. First, if the district in which the group searches is chosen as agenda setter, then the concavity of G^* with respect to the agenda setter's valuation lowers the provision of public good in expectation. Since the identity of the agenda setter is unknown *ex ante*, the group considers the risk that it searches in the setter's district an expected cost. We derive a condition on the distribution of public good valuations that assures that the group wants to search in *at least* one district (Proposition 1).

Second, the group never wants to search in too *many* districts. If it searches in many districts, it raises the chance that districts for which it found no favorable information need to be included in the majority coalition, thus lowering the expected total provision of public good. Proposition 2 below characterizes the optimal search strategy in large legislatures.

Proposition 1. *The lobby group always searches in at least one district in a congressional system with n districts if the following condition holds:*

$$\frac{\overline{r} - 2\mathrm{E}_{\circ} r}{\mathrm{E}_s r} \leq n. \tag{C1}$$

Proof. If the group searches in one district, the expected net gain from searching is

$$\begin{aligned} \Delta G_1 \ &= \ pq \left(G^*(\overline{r}, \mathrm{E}_{\circ} r_{M \setminus \{i\}}) - G^*(\mathrm{E}_{\circ} r_{\bar{M}}) \right) \\ &\quad + \tfrac{1-pq}{n} \left(G^*(\mathrm{E}_s r, \mathrm{E}_{\circ} r_M) - G^*(\mathrm{E}_{\circ} r_M) \right), \end{aligned} \tag{4}$$

where the first term is the expected gain from having a successful search in any district, and the second term is the expected loss due to the possibility of an unsuccessful search in the agenda setter's district.

Plugging in the G^* function and simplifying, the net gain becomes

$$\Delta G_1 \ = \ pq\, n\, \mathrm{E}_{\circ} r \, \frac{\overline{r} - \mathrm{E}_{\circ} r}{m(\mathrm{E}_{\circ} r + (m-1)\overline{r})} - (1-pq)\mathrm{E}_{\circ} r \, \frac{\mathrm{E}_{\circ} r - \mathrm{E}_s r}{m(\mathrm{E}_{\circ} r + (m-1)\mathrm{E}_s r)}.$$

Notice that $pq\,(\overline{r} - \mathrm{E}_{\circ} r) = (1-pq)(\mathrm{E}_{\circ} r - \mathrm{E}_s r)$ since $\mathrm{E}_{\circ} r = (1-pq)\,\mathrm{E}_s r + pq\,\overline{r}$. Therefore ΔG_1 is positive iff

$$\begin{aligned} \frac{n}{\mathrm{E}_{\circ} r + (m-1)\overline{r}} \ &\geq \ \frac{1}{\mathrm{E}_{\circ} r + (m-1)\mathrm{E}_s r} \\ mboxor \qquad \frac{\overline{r} - 2\mathrm{E}_{\circ} r}{\mathrm{E}_s r} \ &\leq \ n. \end{aligned}$$

□

Since $\mathrm{E}_{\circ} r$ and $\mathrm{E}_s r$ are functions of $p, q, \underline{r}$ and $\overline{r}$, condition C1 delineates a *sufficient* set of parameters $(p, q, \underline{r}, \overline{r}, n)$ for which it is optimal for the group to search in the congressional system. Since C1 can always be satisfied for a large enough legislature, we conclude that searching is optimal in most situations in the congressional system.

The above result shows how the incentive to lobby a multi-member congressional legislature is very different from lobbying a single decision maker. In fact, while the interest group can never gain from searching for information when confronting a single decision maker, it almost always searches when confronting a multi-member majoritarian institution. The reason is that the majoritarian nature of decision maker enables the group to benefit from positive information about districts, while at the same time to avoid the detriment of negative (or nil) information. Since it is in the agenda setter's *and* the lobby group's interest to identify high-valuation coalition partners, lobbying is most effective in the multi-member congressional structure.

Optimal search strategy in large legislatures

The previous section shows that an interest group has an incentive to search for information in the congressional legislature when the legislature is large and the group reveals the information it finds strategically to the legislature. It remains to derive the optimal search strategy. Given that it is in the group's interest to search, in how many districts will the group optimally search?

When the group searches for information, four different circumstances can arise, in each of which searching either raises or lowers the proposer's allocation of the public good, or leaves it unaffected.

Let $K \subseteq N$ be the set of districts in which the lobby group searches, $k = |K| > 0$. Furthermore, let $H = \{i \in K | \sigma_i = \overline{r} \text{ and } i \neq a\}$, i.e. the non-agenda setter districts for which the group found favorable evidence; $h = |H|$.

When the group considers to search in an additional district $j \notin K$, the following four cases can arise:

(1) $j = a$. If j is chosen to be the agenda setter, the group incurs an expected loss for searching due to the concavity of G^* in r_a.

The next three cases assume that $j \neq a$:

(2) $h < \frac{n-1}{2}, k - h < \frac{n-1}{2}$. If the search in j is successful, j will be included in the majority; if $\sigma_j \neq \overline{r}$, it will not receive positive allocation of public good. In expectation, G^* increases.

(3) $h < \frac{n-1}{2}, k - h \geq \frac{n-1}{2}$. If the number of unsuccessful searches is larger than half of the number of districts (excluding the agenda setter's), then some districts for which $\mu_i = \emptyset$ have to be in the majority coalition, and search in j increases that number. Thus, additional search reduces G^*.

(4) $h \geq \frac{n-1}{2}$. The number of districts with successful searches is already sufficient to form a majority. Additional search does not affect G^*.

The *expected gain* from searching in k districts involves summing up the best-response public goods allocations resulting from each possible outcome, i.e. with h ranging from $0 \dots k$, and weighting each case by the probability with which it occurs. Case 1, of course, occurs with a constant probability of $1/n$, while the probability of the other three cases is given by the cumulative of the binomial distribution $\mathcal{B}(k, pq)$.

Suppose the lobby group has an incentive to search in at least k districts. The following Lemma establishes the condition under which the group has an incentive to increase its search, i.e. to search in at least $k+1$ districts.

Lemma 3. *If C1 holds, then in the congressional system the group has an incentive to increase the number of districts k in which it searches whenever*

$$h < \frac{n-1}{2} \quad \textit{and} \quad k - h < \frac{n-1}{2}.$$

Proof. Suppose the group searches in k districts, and $h < \frac{n-1}{2}, k - h < \frac{n-1}{2}$. Then, if the group searches in $k+1$ districts, the expected change in public good allocation is

$$\begin{aligned}
\Delta G_k &= pq\big(G^*(\overline{r}, \mathrm{E}r_{M\setminus\{i\}}) - G^*(\mathrm{E}r_{\bar{C}})\big) + \tfrac{1-pq}{n}\big(G^*(\mathrm{E}_s r, \mathrm{E}r_{\bar{C}\setminus\{a\}}) - G^*(\mathrm{E}r_{\bar{C}})\big) \\
&= pq\, n \left(\tfrac{\overline{r}\mathrm{E}_\circ r}{(h+1)\mathrm{E}_\circ r + (m-h-1)\overline{r})} - \tfrac{\overline{r}\mathrm{E}_\circ r}{h\mathrm{E}_\circ r + (m-h)\overline{r}}\right) \\
&\qquad + (1-pq)\left(\tfrac{\overline{r}\mathrm{E}_\circ r \mathrm{E}_s r}{\overline{r}\mathrm{E}_\circ r + h\mathrm{E}_\circ r\mathrm{E}_s r + (m-h-1)\overline{r}\mathrm{E}_s r} - \tfrac{\overline{r}\mathrm{E}_\circ r}{h\mathrm{E}_\circ r + (m-h)\overline{r})}\right) \\
&= \tfrac{pq\, n\, \overline{r}\mathrm{E}_\circ r\, (\overline{r} - \mathrm{E}_\circ r)}{((h+1)\mathrm{E}_\circ r + (m-h-1)\overline{r})(h\mathrm{E}_\circ r + (m-h)\overline{r})} \\
&\qquad - \tfrac{(1-pq)\, \overline{r}^2\, \mathrm{E}_\circ r\, (\mathrm{E}_\circ r - \mathrm{E}_s r)}{(\overline{r}\mathrm{E}_\circ r + h\mathrm{E}_\circ r\mathrm{E}_s r + (m-h-1)\overline{r}\mathrm{E}_s r)(h\mathrm{E}_\circ r + (m-h)\overline{r})} \\
&= \tfrac{pq\, \overline{r}\mathrm{E}_\circ r\, (\overline{r} - \mathrm{E}_\circ r)}{h\mathrm{E}_\circ r + (m-h)\overline{r}} \left(\tfrac{n}{(h+1)\mathrm{E}_\circ r + (m-h-1)\overline{r}} - \tfrac{\overline{r}}{\overline{r}\mathrm{E}_\circ r + h\mathrm{E}_\circ r\mathrm{E}_s r + (m-h-1)\overline{r}\mathrm{E}_s r}\right),
\end{aligned}$$

where the last equality follows since $\mathrm{E}_{\circ}r = (1-pq)\,\mathrm{E}_s r + pq\,\overline{r}$. Denote the difference in the parentheses by ψ. The term premultiplying ψ is positive; hence $\Delta G_k > 0$ if and only if ψ is positive. Rearranging terms we have

$$\begin{aligned}\psi(h) &= \tfrac{n}{\mathrm{E}_{\circ}r+(m-1)\overline{r}-h(\overline{r}-\mathrm{E}_{\circ}r)} - \tfrac{1}{\mathrm{E}_{\circ}r+(m-1)\mathrm{E}_s r-h\frac{\mathrm{E}_s r}{\overline{r}}(\overline{r}-\mathrm{E}_{\circ}r)} \\ &= \frac{n}{a-hb} - \frac{1}{c-hd}.\end{aligned}$$

Condition C1 implies that $\psi(h) > 0$ for $h = 0$. Furthermore, it is easy to show that $\frac{b}{a-hb} > \frac{d}{c-hd}$. Thus,

$$\begin{aligned}\psi'(h) &= \frac{nb}{(a-hb)^2} - \frac{d}{(c-hd)^2} \;>\; 0 \\ \text{and} \quad \psi''(h) &= \frac{nb^2}{(a-hb)^3} - \frac{d^2}{(c-hd)^3} \;>\; 0.\end{aligned}$$

Thus, as ψ is convex, it is increasing and positive throughout. Hence C1 implies that $\Delta G_k > 0$. □

Lemma 3 shows that condition C1 is sufficient so that whenever case 2 occurs, the group has an incentive to search in more districts. Countervailing this incentive, of course, is any (possible) occurrence of cases 3 and 4; this is considered below.

An immediate consequence of Lemma 3 however is that, whenever C1 holds, the group always searches in *at least half* the districts: If $k \leq \frac{n-1}{2}$, then the premise of Lemma 3 is guaranteed to be satisfied (because cases 3 and 4 cannot occur), and the group has a strict incentive to increase the number of districts in which it searches until it searches in at least half of the districts.

Calculating the optimal number of districts using the binomial distribution of successful and unsuccessful searches is analytically cumbersome. For large n, however, the calculation becomes relatively simple, since the distribution of successful searches approaches the expected value $pq \cdot k$. Proposition 2 shows that the optimal fraction of districts in which the group searches in the congressional system converges to a fixed number greater than one-half and less than all of districts. The exact proportion depends on the search parameters (p and q).

Let $\alpha = \frac{k}{n}$ be the proportion of districts in which the group searches.

Proposition 2. *For large n in the congressional system the proportion of districts in which the group searches in equilibrium is*

$$\alpha^* \to \min\left\{\frac{1}{2pq}, \frac{1}{2(1-pq)}\right\}.$$

Proof. Assume the group searches in k districts, and let (as before) ΔG_k be the expected gain from searching in one additional district.

First, notice that as $n \to \infty$, C1 in Proposition 1 is satisfied. Thus, by Lemma 3, if $\max\{h, k-h\} < \frac{n-1}{2}$, then $\Delta G_k > 0$ and the group has an incentive to increase k.

Second, if $k - h \geq \frac{n-1}{2}$, case 3 or case 1 occurs, implying that $\Delta G_k = G^*(\mathrm{E}_s r, \overline{r}_{\bar{C}\setminus\{i\}}) - G^*(\overline{r}_{\bar{C}}) < 0$. Alternatively, if $h \geq \frac{n-1}{2}$, case 4 or (with a $1/n$ chance) case 1 occurs, so that $\Delta G_k = \frac{1}{n} G^*(\mathrm{E}_s r, \overline{r}_{\bar{C}\setminus\{a\}}) - G^*(\overline{r}_{\bar{C}}) < 0$.

h, of course, is a random variable distributed binomially $\mathcal{B}(k, pq)$, with $\mathrm{E}[h] = pq\, k$. As $n \to \infty$ the Central Limit Theorem implies that $\frac{h}{k} \xrightarrow{a.s.} pq \Leftrightarrow \frac{h}{n} \xrightarrow{a.s.} pq\, \frac{k}{n} = pq\, \alpha$.

Suppose by contradiction that the optimal proportion of districts in which the group searches for large n, $\alpha^* = \frac{k^*(n)}{n} < \min\left\{\frac{1}{2pq}, \frac{1}{2(1-pq)}\right\}$. Then for arbitrarily small $\varepsilon, \varepsilon' > 0$ there exists an n, large, such that $\varepsilon, \varepsilon' < \frac{1}{n}$ and such that $\frac{h}{n} \leq pq\, \alpha^* + \varepsilon < \frac{1}{2}$ and $\frac{k^*(n)-h}{n} \leq \alpha^* - pq\, \alpha^* + \varepsilon' < \frac{1}{2}$ with probability *one*. For such n $\Delta G_{k^*} > 0$; thus, the group has an incentive to increase k, and α^* cannot be optimal.

Suppose on the other hand, also by contradiction, that for large n $\alpha^* > \min\left\{\frac{1}{2pq}, \frac{1}{2(1-pq)}\right\}$. Then for some small $\varepsilon, \varepsilon' > 0$ there exists an n, large, such that $\frac{h}{n} \geq pq\, \alpha^* - \varepsilon > \frac{1}{2}$ and $\frac{k-h}{n} \geq \alpha^* - pq\, \alpha^* - \varepsilon' > \frac{1}{2}$ with probability *one*. For such n $\Delta G_k < 0$. Thus, the group has an incentive to decrease k, and α^* is not optimal.

It follows that $\alpha^* \in \left[\min\left\{\frac{1}{2pq}, \frac{1}{2(1-pq)}\right\} \pm \max\{\varepsilon, \varepsilon'\}\right]$ for large n, where $\varepsilon, \varepsilon'$ are arbitrarily small. $\square$

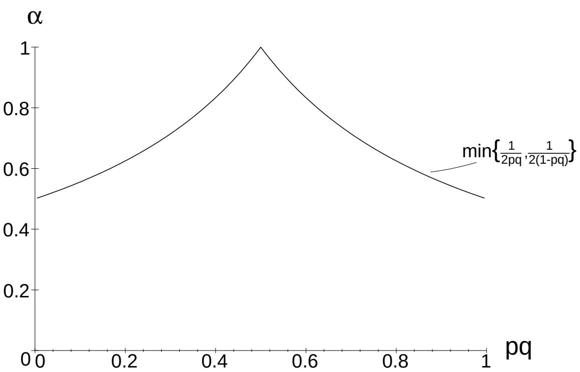

Figure 1: Optimal search strategy without vote of confidence procedure

The optimal search strategy—and thus the optimal number of districts—depends, as Proposition 2 shows, on the parameters of the search. Figure 1 shows the optimal proportion of search districts α^* for a large legislature as a function of pq. As we observed earlier, the group optimally searches in at least one-half of all districts and (generically) never in all districts.

In the congressional system, interest groups can actively seek to affect the composition of policy coalition. Since the agenda setter and the interest group's interests are aligned, the group can affect policy by identifying "high demand" districts. Negative search results do not affect the policy negatively since they can be externalized, to some degree, to non-majority members. Thus, interest groups have an incentive to provide policy-relevant information that allows the agenda setter—or other leaders—to construct most favorable policy coalitions.

4 Lobbying a Legislature With Vote of Confidence Procedure

Policy making in a parliamentary system is characterized by a high degree of cohesion within the governing coalition. Diermeier and Feddersen (1998) show how this voting cohesion can be induced by the vote of confidence procedure, since coalition partners derive benefits being in the government only if the governing coalition is maintained. We show that this voting cohesion reduces an interest group's incentive to provide information.

Government membership is valuable. In a first step and to keep the model as simple as possible we assume in this section that this value is exogenously given and that members of the governing coalition lose the benefit b if the government is dissolved. In Section 5 we derive the value of b in a simple dynamic policy game.

Our focus is on the policy making process and lobbying, and we are less concerned with the coalition formation stage; we thus simply assume that Nature chooses a governing coalition M and a proposer, $a \in M$. a proposes a policy vector and decides whether or not to attach a vote of confidence to the proposal. To simplify the analysis, we assume that $|M| = \frac{n-1}{2}$, i.e. the governing coalition is a minimum majority.[6]

By attaching a vote of confidence to policy $\mathbf{g}$ the proposer can exploit the coalition partners' incentive of maintaining the governing coalition. When b is large enough the proposer proposes a policy that receives the support from the members of the governing coalition and extracts the surplus b. When b is small, the proposer may be better off choosing the best policy coalition C, irrespective of M. Let $C \subset N$ denote the best policy coalition that constitutes a majority. From the previous section we know that C will never be a super majority, i.e. $|C| = \frac{n-1}{2}$. If the proposer seeks support from policy coalition $C \neq M$, she will not attach a confidence vote to the proposal in order not to risk the dissolution of the government, and b remains unaffected

[6] An alternative assumption would be to let M be of any size, but assume that a vote of confidence requires unanimity among the coalition partners.

by the outcome of the vote on the proposal in this case.

The proposer's problem when seeking support from M by attaching a vote of confidence is,

$$\begin{aligned}\max_{\mathbf{g}} \quad & r_a g_a - \tfrac{1}{2n}G^2 + b \\ \text{s.t.} \quad & r_i g_i - \tfrac{1}{2n}G^2 + b \geq 0 \qquad \forall\ i \in M \\ & g_i \geq 0 \qquad \forall\ i \in N.\end{aligned}$$

The solution, G^*_{+v}, in terms of the aggregate amount of public good to this problem is given by

$$G^*_{+v} = \begin{cases} \dfrac{n}{\sum_{i\in M}\frac{1}{Er_i}} & \text{if } \ b \leq \dfrac{n}{2}r_a^2 \\ n\,r_a & \text{otherwise.}\end{cases}$$

The first row is the case where the proposal makes the majority partners indifferent between supporting or not. However, if b is very large, it is possible that the rent transfer from coalition partners to the proposer through an increase of public good in the proposer's district is so inefficient that the proposer prefers to leave the coalition partners with some rent in equilibrium. This is captured by the second row in the definition of G^*_{+v}.

If the proposer instead chooses support from C without invoking the confidence procedure, her problem is identical to the one in Section 3:

$$\begin{aligned}\max_{\mathbf{g}} \quad & r_a g_a - \tfrac{1}{2n}G^2 + b \\ \text{s.t.} \quad & r_i g_i - \tfrac{1}{2n}G^2 \geq 0 \qquad \forall\ i \in C \\ & g_i \geq 0 \qquad \forall\ i \in N.\end{aligned}$$

The aggregate solution G^*_{-v} to the problem without the use of the confidence procedure is

$$G^*_{-v} = \frac{n}{\sum_{i\in\bar{C}}\frac{1}{Er_i}}.$$

Proposition 3 below states the main result of this section, namely that an interest group's incentive to engage in information provision is smaller in the parliamentary system than in the congressional system.

To derive the proposition, the following lemma will be useful.

Lemma 4. *If in all possible equilibria the proposer chooses support for the policy proposal from the governing coalition M by attaching the vote of confidence, then the interest group is strictly better off not searching for information.*

Proof. Suppose a seeks support for her proposal from the governing coalition M, and the group searches in $k \in \{0, \ldots, n-1\}$ districts. Let K be the set of districts in which the group searches and $B = K \cap M$ (possibly empty). Denote by Er_B the vector of expected valuations for the districts in B after the group has sent messages to the proposer (i.e., each element in Er_B will be either $\overline{r}$ or $\mathrm{E}_s r$). The allocation of public good the proposer chooses is given by

$$G^*(Er_B, \mathrm{E}_\circ r_{M \setminus B}). \qquad (*)$$

Now consider that the group searches in $k+1$ districts, by adding district j. In case 1, $j \in M$, which implies the expected allocation

$$pq\, G^*(\overline{r}, Er_B, \mathrm{E}_\circ r_{M\setminus(B\cup\{j\})}) + (1-pq) G^*(\mathrm{E}_s r, Er_B, \mathrm{E}_\circ r_{M\setminus(B\cup\{j\})}) \quad (*')$$

By concavity and Jensen's inequality $(*')$ is less than $(*)$.

In case 2, $j \notin M$, in which case the allocation is not affected by the search (i.e., as given in $(*)$).

Since both cases have a positive probability of occurring, the expected allocation after searching in $k+1$ districts is less than for searching in k districts. Since k is any number between $0 \ldots n-1$, this means that the group is strictly worse off searching in *any* district. □

Lemma 4 builds on the following fact. If the policy coalition is fixed and cannot be affected by the interest group's message, then searching in a coalition member's district is a risky undertaking for the interest group: If the search is successful, it increases the total amount of public good provided; if it is not successful, it reduces the amount. As shown in Lemma 1 the proposer's optimal allocation of public good G^* is concave in the districts' valuations for the good; thus, by Jensen's inequality, the expected allocation is lower than if the group does not search.

We are now ready to state our main result. Proposition 3 establishes the conditions under which a proposer chooses support from M only, leaving interest groups with no incentive to search.

Proposition 3. *The vote of confidence procedure reduces the interest group's incentive to search for information. In particular, the group never searches if*

$$b \;\geq\; \underline{r}\,(\overline{r} - \underline{r})\frac{2n}{n^2 - 1} \;\equiv\; \bar{b} \tag{5}$$

Proof. After the lobby has delivered its message two situations can arise. Either the proposer selects as policy coalition the group of legislators with the highest expected r_i, C, or she proposes a policy supported by the members of the governing coalition M.

In the former case the lobby has the same benefit from its search activity as in the case without vote of confidence procedure (congressional case). In the latter case, when the proposer chooses support from M, the lobby group's benefit from searching can never be higher than in the congressional case, since M may include legislators who *ex-post* do not have the highest expected r_i. It remains to show that $b \geq \bar{b}$ is a sufficient condition for the proposer to choose a policy supported by M independently of the information transmitted by the lobby.

To show this, consider the most adverse case, where the proposer has the largest incentive to include legislators from outside the governing coalition. This case occurs when the lobby has delivered messages $\mu_i = \overline{r}$ for all $i \notin M$ and $\mu_i = \underline{r}$ for all $i \in M \setminus \{a\}$.

If the proposer chooses support from the governing coalition she will link the policy to a vote of confidence. The aggregate amount of public good will be,

$$G^{*}(Er_a, \underline{r}_M) = \frac{n}{(m-1)\frac{1}{\underline{r}} + \frac{1}{Er_a}}.$$

The utility, u_a^{+v}, of the proposer in this case is,

$$u_a^{+v} = \frac{n}{2}\frac{Er_a^2\underline{r}}{(m-1)Er_a + \underline{r}} + \frac{Er_a}{\underline{r}}(m-1)b + b.$$

If the proposer instead chooses support from outside the governing coalition, she will not use the vote of confidence procedure and the aggregate public good will be,

$$G^*(Er_a, \overline{r}) = \frac{n}{(m-1)\frac{1}{\overline{r}} + \frac{1}{Er_a}}.$$

The utility, u_a^{-v}, of the proposer in this case is,

$$u_a^{-v} = \frac{n}{2}\frac{Er_a^2\overline{r}}{(m-1)Er_a + \overline{r}} + b.$$

The proposer, therefore, prefers to find support within the governing coalition if $u_a^{+v} - u_a^{-v} \geq 0$, which reduces to,

$$(m-1)\,b \geq \frac{n\,\underline{r}\,Er_a}{2}\left[\frac{\overline{r}}{(m-1)Er_a + \overline{r}} - \frac{\underline{r}}{(m-1)Er_a + \underline{r}}\right] \qquad (6)$$

Since $\frac{\overline{r}}{(m-1)Er_a+\overline{r}} < \frac{\overline{r}}{mEr_a}$ and $\frac{\underline{r}}{(m-1)Er_a+\underline{r}} > \frac{\underline{r}}{mEr_a}$ we get an upper bound on the right hand side of equation (6) by substituting these latter terms (note that this is a least upper bound as $m \to \infty$), which reduces to

$$b \;\geq\; \frac{n\,\underline{r}(\overline{r} - \underline{r})}{2\,m(m-1)} \;=\; \underline{r}\,(\overline{r} - \underline{r})\frac{2n}{n^2-1}.$$

□

Proposition 3 establishes that an interest group has no incentive to lobby a legislature with the vote of confidence procedure than when b, the value of keeping the government in office, is large enough. The reason is that with $b \geq \bar{b}$, the proposer always chooses policy that is supported by members of the governing coalition. Thus, following the logic of Lemma 4, the interest group has no incentive to search for information.

Comparing the results from Sections 3 and 4 we observe that policy coalitions are formed differently in the parliamentary and the congressional systems, and as a consequence they provide private interest groups with very different incentives to lobby. When the proposer has the ability to link the policy proposal to a vote of confidence, she creates voting cohesion among the governing coalition, thus reducing the benefit of lobbying with policy relevant information. If the voting cohesion is sufficiently strong, then the interest groups abstains entirely from searching.

5 The Value of Government Membership

In the previous section we assumed that the continuation value for being a member of the majority coalition is exogenously given. In this section we derive the value of the government coalition in a simple dynamic version of our policy game. We will show that the an interest group's gain from engaging in information provision is strictly higher in the absence of a vote of confidence procedure.

Assume that a legislature is in place for T policy periods and that a governing coalition M has been chosen by Nature. Each policy period deals with a separate policy issue, and legislators' preferences are not correlated across issues. In addition, there is one interest group per policy issue confronting the legislature in each period.

The timing *within* each policy period is as before,

1. The lobby group decides upon its search activity.
2. Nature chooses a proposer from the governing coalition M.
3. The lobby group delivers its message to the legislature.
4. Proposer chooses a policy allocation $\mathbf{g}$. If available, the proposer also decides upon the use of the confidence procedure.
5. The legislature votes on the proposal. As before, if the proposal is rejected and it is not linked to a vote of confidence, then $\mathbf{g} = \mathbf{0}$. If

the confidence procedure is invoked, then losing the vote forces the government coalition to step down.

The only difference between the two legislative systems is the ability to make a vote of confidence in the parliament. For simplicity we assume that each time the government steps down, Nature chooses a new government coalition M by a random draw from the subset of 2^N for which $|M| \geq \frac{n+1}{2}$.[7] For notational convenience we number periods in reverse order, i.e. the last policy period is period 1 and the first period is period T.

To simplify matters further we assume that the legislature consists of three legislators ($n = 3$) and that the governing coalition, M, consists of exactly two legislators. In each policy period as long as the government is in power, Nature designates one of these two legislators as the proposer (or agenda setter), and the other as coalition partner. The third legislator, who is not a member of the governing coalition, remains the minority legislator. To distinguish between the three legislators (and the three districts) we use subscripts a, cp and mi. Notice that in a given policy period the proposer may choose to include the coalition partner *or* the minority legislator in a policy coalition. Legislators' preferences in each policy period are as in the previous sections, with the exception that the the value of remaining in the governing coalition, b, is derived endogenously.

Congress: No vote of confidence

In the absence of the confidence procedure there is no strategic link between the policy periods.[8] Thus, in any policy period the agenda setter includes the legislator with the highest expected marginal utility of the regional good in the policy coalition and proposes a distribution of the public good according to equation (3).

[7] Alternatively we could assume, as Diermeier and Feddersen do, that legislators' preferences over coalition partners change randomly between each time a government coalition forms.

[8] Note that potential reciprocal arrangements between legislators break down in the last period and thus unravel by backward induction.

In each policy period the lobby strictly prefers to search for information. This is easily seen from the fact that the expected value of searching in the minority district relative to not searching is strictly positive: with probability pq the lobby finds evidence for a high marginal utility of the good, which implies that the proposer chooses the minority district as a majority partner. If the lobby does not find this positive evidence, the proposer chooses the coalition partner as majority partner and the aggregate good will be as high as if the lobby had not searched. The following lemma, whose proof is in the appendix, verifies that this search strategy is optimal in the congressional system.

Lemma 5. *In the dynamic policy game without vote of confidence procedure (congressional system), in each policy period the interest group's unique optimal search strategy is to search in the minority district alone.*

The Lemma confirms that the incentives for the lobby group do not change in the congressional system for the dynamic version of the game.

Introducing the confidence procedure

In proposition 4 below we state, that when the proposer can link its policy proposal to a vote of confidence and there are sufficiently many policy periods remaining, then a lobby has less incentive to search than without the confidence procedure. In particular, we show that the lobby does not gain from using the search strategy that is optimal in the congressional system. Hence, the expected gain from searching, and thus the lobby's incentive to search, is strictly smaller (possible negative) than in the congressional system.

We show the result by solving the model backwards from period 1.

Date 1: The continuation value in period 1, b^1, for a member of the governing coalition is obviously zero as the government needs to step down for sure at the end of the period. Thus, the proposer simply chooses the coalition partner with the highest expected r as in the case without the vote of confidence procedure. As shown in Lemma 5, the lobby's unique optimal search strategy is to search in the minority district alone. The expected benefits for the proposer, u_a^1, the coalition partner, u_{cp}^1, and the minority legislator are, u_{mi}^1, are

$$\begin{aligned} u_a^1 &= pq\,\tilde{u}^a(\mathrm{E}_\circ r, \overline{r}) + (1-pq)\tilde{u}^a(\mathrm{E}_\circ r, \mathrm{E}_\circ r), \\ u_{cp}^1 &= -\tfrac{pq}{3} G^*(\mathrm{E}_\circ r, \overline{r}), \\ u_{mi}^1 &= -\tfrac{1-pq}{3} G^*(\mathrm{E}_\circ r, \mathrm{E}_\circ r). \end{aligned}$$

where $\tilde{u}^a(r_i, r_j) \equiv \frac{3}{2}\frac{r_i^2 r_j}{r_i + r_j}$ is the proposer's one period utility from the optimal policy proposal, and G^* is given in equation (2). Note that the expected benefits for the minority and coalition partner are simply their expected tax share whenever they do not receive any public good allocations. The proposer has *no incentive* to attach the confidence vote to his proposal in period 1.

Date $t > 1$: The continuation value b^t for the members of the governing coalition arises from their increased likelihood of being the proposer in the next period. If the government remains in power at date t, each of the two legislators in the governing coalition has probability $1/2$ of being the proposer at date $t-1$. This probability drops to $1/3$ if the government is dissolved and newly formed.

In period t the lobby has the highest incentive to engage in information provision whenever it can use its preferred search strategy from the congressional case and the proposer is willing to change the majority composition in response to the message received from the lobby. Assume this has been the case up to period $t-1$. The following lemma describes the evolution in b^t and the expected utilities in period t:

Lemma 6. *Suppose in all periods $1, \ldots, t$ the lobbies search in the minority district only, and that the proposer includes the minority district in the policy coalition if and only if the lobby provides positive evidence for $r_{mi} = \overline{r}$. Then for $t > 1$,*

$$\begin{aligned} b^t &= h(t)(u_a^1 + u_{cp}^1) - k(t)u_{mi}^1, \\ u_a^t &= [1 + (2-pq)h(t)]u_a^1 + (2-pq)h(t)u_{cp}^1 - (2-pq)k(t)u_{mi}^1, \\ u_{cp}^t &= pq\,h(t)u_a^1 + [1 + pq\,h(t)]u_{cp}^1 - pq\,k(t)u_{mi}^1, \\ u_{mi}^t &= t\,u_{mi}^1, \end{aligned}$$

where

$$h(t) \equiv \frac{1}{2}\sum_{i=1}^{t-1}\left(\tfrac{1}{3}\right)^i \quad \textit{and} \quad k(t) \equiv \sum_{i=1}^{t-1}\left(\tfrac{1}{3}\right)^i (t-i).$$

Proof. The proof is by induction.

Date 2. The continuation value for each member of the coalition is,

$$b^2 \;=\; \tfrac{1}{6}(u_a^1 + u_{cp}^1) - \tfrac{1}{3}u_{mi}^1 \;=\; h(2)(u_a^1 + u_{cp}^1) - k(2)u_{mi}^1.$$

By assumption the lobby searches only in the minority district and the proposer is willing to include this district in a policy majority if $\mu_{mi} = \overline{r}$. Then, with probability pq the proposer picks L_{mi} as a policy coalition partner without invoking the confidence procedure. With probability $1 - pq$ the proposer uses L_{cp} to support the policy and extracts the rent (continuation value) by attaching a confidence vote. Whichever legislator is picked as policy partner receives reservation utility zero. Thus the expected utilities for the proposer, the coalition partner and the minority legislator are,

$$\begin{aligned}
u_a^2 &= u_a^1 + (2-pq)b^2 \\
&= [1 + (2-pq)h(2)]u_a^1 + (2-pq)h(2)u_{cp}^1 - (2-pq)k(2)u_{mi}^1, \\
u_{cp}^2 &= u_{cp}^1 + pqb^2 \;=\; pq\,h(2)u_a^1 + [1 + pq\,h(2)]u_{cp}^1 - pq\,k(2)u_{mi}^1, \\
u_{mi}^2 &= 2u_{mi}^1.
\end{aligned}$$

Date $t > 2$. Assume the lemma true for all periods up to $t-1$. The continuation value for each coalition partner in period t is,

$$\begin{aligned}
b^t &= \tfrac{1}{6}(u_a^{t-1} + u_{cp}^{t-1}) - \tfrac{1}{3}u_{mi}^{t-1} \\
&= \tfrac{1}{6}\left(1 + 2\,h(t-1)\right)(u_a^1 + u_{cp}^1) - \left(\tfrac{1}{3}k(t-1) + \tfrac{1}{3}(t-1)\right)u_{mi}^1 \\
&= \frac{1}{6}\Big(1 + 2\sum_{i=1}^{t-2}\left(\tfrac{1}{3}\right)^i\Big)(u_a^1 + u_{cp}^1) - \Big(\tfrac{1}{3}\sum_{i=1}^{t-2}\left(\tfrac{1}{3}\right)^i (t-1-i) + \tfrac{1}{3}(t-1)\Big)u_{mi}^1 \\
&= h(t)(u_a^1 + u_{cp}^1) - k(t)u_{mi}^1
\end{aligned}$$

Given b^t the expected payoffs for the legislators are,

$$\begin{aligned}
u_a^t &= u_a^1 + (2-pq)b^t \\
&= (1+(2-pq)h(t))u_a^1 + (2-pq)h(t)u_{cp}^1 - (2-pq)k(t)u_{mi}^1, \\
u_{cp}^t &= u_{cp}^1 + pqb^t \;=\; pq\,h(t)u_a^1 + (1+pq\,h(t))u_{cp}^1 - pq\,k(t)u_{mi}^1, \\
u_{mi}^t &= t\,u_{mi}^1.
\end{aligned}$$

□

Suppose now that the lobby in period t provides positive evidence for a high valuation in the minority district, $\mu_{mi} = \bar{r}$. The proposer is willing to forego the benefit of the confidence procedure if and only if,

$$\tilde{u}^a(Er, \overline{r}) \;\geq\; \tilde{u}^a(\mathrm{E}_\circ r, \mathrm{E}_\circ r) + b^t. \tag{7}$$

Since $u_{mi} < 0$, $h(t)$ is increasing and bounded, and $k(t)$ grows without bound, we we observe that b^t increases without bound as t increases; therefore the proposer will always prefer using the confidence procedure and require the support from the coalition partner whenever t large enough. Let $\tilde{t}$ be the maximum t for which (7) holds, and define $t^* = \min\{\tilde{t}, T\}$. Thus, for $t \leq t^*$ the proposer is willing to graft the coalition opportunistically when she receives information from the lobby group.

When $t > t^*$, the proposer enforces voting cohesion among the government coalition. Hence, the lobby may either choose another search strategy that is able to affect the composition of the majority or abstain from searching. In the former case, Lemma 5 proves these strategies have lower expected gain for the lobby group. We, therefore, arrive at the following proposition:

Proposition 4. *For all policy periods from date T to t^*+1 an interest group's expected gain from searching and information provision is strictly smaller in the parliamentary system than in the congressional system.*

In the last t^* policy periods the two types of legislature provide an interest group with the same expected gain from information provision.

The proposition implies that the interest groups' incentive to engage in information search is strictly smaller in legislatures with the confidence procedure than in legislatures without this procedure, for periods $t > t^*$. Clearly, the relevance of this result depends on the size of t^*. Simulations show that for a large range of plausible parameter values $t^* = 1$,[9] that is, the two legislative structures provide different incentives for lobby groups to engage in information search in all but the final policy period.

6 Discussion

Our model of lobbying legislatures for favorable policy has shown that the incentive interest groups have to lobby depends, not too surprisingly, on the legislative structure in which the group operates. The results roughly correspond to the empirical observation that lobbying is far more active in the U.S. Congress than in European parliamentary systems.

The distinguishing feature we have identified between the parliamentary and congressional systems is the ability of parliamentary leaders to induce voting cohesion through the use of the confidence procedure. On the other hand, leaders in Congress craft legislative coalitions according to the policy preferences of legislators for each policy issue at a time. As the analysis has shown, it is this feature that provides interest groups with influence by passing on information that helps the agenda setter identify the most favorable supporters for the proposal.

In the absence of this coalitional flexibility, as in parliamentary systems when the value of government membership is significant, the proposer has nothing to learn about the composition of the winning coalition. Therefore, the only way the interest group can affect outcomes is by providing informa-

[9]For example let $\underline{r} = 1$ then $\forall\, q, p \in [0, 1]$ and $\forall\, \overline{r} \leq 2, t^* = 1$.

For smaller variation between districts the result is even stronger. In this numerical example, $\overline{r} \leq 1.4$ is a sufficient condition for $b^1 > u^p(\overline{r}, \overline{r}) - u^p(\overline{r}, \underline{r})$, which is the highest gain a proposer can ever achieve from breaking the governing coalition. Thus, in this case *the lobbies will never search in any policy period before the final one*, since the composition of the policy majority is not affected by any transmitted information.

tion about a *given set* of districts. As we show, it is a feature of Bayesian updating that the *ex ante* (uninformed) beliefs are a weighted average of the posterior (informed) beliefs. Therefore, the degree to which the proposer's beliefs are influenced by favorable information as well as the potential detriment from the failure to do so cancel each other out in expectation. Moreover, since the proposer's reaction function is concave in her expectation, the group is strictly worse off trying to lobby a proposer who is wedded to the districts she needs to favor. Thus, without the flexibility to customize winning coalitions there is no scope for informational lobbying.

An interesting sideline to our results is that lobbying in the congressional system always yields coalitions of "high demand" districts, i.e., districts whose preference for the public good are above the average and who are willing to support the agenda setter's over-provision of public good to some districts. In this regard the model suggests that the congressional system is more prone to inefficient allocation of policy than the parliamentary system (although this assessment lies beyond the scope of our model for the present time).

A variation of our model could relax the assumption that the interest group is organized at the national level and benefits from the provision of the public good in *any* district. An interest group's benefit is often localized, and it may have a particular knowledge of the local incidence of the public good that it might want to convey to the legislators. First results along these lines indicate that if interest groups are local, they compete for inclusion of their district in the majority by providing information. Since such an incentive is absent in the parliamentary system, our general result prevails and may even be amplified.

In the present paper we assume that the lobby's search activity is observable for the legislature; this allow us to highlight the mechanism of Bayesian inference engendered by the group's search for favorable information. In practice, legislators cannot be expected to monitor interest group activities all too closely. However, if we maintain the standard assumption of Bayesian games, namely that players are rational and make the best (equilibrium) predictions about other players' unobserved behavior and that players' actions are optimal given their beliefs, then the main observation[10]from the present analysis obtains when the search activity is unobservable, albeit in a qualified form: the congressional system provides an interest group with a greater incentive to lobby via information search than the parliamentary system. The principal difference is that when the search activity is not observable, searching itself does not induce the proposer to revise her beliefs, so that the activity itself does not impose a Bayesian cost. Instead, the proposer infers whether or not the group has an incentive to search and forms her expectations accordingly. Thus, *in equilibrium* the failure to report a positive finding still carries the Bayesian updating cost.

Some observers of lobbying argue that interest groups in Europe far more actively lobbying bureaucrats rather than legislators, relative to their US counterparts. The standard explanation is that legislators are less important in the design of policy. Our analysis provides a different explanation for this observation: Lacking the ability to influence policy coalitions and outcomes in the legislature, interest groups focus their attention on the *implementation* of policy. Further empirical work will need to shed light on the merits of either explanation.

[10]The following argument is developed in Bennedsen and Feldmann 1999.

Appendix: Proof of Lemma 5.

Proof. Since the lobby cannot distinguish between the proposer and the coalition partner when it picks its search strategy, there are five search strategies with different expected values. With a slight abuse of notation we can write these strategies as s_1 (one coalition member's district), s_3 (the minority district), s_{12} (both coalition members' districts), s_{13} (one coalition member's district and the minority district), s_{123} (all three districts). Similarly, we write the lobby's expected value (relative to not searching) from using these strategies as V_1, V_3, V_{12}, V_{13}, and V_{123}.

$$
\begin{aligned}
V_3 &= pq(G^*(\overline{r}, \mathrm{E}_\circ r) - G^*(\mathrm{E}_\circ r, \mathrm{E}_\circ r)) \;>\; 0, \\
V_1 &= \tfrac{1}{2}(pq\, G^*(\overline{r}, \mathrm{E}_\circ r) + (1-pq) G^*(\mathrm{E}_s r, \mathrm{E}_\circ r)) \\
&\quad + \tfrac{1}{2}(pq\, G^*(\overline{r}, \mathrm{E}_\circ r) + (1-pq) G^*(\mathrm{E}_\circ r, \mathrm{E}_\circ r)) - G^*(\mathrm{E}_\circ r, \mathrm{E}_\circ r) \;<\; V_3, \\
V_{13} &= \tfrac{1}{2}\left[(pq)^2 G^*(\overline{r}, \overline{r}) + pq(1-pq)(G^*(\mathrm{E}_s r, \overline{r}) + G^*(\overline{r}, \mathrm{E}_\circ r)) + (1-pq)^2 G^*(\mathrm{E}_s r, \mathrm{E}_\circ r)\right] \\
&\quad + \tfrac{1}{2}\left[(pq + (1-pq)pq) G^*(\overline{r}, \mathrm{E}_\circ r) + (1-pq)^2 G^*(\mathrm{E}_\circ r, \mathrm{E}_s r)\right] - G^*(\mathrm{E}_\circ r, \mathrm{E}_\circ r) \\
&< \tfrac{1}{2}\left[pq\, G^*(\mathrm{E}_\circ r, \overline{r}) + (1-pq) G^*(\mathrm{E}_\circ r, \mathrm{E}_\circ r)\right] \\
&\quad + \tfrac{1}{2}\left[pq\, G^*(\overline{r}, \mathrm{E}_\circ r) + (1-pq) G^*(\mathrm{E}_\circ r, \mathrm{E}_\circ r)\right] - G^*(\mathrm{E}_\circ r, \mathrm{E}_\circ r) \;=\; V_3, \\
V_{12} &= (pq)^2 G^*(\overline{r}, \overline{r}) + pq(1-pq)(G^*(\overline{r}, \mathrm{E}_\circ r) + G^*(\overline{r}, \mathrm{E}_s r)) \\
&\quad + (1-pq)^2 G^*(\mathrm{E}_s r, \mathrm{E}_\circ r) - G^*(\mathrm{E}_\circ r, \mathrm{E}_\circ r) \\
&< pq\, G^*(\overline{r}, \mathrm{E}_\circ r) + (1-pq) G^*(\mathrm{E}_\circ r, \mathrm{E}_\circ r) - G^*(\mathrm{E}_\circ r, \mathrm{E}_\circ r) \;=\; V_3, \\
V_{123} &= pq[pq(2-pq) G^*(\overline{r}, \overline{r}) + (1-pq)^2 G^*(\overline{r}, \mathrm{E}_s r)] \\
&\quad + (1-pq)[pq(2-pq) G^*(\mathrm{E}_s r, \overline{r}) + (1-pq)^2 G^*(\mathrm{E}_s r, \mathrm{E}_s r)] - G^*(\mathrm{E}_\circ r, \mathrm{E}_\circ r). \\
&< pq[pq\, G^*(\overline{r}, \overline{r}) + (1-pq) G^*(\overline{r}, \mathrm{E}_\circ r)] \\
&\quad + (1-pq)[pq\, G^*(\mathrm{E}_s r, \overline{r}) + (1-pq) G^*(\mathrm{E}_s r, \mathrm{E}_\circ r)] - G^*(\mathrm{E}_\circ r, \mathrm{E}_\circ r). \\
&< pq\, G^*(\mathrm{E}_\circ r, \overline{r}) + (1-pq) G^*(\mathrm{E}_\circ r, \mathrm{E}_\circ r) - G^*(\mathrm{E}_\circ r, \mathrm{E}_\circ r) \;=\; V_3.
\end{aligned}
$$

where each inequality (except the first) follows from Jensen's inequality and from concavity of $G^*(\cdot)$. □

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