*Information and Influence: Lobbying for Agendas and Votes**

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This paper explores the extent and character of interest group influence on legislative policy in a model of decision making under incomplete information. A committee may propose an alternative to a given status quo under closed rule. Policies are related to consequences with ex ante uncertainty. An interest group is able to acquire policy-relevant information at a price and has access to legislators at both the agenda-setting stage and the vote stage. Lobbying is modeled as a game of strategic information transmission. The price of information is itself a private datum to the group, and legislators cannot observe whether the group elects to become informed. If the group is informed, then its information is likewise private. Among the results are that not all informed lobbyists choose to try to influence the agenda directly; that there can coexist influential lobbying at both stages of the process; and that while informative agenda stage lobbying is generically influential, the same is not true of voting stage lobbying.

1. Introduction

Interest groups are typically seen to influence policy in two ways: through the giving of campaign contributions and through the distribution of specialist information. Although logically distinct, these two activities are surely related empirically. The basic premise of the "access' view of campaign contributions, in particular, is that groups make contributions to secure the attention of the relevant legislator. Despite such interrelationships, this paper is concerned exclusively with the role of groups as sources of policy-relevant information. In this context, lobbying is strategic information transmission.

Policy is a means to an end and not an end in itself. Legislators care about policy only insofar as they care about its consequences. Such consequences may be purely "political" (e.g., How are reelection chances affected?), or they may be technical (e.g., How will a revised Clean Air Act hurt employment in the car industry?). If there is no uncertainty about how policies map into consequences, then there is no issue here. However, such omniscience is rare, and decision makers are frequently

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choosing policies without complete information on their consequences, in which case, information becomes valuable, and those who possess it are accordingly in a position to influence policy.

In an important series of papers, Gilligan and Krehbiel (1987, 1989, 1990) study a legislative decision-making process in which a committee is informed about the consequences of policy decisions relative to the majority of the House. Their focus is on the House's selection of rules for consideration of committee proposals to change the status quo, especially: When will a majoritarian House agree to a closed rule that surrenders monopoly agenda-setting power to a minority committee? Loosely speaking, the answer is when the expected informational gains under a closed rule outweigh the expected distribution losses from that rule. In effect, the distributional loss is a price paid by the House in exchange for the committee revealing more information about the consequences of policy. For many decisions, however, the degree of informational asymmetry between committee members and the legislative body as a whole is negligible. Instead, it is interest groups who possess the relevant information (Rothenberg 1989; Hansen 1991). Unlike legislators, interest groups or lobbyists have no legislative decision-making rights. But nevertheless they can, as observed above, influence policy through the specialist information they offer legislators.

In what follows, I build on the basic Gilligan and Krehbiel (1987) model by, inter alia, introducing a lobbyist in addition to the committee and the House. Legislative decision making is by closed rule, and only the lobbyist may (but does not necessarily) possess technical information about the consequences of selecting any given policy. All the agents—legislators and lobbyist—have preferences over consequences that, with their beliefs about the relationship between policies and consequences, induce preferences over policies per se. Because preferences over consequences are primitive, "influence" occurs only through changing beliefs. And the extent to which any information offered to alter beliefs is effective depends on the credibility of the lobbyist to the legislator in question. Such credibility is endogenous to the model and depends partly upon how closely the lobbyist's preferences over consequences reflect those of the legislator being lobbied, and on how confident is the legislator that the lobbyist is in fact informed.

An important issue here concerns identifying the circumstances under which a lobbyist chooses to lobby the committee at the agenda-setting stage, or to lobby the House at the subsequent voting stage, or both. Clearly, the character of the information that might be transmitted and the nature of the influence that might be exerted is likely to differ between these stages. Among the results presented below are, first, that there exist circumstances under which influential lobbying can take place at both stages of the process, but that the structure of the information offered at each stage is distinct; second, that agenda stage lobbying can be influential even when the House's most preferred policy consequence lies between those of the committee and those of the lobbyist; and third, that more information can be offered here, where it is occasionally uncertain whether the lobbyist is informed or not, than is possible in the Gilligan and Krehbiel environment where the committee is known to possess information surely.

The plan of the paper is as follows. Section 2 develops the model and section 3 reviews two benchmark cases against which to juxtapose the results presented in section 4. Section 5 contains some numerical examples to illustrate the results, and section 6 is a brief conclusion. All formal proofs are confined to an appendix.

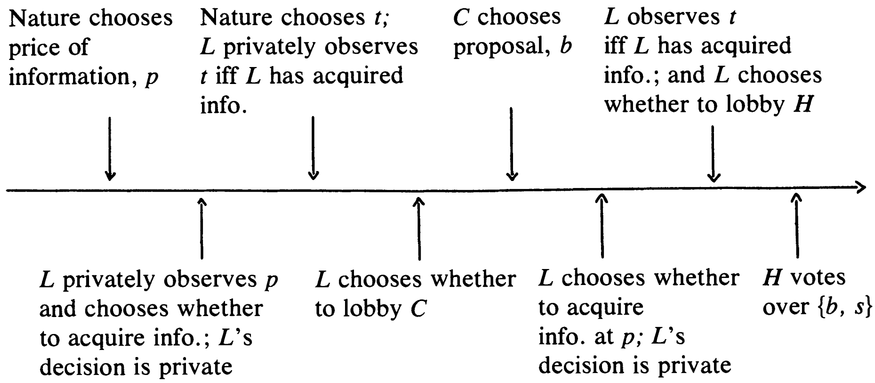
2. Model

Agents and Decision Sequence

There is an exogenously given status quo policy, $s \in \mathbb{R}$. Changes from the status quo are governed by a closed rule whereby a committee has the sole legislative right to propose an alternative policy, following which the legislature as a whole votes on whether to accept the committee's proposal or to retain the status quo. Assume that the committee is a unitary actor, C, and that there is a pivotal voter in the legislature as a whole (the House), H. Both C and H have primitive preferences over the consequences of policy decisions that, ex ante, are known only with uncertainty. In addition to C and H, there is a third interested party, a lobbyist L, who has no legislative decision-making rights but has access to both the committee and the House. Moreover, relative to both C and H, L might be better informed about the consequences of legislation. Consequently, lobbying in this model is strategic information transmission, in which L seeks to persuade C or H to behave in certain ways by providing information about the consequences of their legislative decisions (Austen-Smith and Wright 1992). The sequence of events and decisions detailed below is summarized in Figure 1.

Three central aspects of the model are, first, that only the lobbyist L has the opportunity to acquire information about how policies map into consequences; second, that if L does acquire such information, it is private information to L; and third, whether L has acquired information is itself private information to L. However, with respect to this last point, I assume, on the one hand, that if L chooses to lobby some legislative actor $j \in \{C, H\}$, then L can costlessly prove to j that L has acquired the

Figure 1



information (but not what that information is); but, on the other hand, L has no way of credibly demonstrating that L has *not* acquired data. For example, given that information acquisition is costly, L can prove to j that L has acquired data by submitting the appropriate accounts. But while documentation can establish some fact or other, the absence of documentation does not prove the case one way or the other.[1]

To model the features listed above, at the start of the game Nature is assumed to pick a price at which the lobbyist is able to purchase information. Let $p \in [0, 1]$ denote this price and assume $p \sim U[0, 1]$ with this distribution being common knowledge among $\{C, H, L\}$. Once Nature has selected p randomly from the uniform distribution on $[0, 1]$, p is revealed privately to L, who then chooses whether to acquire information. The technology governing how policies map into consequences is assumed to be

$$y = b - t, \tag{1}$$

where $y \in \mathbb{R}$ is a consequence, $b \in \mathbb{R}$ is a policy decision, and $t \sim U[0, 1]$ is an ex ante unknown parameter uncorrelated with p (see Gilligan and Krehbiel 1987 for a discussion of this specification). Let $T = [0, 1]$. Assume that if L elects to acquire information at price p, then Nature

[1]See Okuno-Fujiwara, Postlewaite, and Suzumura (1990) for a discussion of the difficulty of showing that one does *not* know something. A contemporary example is that if a country conducts a nuclear weapons test then it is trivial to verify that the country possesses a nuclear capability. However, the absence of such tests does not establish a corresponding absence of such capability.

privately reveals the true value of $t \in T$ to L.[2] Moreover, as remarked above, L's decision on whether to acquire information at price p is not observable by C or by H. Having become informed or not, L then chooses whether to lobby C at the agenda-setting stage.[3] Lobbyist L's decision on whether to lobby is common knowledge.

In the model, lobbying itself is modeled as a cheap-talk speech (Crawford and Sobel 1982; Farrell 1988; Austen-Smith 1990, 1993): it is no more difficult for a lobbyist to tell the truth about the value of t than it is for him or her to dissemble. In other words, although L can unequivocally prove to the legislator that L is informed when L has acquired information on t, L cannot similarly prove that he or she has observed any particular value of t. And so, since L is known to have preferences over consequences, legislators will take account of the strategic incentives for informed lobbyists to dissemble. After hearing what the lobbyist has to say, if anything, the committee then chooses an alternative proposal to the status quo.

Once the alternative is fixed, L may choose to acquire information at the price p if he or she has not already done so. Having made this decision (again, private information to L), L may lobby H or not at all (evidently, given that the agenda is set at this stage, there is no further incentive for L to lobby C). Again, L's lobbying is strategic information transmission and modeled as a cheap-talk speech. Finally, the House votes on whether to accept the committee's proposal or to retain the status quo, and the game ends with all agents receiving their payoffs from the House's policy decision.

Preferences

Each agent $j \in \{C, H, L\}$ has preferences over consequences given by

$$U_j(y) = -(x_j - y)^2; y \in \mathbb{R}, x_j \in \mathbb{R}. \tag{2}$$

These preferences are common knowledge, and it is assumed that $x_C > x_H \equiv 0$. No restriction is placed on the relative location of L's ideal point at this stage. And if L has become informed at price $p > 0$, L's net payoff is $U_L(\cdot) - p$.

[2]It is worth noting that the assumption that L learns the true value of t is considerably stronger than necessary. Making the assumption facilitates the exposition.

[3]Assuming that L cannot lobby H, or both C and H together, at this stage, is substantively restrictive (Farrell and Gibbons 1989) and will be discussed further in the concluding section. Formally relaxing the assumption is deferred to subsequent work.

Given equations (1) and (2), j's induced preferences over policies are given by

$$u_j(b) \equiv E[U_j(b - t)|\cdot] = -(x_j + E[t|\cdot] - b)^2 - \text{var}[t|\cdot], b \in \mathbb{R}, t \in T; \tag{3}$$

where the expectations are conditional on all the information that j possesses. It follows immediately from equation (3) that, for all j, the higher is the realized value of t, the larger is j's most preferred policy. In particular, for informed lobbyists, L's most preferred policy decision is strictly increasing in L's *type* t.

Strategies

Consider L's decisions: L has to decide when, if at all, to collect information; who to lobby and at what stage; and finally, what to say to the legislators L does elect to lobby. It is convenient to describe these in sequence: L's *agenda stage information acquisition strategy* is a map:

$$\delta_a: [0, 1] \times \mathbb{R} \rightarrow \{0, 1\}, \tag{4}$$

where $\delta_a(p, s) = 1$ (respectively, 0) means that if the price of information is p and the status quo is s, then L acquires (respectively, does not acquire) the information on t. The restriction to a pure strategy here is without loss of generality. If $\delta_a(p, s) = 0$, then L will not lobby the committee. To see this, recall the assumption that if L lobbies legislator $j \in \{C, H\}$ then L can prove without cost whether L is informed, but not whether L is uninformed. Therefore, if L does not acquire the information, actively lobbying a legislator is equivalent to not lobbying at all. So without loss of generality, assume L actively lobbies a legislator only if L is informed.

Let $\delta_a(\cdot) = 1$, so L knows the value of t surely. Then it is natural to combine the decision on whether to lobby C with the subsequent choice of what to say to C if C is lobbied. So L's *agenda stage lobbying strategy* is a map:

$$\lambda_a: T \times \mathbb{R} \rightarrow M_C \cup \phi, \tag{5}$$

where M_j is an arbitrary uncountable message space and ϕ denotes the decision not to lobby the legislator actively.[4] (In this notation, then, an

[4]Excluding mixed strategies here is justified by Crawford and Sobel (1982, Theorem 1), who demonstrate that all equilibria in a game of this form are essentially "partition" equilibria: the set T is partitioned into intervals and all types in a given interval use the same signaling strategy. Allowing for mixed strategies, therefore, simply means that there need be no out-of-equilibrium beliefs to specify. And in the present context, the issue is purely technical.

uninformed lobbyist's message is identically "ϕ"; under the verifiability assumption, only informed lobbyists can credibly send messages in M_j.) For example, $\lambda_a(t', s) = m$ means that L, having acquired the information that the true value of t is t' and given the status quo s, actively lobbies C by making a speech ("sending a message") $m \in M_C$; similarly, $\lambda_a(t'', s) = \phi$ means that if L learns that the true value of t is t'' and the status quo is s, then L chooses not to lobby C at this stage of the game (and therefore mimics the behavior of a lobbyist who chose not to become informed). If L lobbies some legislative agent j, then this fact is common knowledge, but the message L gives to j is private information to L and j. In other words, if L lobbies C, for instance, then H can see whether C is lobbied but cannot observe the lobbying message itself.[5] To save on notation later, let $Z_j \equiv (M_j \cup \phi), j = C, H$.

After any lobbying takes place at the agenda-setting stage, the committee chooses an alternative to the status quo. The committee's strategy is specified below. Given the committee's decision, if $\delta_a(\cdot) = 0$, L may again choose to acquire information at the price p originally revealed by Nature; L's *voting stage information acquisition strategy* is a map:

$$\delta_v: [0, 1] \times \mathbb{R}^2 \rightarrow \{0, 1\}, \tag{6}$$

where $\delta_v(p, b, s) = 1$ means that, given a price of information p, the committee's proposal b and a status quo s, L chooses to acquire information on the value of t; and conversely for $\delta_v(\cdot) = 0$. Once again, if $\delta_v(\cdot) = \delta_a(\cdot) = 0$, then L will not lobby H. So, assuming $\delta_a(\cdot) + \delta_v(\cdot) > 0$, define L's *voting stage lobbying strategy* as a map:

$$\lambda_v: T \times \mathbb{R}^2 \rightarrow Z_H, \tag{7}$$

where, for example, if $m \in M_H$ then $\lambda_v(t', b, s) = m$ means that, having observed a true value of t equal to t', a committee proposal of b, and the status quo s, L makes a cheap-talk speech to H about how to vote.

The description of C's strategy and of H's strategy is more straightforward, since each has only one decision to make. Consider the committee's strategy: C cannot observe what the price of information is or whether L chooses to acquire information at that price. All that C can

[5]Strictly, "Not lobby" is itself a message, and in the analysis to follow it will be treated as such. However, it is convenient to distinguish the decision not to lobby a legislator directly from active lobbying messages (i.e., speeches given directly to legislators). Similarly, lobbying strategies depend on the realized value of p. However, since all agents' induced preferences over bills are independent of p, it is straightforward to show that in equilibrium information about p is decision-irrelevant for the committee (save with respect to estimating the likelihood that L is informed per se). Consequently, the formal dependence of lobbying strategies on p is suppressed throughout.

observe prior to making any proposal is the message, if any, that L sends to C itself. Hence, C's *proposal strategy* is a map:

$$\pi: Z_C \times \mathbb{R} \to \mathbb{R}. \tag{8}$$

For example, $\pi(m, s) = b$ says that the committee, having been lobbied by L and having heard the message $m \in M_C$, proposes $b \in \mathbb{R}$ as an alternative to the given status quo $s \in \mathbb{R}$. Similarly, $\pi(\phi, s) = b'$ means that C proposes b' as an alternative to s, given that L lobbied no one. Again, the restriction to a pure strategy here is without loss of generality.

The House can observe whether L lobbies, what L says only if L lobbies H, and what proposal the committee offers in place of the status quo. Hence, H's *voting strategy* is a map:

$$\nu: (\{C\} \cup \phi) \times Z_H \times \mathbb{R}^2 \to [0, 1], \tag{9}$$

where, for example, if $m \in M_H$ then $\nu(C, m, b, s) = r$ says that H votes for the proposal b with probability $r \in [0, 1]$, given that (i) L lobbied C at the agenda-setting stage; (ii) L lobbied H at the voting stage and made a speech $m \in M_H$; and (iii) the committee's proposal is b and the status quo is s.

Equilibrium Concept

The basic notion is sequential equilibrium: a list of strategies $\sigma^* \equiv ((\delta_a^*, \lambda_a^*, \delta_\nu^*, \lambda_\nu^*), \pi^*, \nu^*)$ and a set of beliefs $\mu \equiv (\mu_C, \mu_H)$ such that, loosely speaking, at every decision node (both reached and unreached) every agent's strategy maximizes that agent's expected payoffs, and expectations are derived from players' strategies and the priors using Bayes Rule where this is defined. A formal definition is given in the appendix.

In the present context, there are multiple sequential equilibria, due largely to lobbying strategies being cheap-talk. Some of these equilibria are essentially identical in that they differ only in a labeling convention, and I shall ignore such differences. More important is that there exists an equilibrium in which the lobbyist never acquires information—even at zero cost—and no lobbying takes place. Such an equilibrium is supported by pooling lobbying strategies conditional on L acquiring information (Farrell 1988). With a pooling strategy, all lobbyist types (i.e., whatever the value of t that L learns is the truth) send the same message, and, therefore, the listener can infer nothing. Hence, the message is wholly uninformative, in which case, there is no incentive for the lobbyist to purchase information in the first place. This kind of uninformative equilibrium specifies the least amount of information and influence that might be observed. Of more interest is the opposite extreme. Consequently, in what follows I shall only consider the most informative available equilibria. There are two justifications for this selection. The first, as already observed, is that it is useful to identify how much information transmission and influence there can be in any given institution; and the second is that, in the present context of risk-averse agents and uniform priors, all agents ex ante strictly prefer that the most informative equilibrium is played rather than any other (Crawford and Sobel 1982; Austen-Smith 1993). Where there is no ambiguity, I shall refer to an "equilibrium σ^*," taking the specification of beliefs μ as understood.

It is important to note that in equilibrium the price at which L will choose to acquire information is endogenous. This follows simply because the expected payoff to L from lobbying depends, inter alia, on what C chooses to do if C is not lobbied, and exactly what C chooses to do in this instance depends in turn on C's inference regarding whether L did not lobby because L has no information, or because L has information but chooses not to lobby at the agenda-setting stage.

A lobbying strategy, λ_a or λ_v, is *informative* if and only if, on hearing L's message, the relevant listener's posterior beliefs about the value of t are distinct from his or her prior beliefs. A lobbying strategy is *influential* if and only if the relevant listener's subsequent decision (what alternative to propose in the case of C, or how to vote in the case of H) is not constant in the messages sent under the strategy. Influential strategies are necessarily informative, but informative strategies need not be influential. In particular, because listeners are risk-averse, messages given via an informative strategy affect the listener's expected utility from taking any action but do not alter the choice of action itself relative to what would be chosen prior to hearing the messages. On the other hand, messages sent under an influential strategy affect both the listener's expected utility and his or her choice of action.

An action is said to be *elicited* by a lobbying strategy if there is a message sent under the strategy that induces the listener to take that action. Clearly, the maximum number of actions (votes) that a voting stage lobbying strategy, λ_v, might elicit is two, and the maximum number of actions (proposals) that an agenda stage lobbying strategy, λ_a, might elicit is infinite. Suppose there exist two distinct equilibria σ and σ' such that (λ_a, λ_v) are used in σ and (λ'_a, λ'_v) are used in σ'. Then λ_a (respectively, λ_v) is *at least as influential as* λ'_a (respectively, λ'_v) if and only if at least as many actions are elicited by λ_a (respectively, λ_v) as by λ'_a (respectively, λ'_v).

DEFINITION. An equilibrium σ^* is *most influential* if and only if the agenda stage lobbying strategy, λ^*_a, used in the equilibrium is at least as influential as the agenda stage lobbying strategy used in any other available equilibrium, and, *given* λ_a^*, the voting stage lobbying strategy, λ_v^*, is at least as influential as the voting stage lobbying strategy used in any other available equilibrium in which λ_a^* is used.

In what follows, the focus is on most influential equilibria. Given the lexicographic structure of the definition, such equilibria always exist. (A justification for defining "most influential" in this way is given below.)

3. Two Benchmarks

Before proceeding to results from the model, it is useful to identify two benchmark cases in which the lobbyist plays no role. In the first, there is full information: in particular, both C and H know the true value of t. And in the second, the committee is fully informed, but the House and lobbyist are uninformed. The former case has been much studied in the structure-induced equilibria literature (e.g., Denzau and MacKay 1983), and the latter case is analyzed in Gilligan and Krehbiel (1987).

Figure 2 illustrates the equilibrium proposals and outcomes for the full information case. In equilibrium, the committee proposes its most favored alternative from the set of policies that both C and H prefer to the status quo. When this set is empty, C may propose any policy that it prefers to s, knowing it will be rejected; in Figure 2, it is assumed that in such cases C simply proposes the status quo.

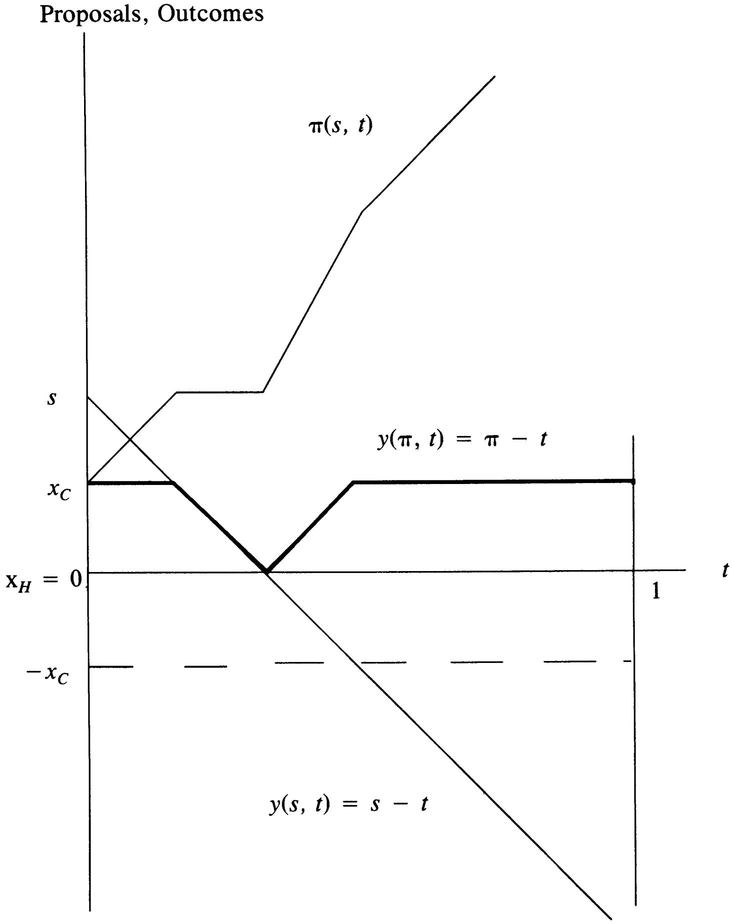
If no agent is informed, then the equilibrium policy proposal and expected outcome for any s can be read off from Figure 2 by setting t equal to its expected value. The situation is more complicated for the asymmetric information case. Gilligan and Krehbiel (1987) demonstrate that the most influential equilibrium (suitably defined for this case) is of the form illustrated in Figure 3.

For small and large values of t, the committee's equilibrium proposal reveals all the information, and C is able to extract all of its monopoly agenda-setting rents as in the full information case. For intermediate values of t, however, this is not so. In particular, the committee is unable credibly to offer any proposal for $t \in (s, s + x_C)$ that can defeat the status quo. In the full information case, there is such a proposal for every t in this range, and all of these proposals have an equilibrium outcome equal to $t - s$.

4. Results

In what follows, let σ^* denote an arbitrary equilibrium. Unless explicitly stated otherwise, equilibrium statements refer to most influential equilibria. Formal statements of, and proofs for, results are contained in the appendix.

Figure 2. *C, H* Fully Informed

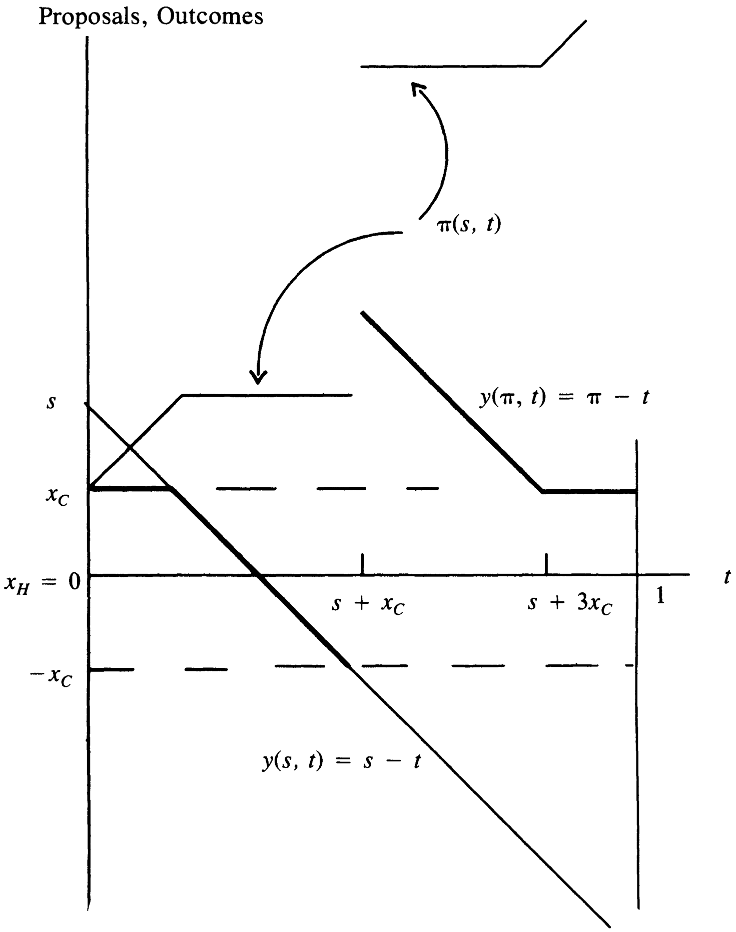


The first two results, although of some independent interest, serve principally to simplify finding equilibria.

> LEMMA 1: The House, H, never randomizes in equilibrium. In particular, if there is no influential lobbying at the voting stage, then H chooses the committee's proposal whenever H is indifferent between that proposal and the status quo.

Despite being essentially technical, Lemma 1 does have some substantive implications for the predicted pattern of vote stage lobbying, and these are discussed later.

Figure 3. *C* Fully Informed, *H* Uninformed



LEMMA 2: There exists no equilibrium in which L strictly prefers to acquire information at the vote stage rather than at the agenda-setting stage or not at all.

To all intents and purposes, therefore, if ever L chooses to become informed, then L does so at the agenda-setting stage of the game. Specifically, if waiting until the vote stage to purchase data is a best response, then it is also a best response to acquire the information at the agenda-setting stage. This is because waiting until the vote stage has no strategic or payoff-relevant implications for L, C, or H.

The next result is substantive, providing a simple characterization of the circumstances under which L can influence H's vote once the agenda has been set.

> PROPOSITION 1: Fix an agenda $\{b, s\}$. Then vote stage lobbying is influential if and only if
>
> $(b + s)/2 \geqslant x_L > (b + s - 2)/2$ *and* $(b + s)/2 \geqslant -x_L > (b + s - 2)/2$.
>
> The same result holds for $b < s$ with the inequalities reversed.

It is easily seen from this result that the closer are the lobbyist's preferences over consequences to those of the House ($x_H = 0$), the more likely it is that there can be influential vote stage lobbying.

Let $L(t)$ denote an informed lobbyist who has observed t and let $\hat{T}(b, s) \subseteq T$ be the subset of $L(t)$ that weakly prefer the status quo s to the alternative b; $\hat{T}(b, s) = \{t \in T \mid u_{L(t)}(b) \leqslant u_{L(t)}(s)\}$. Then the condition in Proposition 1 for $b > s$ is equivalent to $E_{\mu_H}[t \mid t \in \hat{T}(\cdot)] \leqslant (b + s)/2 < E_{\mu_H}[t \mid t \in T \backslash \hat{T}(\cdot)]$.[6] Thus, vote stage lobbying can influence the House's decision if and only if, first, the committee's proposal and the lobbyist's preferences jointly induce a division of types into "high" and "low," and, second, the midpoint between the committee's proposal and the status quo lies between the (conditional) expected "high" type and the expected "low" type. It follows easily from this characterization that if vote stage lobbying is influential, then, at the time of the vote, the House *always* has strict preferences over the agenda. To see this, simply note that indifference requires the two inequalities of Proposition 1 to be replaced by equalities.

The result is driven by the agenda consisting of at most two alternatives and by the fact that higher values of t induce the House to prefer higher bills. If the model were complicated by allowing longer agendas—for instance, through both majority and minority members of a heterogeneous committee being permitted to introduce alternative proposals (Gilligan and Krehbiel 1989)—then the characterization of influential vote stage lobbying would likewise become more complex. But in the one-dimensional setting, the basic qualitative structure of Proposition 1 is unaltered; each proposal on the agenda is associated with an interval of $L(t)$ that strictly prefer the proposal to any other available bill, and

[6] It is incorrect to infer from this equivalence that, say, $E_{\mu_H}[t \mid t \in \hat{T}(b, s)] = -x_L$. Furthermore, the equivalence holds only under the assumption of a uniform distribution of t on $T = [0, 1]$. For more general distributions, the inequalities in terms of expectations characterize influential vote stage lobbying, but those in terms of x_L do not: see the appendix for details.

lobbying can be influential only if, when all such types in favor of a given proposal send the same message to the House, the House's beliefs are updated sufficiently to lead it to support that proposal. Unlike with a binary agenda, however, vote stage lobbying with longer agendas might be influential over some pair of alternatives within the agenda but not over all pairs of alternatives.

Proposition 1 suggests that, from a strategic perspective, only two messages are given in vote stage lobbying. This suggestion is discussed momentarily; before doing so, it is convenient to consider how the committee responds to any agenda stage lobbying.

Not surprisingly, the committee's equilibrium behavior reflects the equilibrium strategy identified by Gilligan and Krehbiel (1987), illustrated in Figure 3. In particular, in a most influential equilibrium, as the ideal point x_L of an informed lobbyist converges to that of the committee, x_C, the committee's proposal strategy converges to the Gilligan and Krehbiel committee strategy. In general, however, the lobbyist and the committee will have distinct preferences over consequences, and so the number of proposals that can be elicited in equilibrium is finite. A partial characterization of the strategy is given in the appendix. For now, however, it suffices to report two facts. First, the committee will report a proposal that (ceteris paribus) induces the House to choose the status quo s, say $b = s$, only if the committee believes the expected value of t to lie within the interval $(s - x_C, s]$.[7] And second, unlike in the benchmark case where C has full information, there can exist at most one proposal in the interval $(s, s + 2x_C)$. This is due to the finite number of proposals that any agenda stage lobbying can elicit when it is L who is informed and $x_L \neq x_C$; the relevant incentive compatibility constraints are less demanding.

With Proposition 1, the partial characterization of the committee's proposal strategy yields the following claim.

Proposition 2: In any (not necessarily most influential) equilibrium:

(1) Informative agenda stage lobbying is *not* influential if, for any message n sent by L to C, $E_{\mu C}[t|n] \in [s - x_C, s]$; and only if, for any such message, $E_{\mu C}[t|n] \in [s - x_C, s + x_c]$. Consequently, agenda stage lobbying is rarely informative without being influential.

(2) Informative vote stage lobbying essentially involves only two messages.[8] Consequently, vote stage lobbying is often informative without being influential.

[7]Strictly speaking, C here can choose any policy that induces H to vote for s in the absence of any voting stage lobbying by L. To avoid irrelevant generalities (and having to make repeated qualifications during the exposition), it is assumed that C simply reports s.

[8]Formally: $\forall\, t \in \hat{T}(\cdot)$, $\lambda_v^*(t, \cdot) \in \hat{Z} \subset Z_H$; $\forall\, t' \notin \hat{T}(\cdot)$, $\lambda_v^*(t', \cdot) \in Z_H \backslash \hat{Z}$.

Proposition 2.1 follows from the committee being able to offer any proposal on the real line as an alternative to the status quo. Because of this, any informative lobbying by the interest group will lead the committee to update its beliefs about the true value of t and adjust its proposal accordingly. Unless all the information that could possibly be offered leads the committee to update its beliefs to expecting the true value of t to lie within $[s - x_C, s]$, then the proposal offered will typically be sensitive to the lobbyist's speech. In contrast, once the agenda is set, the House can do only one of two things: accept or reject the proposal. Consequently, all vote stage lobbying amounts to a speech either supporting the proposal or supporting the status quo; Proposition 2.2 then follows.

The argument above depends on legislative decision making being by closed rule. Under open rule, whereby the House can freely amend any proposal by the committee, the House's strategy space is identical to that of the committee (save for committee gatekeeping power). Hence, the substantive implication of Proposition 2 for the relative influence of lobbyists is attenuated. In effect, the distinction between the agenda-setting stage and the vote stage is blurred under open rule relative to that under closed rule.

Proposition 2 is consistent with the findings of Hall and Wayman (1991) and much of the literature on the impact of campaign contributions on legislative voting (e.g., Wright 1985). Focusing exclusively on the influence of campaign contributions, Hall and Wayman argue that any impact of money on political decision making is most likely to be found at the committee (agenda-setting) stage of the legislative process and not, as much of the empirical literature has considered, on the vote stage. Their empirical study supports this hypothesis. Proposition 2, although evidently not concerned with money, reflects their finding; to the extent that informational lobbying is influential, it is most likely to be so at the agenda-setting stage and not over vote behavior with respect to any given agenda. But whether or not the Hall and Wayman finding with respect to campaign contributions carries over to an informational setting, as Proposition 2 predicts, is an empirical issue.

As remarked above, Proposition 2 claims that essentially only two informative messages are sent to the House at the vote stage. Let the two messages sent with any equilibrium vote stage lobbying strategy be m and m'. Suppose for the moment that all informed types actively lobby H in the equilibrium (i.e., $m, m', \in M_H$). Then all $L(t)$ who strictly prefer the status quo to the alternative b make the same speech (from a strategic perspective); essentially the speech is "Given what I know, you should choose s." This speech is honest in that it correctly reveals $L(t)$'s preferences, but it gives coarse information; if H knows the value of t for sure, then H may well strictly prefer b to the status quo. However, if vote stage lobbying is influential then taking this into account still leads H to infer that choosing s is in H's best interest, and so H votes as recommended by L even though there is a positive probability that H will regret the decision ex post. Similarly, all $L(t)$ who prefer the proposal b make the speech, "Given what I know, you should choose b."

The theory asserts that there can be at most two informative messages sent at the vote stage (although such messages may be offered in a variety of more-or-less eloquent speeches). Suppose first that the agenda stage lobbying strategy is influential and that the committee is lobbied actively; hence, the resultant agenda consists of the status quo and a proposal selected on the basis of a message m in M_C. The House directly observes that the committee is actively lobbied, and, although the House cannot hear the message m, the committee's subsequent equilibrium proposal indirectly reveals m to H. Consequently, once the agenda is set, both the House and the committee share identical information about the true value of L's information, t. In particular, it is common knowledge that L is informed. Therefore, since lobbying is costless, the theory places no further restrictions on the messages that can be sent. In other words, those $L(t)$ preferring the status quo may elect to "stay home," and those supporting the proposal actively lobby H to reaffirm this support; or conversely; or both sorts of type may, as in the discussion of the preceding paragraph, actively lobby the House. Whatever the de facto pattern, the House will update its beliefs about which alternative is most in its interest and vote accordingly.

Now suppose that the agenda stage lobbying strategy is influential but that the committee is *not* lobbied actively; so, as Proposition 3 below makes clear, the alternative offered by the committee is based on an equivocal inference—the message "Not lobby" may mean that the lobbyist is uninformed or that he is informed and a type whose equilibrium strategy is to "stay home." In this case, given that vote stage lobbying is influential, one message that must be sent in equilibrium is "Not lobby"—an uninformed lobbyist necessarily "stays home." Consequently, Proposition 2.2 implies that if both those $L(t)$ favoring the status quo and those favoring the alternative actively lobby H, then one of these messages must lead H to update its beliefs in exactly the same way as it does when H is not lobbied at all. To all intents and purposes, therefore, H is actively lobbied here only by those $L(t)$ favoring one of the available alternatives on the agenda.

By Lemma 1, when the proposal is set optimally by the committee to make the House indifferent between s and b, H will, in the absence of any influential lobbying at the vote stage, choose b whenever $b \neq s$. For this reason, it is natural to presume, when vote stage lobbying *is* influential, that it is only the types favoring the status quo who lobby the House actively (i.e., $\lambda_v^*(t, \cdot) \in M_H$ for all $t \in \hat{T}(b, s)$ and $\lambda_v^*(t, \cdot) = \phi$ otherwise). Hereafter, adopt the convention that influential vote stage lobbying follows this pattern.

Although L can choose not to lobby C actively at the agenda stage, *not* lobbying C can itself constitute an informative signal to C. This follows from Proposition 3. Let $T°(s)$ denote the set of informed $L(t)$ who choose to "stay home" and not lobby the committee actively; $T°(s) = \{t \in T | \lambda_a^*(t, s) = \phi\}$.

PROPOSITION 3: Suppose $x_L \neq x_C$ and assume agenda stage lobbying is informative and most influential. Then $T°(s)$ is an interval; $T°(s) \notin \{\emptyset, T\}$; and $x_L > (<)\, x_C$ implies $E[t | t \in T°(s)] < (>)\, 1/2$ with $\lim_{|x_L - x_C| \to 0} \min[t \in T°(s)] = \lim_{|x_L - x_C| \to 0} \max[t \in T°(s)] = 1/2$.

That $T°$ is an interval follows from the lobbyist's most preferred proposal being monotonic in t, so that all equilibrium lobbying strategies must have a partition structure in which all types in a partition send the same message. Beyond this, the proposition says that unless the committee's and the lobbyist's preferences coincide, in any most influential equilibrium there are *always* informed $L(t)$ who choose not to lobby C actively. Consequently, given the lobbyist's data acquisition strategy is unobservable, C is necessarily unsure whether not being lobbied is because L is uninformed or because L is informed and choosing not to lobby. Given this, what C chooses to do when the agenda stage lobbying strategy is influential and C is not lobbied depends both on C's beliefs about the likelihood that L is informed and on which of the informed types will be members of $T°(s)$.

The remaining statements of Proposition 3 provide some qualitative information on $T°(s)$. First, it is the relatively "low" (respectively, "high") types who choose not to lobby when $x_L >$ (respectively, $<$) x_C.[9] And second, as L's preferences become more similar to C's, the set of types choosing not to lobby shrinks, becomes more centrist, and coincides in the limit with the type ($t = 1/2$) whose most preferred committee proposal is exactly what the committee would choose on the basis of the prior information only.

The intuition for Proposition 3 is fairly straightforward. Let $x_L > x_C$

[9]It should be emphasized that for some parameterizations there can exist equilibria in which, for example, "high" types do not lobby when $x_L > x_C$; but such equilibria cannot be the most influential.

and, for simplicity, suppose the status quo is sufficiently extreme to be irrelevant. Now suppose the committee, if it is not lobbied by L, (naively) assumes L is uninformed and so proposes an alternative based on the expectation that $t = 1/2$. Then an informed lobbyist with information that t is in fact somewhat smaller than 1/2, say $L(t)$, will choose "Not lobby." To see this, recall that, when $x_L > x_C$, L prefers a higher proposal than C for each value of t. Consequently, by "staying home," $L(t)$ induces a relatively better personal outcome than occurs if he or she reveals the information and induces C to offer a smaller proposal. Therefore, C's naive beliefs are inconsistent, and so C will (sophisticatedly) take account of the possibility that L is informed when C is not actively lobbied. In equilibrium, C's beliefs and $T°(s)$ must be consistent, and this cannot happen if $T°(s)$ includes all types (else the agenda stage lobbying strategy could not be informative, since only one message is ever sent), or if $T°(s)$ is empty (since then only an uninformed lobbyist "stays home," which, by the preceding discussion, cannot be consistent with influential agenda stage lobbying and diverse preferences). That it is "low" types who "stay home" when $x_L > x_C$ similarly follows from the fact that the lobbyist prefers more extreme policies than the committee for any value of t. And, finally, the intuition for the limiting behavior of $T°(s)$ is simply that C's and L's preferences are identical in the limit, so $L(1/2)$ "staying home" gives C exactly the same information as if $L(1/2)$ lobbied actively.

An immediate implication of Proposition 3 and the committee's best response proposal strategy is that, ceteris paribus, the committee's proposal consequent on not being lobbied is typically biased away from the proposal it would offer if there were no lobbyist at all. Specifically, let $\pi° \equiv \pi^*(\phi, s)$ denote the committee's proposal when the status quo is s and C is not actively lobbied (i.e., L "stays home"), and let $b(s)$ denote C's proposal if there is *no* influential lobbying at either the agenda-setting stage or the vote stage of the process. Then, for almost all s, $\pi°$ and $b(s)$ are distinct in any influential equilibrium. And note that influential vote stage lobbying alone is sufficient for an equilibrium to be influential. Consequently, even when all informed lobbyist types "stay home" at the agenda-setting stage, the fact that influential vote stage lobbying is possible leads the committee to propose a different alternative to that it would offer were there no influential lobbying at any stage of the process. In other words, it is possible for agenda stage lobbying not to be influential according to the definition, but for the committee's proposal to anticipate (and so be sensitive to) vote stage lobbying.

The game without a lobbyist surely possesses an equilibrium (see section 3) and so, as discussed in section 2 above, the game with a lobbyist also has an equilibrium, specifically, one in which L does not acquire information, and, if ever L does lobby C or H, L's messages are ignored. The relevant issue, then, concerns the circumstances under which there exists an influential equilibrium. Proposition 1 answers this question for voting stage lobbying strategies. Because the committee's strategy space is not finite, an analogous result for agenda stage lobbying strategies is less immediate.

PROPOSITION 4:
(1) Suppose $s \notin (-x_C, 1 + x_C)$. Then there exists an influential agenda stage lobbying strategy in equilibrium if and only if $|x_L - x_C| < 1/2$. When $s \in (-x_C, 1 + x_C)$, these conditions are necessary but not sufficient.
(2) There exists a unique equilibrium price $p^*(x_C, x_L, s)$ such that L chooses to become informed if and only if the realized price of information p is less than $p^*(\cdot)$.

Because $x_C > x_H \equiv 0$ by assumption, it follows from Propositions 1 and 4.1 that for some given distances between x_L and x_C, a lobbyist having $x_L > x_C$ can, ceteris paribus, be influential only at the agenda-setting stage whereas a lobbyist having $x_L < x_C$ can be influential both at the agenda setting and at the vote stage. In other words, if the committee's ideal point lies between that of a lobbyist and the House, then that lobbyist will in general have less (but not necessarily negligible) influence at the vote stage of the legislative sequence than one whose ideal point either lies between those of the committee and the House or lies beyond (but not too far beyond) that of the House. Similarly, if the House's ideal point lies between that of a lobbyist and the committee, then that lobbyist will in general have less influence at the agenda stage of the process than a lobbyist whose ideal point either lies between those of the committee and the House or lies beyond that of the committee.

Assuming it to be common knowledge that L has information, and assuming further that C is free to implement any policy it chooses (in effect, that H prefers the consequence x_C to the consequence $s - t$ for all $t \in T$), Crawford and Sobel (1982) prove that under the current assumptions there can exist an influential agenda stage lobbying strategy if and only if $|x_L - x_C| < 1/4$ (see also Gilligan and Krehbiel 1987). Because neither of the Crawford and Sobel assumptions hold, Proposition 4.1 is prima facie surprising. The intuition for the result lies in "Not lobby" being a distinguished message. If it is common knowledge that L is informed, then "Not lobby" is no different from an explicit speech; in equilibrium, C makes the identical inference about L's information as he or she would if L actively lobbied and delivered an appropriate speech. Thus, the upper bound of 1/4 is necessary to ensure that there is some separation of types who actively lobby C. However, when C is unsure whether not being lobbied means L is uninformed or informed but choosing to "stay home," there is no explicit speech in M_C that induces the same equilibrium inference. Consequently, even if all those $L(t)$ who actively lobby deliver the same message, so long as there exist some types who choose not to lobby, the agenda stage lobbying strategy is influential.

Propositions 3 and 4.1 together justify the lexicographic definition of "most influential" used in this paper: because "Not lobby" is itself an informative signal, the agenda stage lobbying strategy is necessarily influential whether L elects to speak directly to C.

Evidently, there can be active lobbying of H only if the status quo is not elicited by agenda stage lobbying. And Proposition 4 implies that if the committee and the lobbyist have sufficiently diverse preferences, then at most the voting stage lobbying strategy can be influential. Less transparent possibilities are given by Proposition 5.

PROPOSITION 5:
(1) Fix an agenda $\{b, s\}$. Then $x_L > 0$ and $s < b$ (or $x_L < 0$ and $s > b$) together imply that if there exist $L(t)$ who prefer the status quo s to the alternative b (i.e., $\hat{T}(b, s) \neq \varnothing$), then there exists an influential vote stage lobbying strategy;
(2) For some (x_L, x_C, s), there exist most influential equilibria in which *both* agenda stage and vote stage lobbying strategies are influential;
(3) Consider any most influential equilibrium in which both agenda stage and vote stage lobbying strategies are influential, and let π_1^* (respectively, π_N^*) be the lowest (respectively, highest) proposal elicited from the committee by agenda stage lobbying. Then (i) $s \notin [\pi_1^*, \pi_N^*]$ almost always, and (ii) if $x_L > x_C$ and the agenda stage lobbying strategy elicits only two proposals, then only those $L(t)$ who do *not* lobby the committee actively (i.e., $\lambda_a^*(t, s) = \phi$) are capable of inducing the House to vote for the status quo.

Proposition 5.1 gives a simple sufficient condition for voting stage lobbying strategies to be influential (whether agenda stage strategies are influential). Suppose, for example, the status quo is smaller than the committee's proposal, $s < b$, and let the lobbyist's ideal point be greater than that of the House; so for any value of t, L's most preferred policy is higher than that of the House. Then an informed lobbyist would only lobby H in favor of the lower policy alternative if the true value of t were indeed very low, in which case it is rational for H to respond positively to L's advocacy.

Proposition 5.2 says that influential agenda stage and influential voting stage strategies can coexist for some distributions of ideal points and the status quo, and Proposition 5.3 gives a partial description of such situations. Specifically, 5.3(i) claims that both lobbying strategies can be influential, first, only if the status quo s is not an elicited proposal in equilibrium and, second, only if all elicited proposals either lie above or lie below s. From Proposition 1, there can be no influential vote stage lobbying if the status quo is too extreme with respect to the House's and the lobbyist's ideal points. With 5.3(i), this implies that for influential lobbying at both stages to exist, the status quo must be an appropriate policy for the House to approve if t is known to be close to zero (implying s is close to the House's ideal point of zero) or close to one (implying s is close to one).

Proposition 5.3(ii) asserts that when both the agenda stage and the voting stage lobbying strategies are influential, and when the lobbyist is sufficiently more "extreme" than the committee that only two informative messages can be sent at the agenda stage, then it is not possible (in equilibrium) for an informed lobbyist to lobby the committee actively and induce a proposal, say b, and then go on to lobby the House successfully to vote for the status quo against b. In other words, given the restriction on ideal points and an agenda $\{b, s\}$ resulting from influential agenda stage lobbying, the set of $L(t)$ preferring s to b, $\hat{T}(b, s)$ invariably consists of informed types who do not actively lobby the committee (i.e., $\hat{T}(b, s) \subseteq T^{\circ}(s)$). Again using Proposition 1, the result implies that if some $L(t)$ actively lobby both the committee and the House (i.e., $\lambda_a^*(t, s) \neq \phi$ and $\lambda_v^*(t, b, s) \neq \phi$ for some $L(t)$) and is influential in both instances, then x_L must be "close to" x_H. And this is intuitive.

5. Examples

This section presents four numerical examples to illustrate the sorts of equilibrium phenomena identified above. In all of the examples with influential agenda stage lobbying strategies, the lobbyist's and the committee's ideal points admit more informative equilibria than is possible under the assumption that L is known to be informed. Throughout, σ^* denotes the most influential equilibrium strategies and numerical values are rounded to four decimal places.[10]

Example 1

In this example, the status quo is sufficiently extreme that there is no vote stage lobbying. So any influence L has is at the agenda-setting stage. And the example shows that L can have such influence, even

[10]Computational details for the examples are given in the appendix.

though the House's ideal point ($x_H = 0$) lies between that of the committee and the lobbyist. The intuition for this is that the status quo is set high and $x_L < 0$; so an informed lobbyist who knows t to be low has an incentive to lobby the committee actively and reveal this information. On the other hand, this incentive vanishes for "high" $L(t)$. Consequently, as claimed in Proposition 3, such $L(t)$ "stay home" and mimic the behavior of an uninformed lobbyist.

Specifically, let $s = 1 + x_C$, $x_C = 0.075$ and $x_L = -0.3$. Then σ^* is such that: $p^* = 0.0603$; $\lambda_a^*(t, s) = \phi \; \forall \; t \geqslant t_1^*$ and $\lambda_a^*(t, s) = m \in M_C$ $\forall \; t < t_1^*$, where $t_1^* = 0.8363$. Hence, $\pi^*(\phi, s) = 0.5794$ and $\pi^*(m, s) = 0.4931$. Because $s = 1 + x_C$ and $x_L < 0$, all informed $L(t)$ prefer the alternative to the status quo: $\hat{T}(\pi, s) = \varnothing \; \forall \; \pi \in \{\pi^*(\phi, s), \pi^*(m, s)\}$. Hence, $\lambda_v^*(\cdot) \equiv \phi$ and π is accepted.

Notice that if the committee were sure that L were uninformed, then it would choose $b = 0.575$ ($= x_C + Et$); and if it were sure L were informed, then on "hearing" the message "ϕ," it would choose $b' = 0.9932$ ($= x_C + E[t \mid t \geqslant t_1^*]$). However, since $0 < p^* < 1$, the message "ϕ" leaves C uncertain, and so the best response, taking account of L's equilibrium behavior, is to choose $\pi^*(\phi, s) \in (b, b')$. (This property recurs in subsequent examples.)

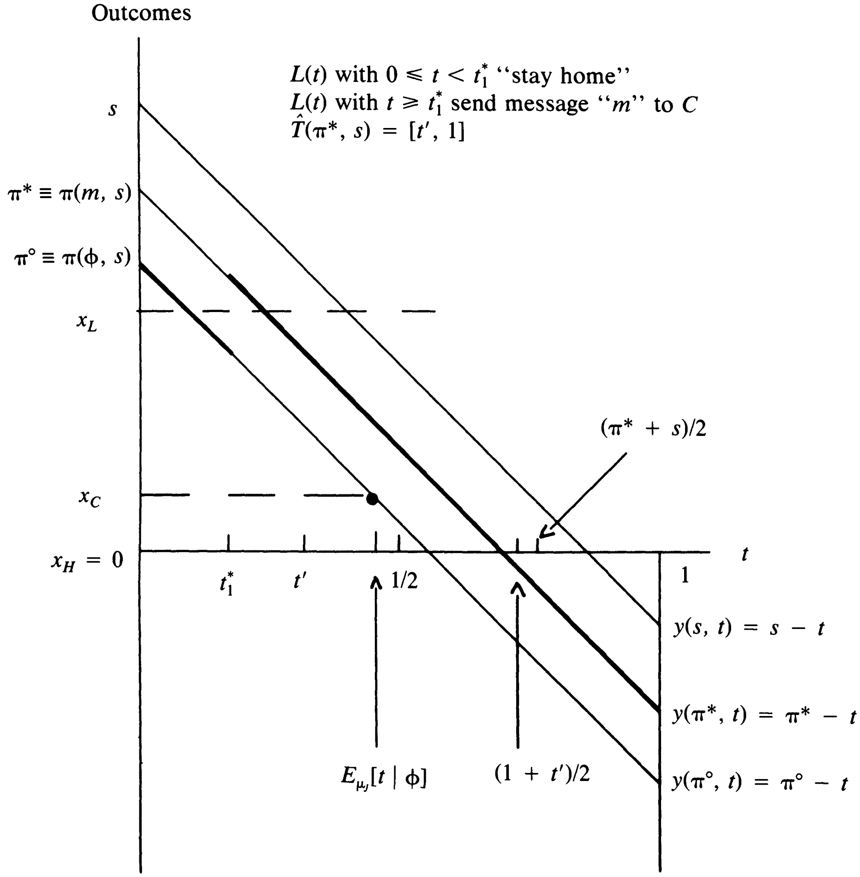
Example 2

The situation here is similar to that of Example 1 in that the status quo is high. However, the lobbyist is now relatively more extreme than the committee. In equilibrium there is influential agenda stage lobbying (and here, since $x_L > 0$, it is "low" $L(t)$ who mimic the uninformed lobbyist), and there can be some informative, but not influential, vote stage lobbying.

Let $s = 0.8$, $x_C = 0.125$ and $x_L = 0.5$. Then σ^* is such that: $p^* = 0.0603$; $\lambda_a^*(t, s) = \phi \; \forall \; t < t_1^*$ and $\lambda_a^*(t, s) = m \in M_C \; \forall \; t \geqslant t_1^*$, where $t_1^* = 0.1638$. Hence, $\pi^*(\phi, s) = 0.6207$ and $\pi^*(m, s) = 0.7069$. In this case, while no informed $L(t)$ prefers s to $\pi^*(\phi, s)$ (so $\hat{T}(\pi^*(\phi, s), s) = \varnothing$), there are $L(t)$ who prefer s to $\pi^*(m, s)$ (viz. $\hat{T}(\pi^*(m, s), s) = [0.2535, 1]$). However, by Proposition 1 (see also Proposition 5.3(ii)), there exists no influential voting stage lobbying strategy, since $E_{\mu H}[t \mid t \in \hat{T}(\pi^*(m, s), s)] < (s + \pi^*(m, s))/2$. So H votes for the proposal whether or not L lobbies H actively.

Nevertheless, given the agenda $\{\pi^*(m, s), s\}$, the vote stage lobbying strategy, $\lambda_v(t, \cdot) = n \; \forall \; t \in \hat{T}(\pi^*(m, s), s)$ and $\lambda_v(t, \cdot) = \phi$ otherwise, is informative, since $E_{\mu H}[t \mid n, \{(\pi^*(m, s), s\}] > E_{\mu H}[t \mid \phi, \{(\pi^*(m, s), s\}]$. Furthermore, given λ_v, the committee would like to alter its proposal (slightly) ex post (i.e., λ_v is also informative for the committee). Figure 4 illustrates the equilibrium.

Figure 4. Equilibrium in Example 2



Key:

= Outcome $y(., t)$, given L informed

● = C's and H's expected (t, outcome) given L "stays home" at the agenda stage

Example 3

In this example, both agenda stage and vote stage lobbying are influential, illustrating the claims of Proposition 5.

Let $s = x_L = 0.3$ and $x_C = 0.05$. Then σ^* is such that $p^* = 0.0789$; $\lambda_a^*(t, s) = \varnothing \; \forall \; t < t_1^*$ and $\lambda_a^*(t, s) = m \in M_C \; \forall \; t \geqslant t_1^*$, where $t_1^* = 0.3318$. Hence, $\pi^*(\phi, s) = 0.5478$, and $\pi^*(m, s) = 0.7159$. In this case, there are $L(t)$ that prefer the status quo to the proposal $\pi^*(\phi, s)$, $\hat{T}(\pi^*(\phi, s), s) = [0, 0.1239]$; and there are no $L(t)$ preferring the status quo to $\pi^*(m, s)$, $\hat{T}(\pi^*(m, s), s) = \varnothing$. By Proposition 1, there exists an influential voting stage lobbying strategy, since $E_{\mu_H}[t | t \in \hat{T}(\pi^*(\phi, s), s)] < (s + \pi^*(\phi, s))/2$. In particular, as predicted by Proposition 5.3(ii), it is those $L(t)$ who did not lobby the committee actively who now lobby the House actively; $\hat{T}(\pi^*(\phi, s), s) \subset T^\circ(s) = [0, t_1^*)$. The relevant vote stage lobbying strategy is thus $\lambda_v^*(t, \cdot) = n \in M_H \; \forall \; t \in \hat{T}(\pi^*(\phi, s), s)$, and $\lambda_v^*(t, \cdot) = \phi \; \forall \; t \in T \backslash \hat{T}(\pi^*(\phi, s), s)$. So H votes for s against $\pi^*(\phi, s)$ if and only if H is lobbied and hears the speech n, and votes against s in all other circumstances. Figure 5 illustrates the equilibrium. (It is worth observing here that the existence of influential vote stage lobbying biases the committee's proposals, relative to the case of no influential vote stage lobbying; this is a general property.)

Example 4

In contrast to Example 1, the situation here is one in which no influential agenda stage lobbying is possible, but there is influential vote stage lobbying. However, as remarked in the discussion following Proposition 3, the existence of influential vote stage lobbying per se is sufficient to bias the committee's proposal. For although the committee receives no information when choosing a proposal (all informed $L(t)$ "stay home"), C recognizes that different agendas will elicit different vote stage lobbying behaviors. Consequently, C trades off choosing a most preferred alternative on the basis of its prior information on t alone, against the likelihood that such a proposal will elicit successful lobbying on behalf of the status quo.

Let $s = 0$, $x_C = 0.4$, and $x_L = -0.2$. Then σ^* is such that $\lambda_a^*(\cdot) \equiv \phi$ (by Proposition 4.1); $p^* = 0.0734$; and C's best response is (see appendix) $\pi^*(\phi, s) = 0.6647$. (Note that $\pi^*(\phi, s) < b(s) = 0.9$.) However, $\hat{T}(\pi^*(\phi, s), s) = [0, 0.5324]$ and so $E_{\mu_H}[t | t \in \hat{T}(\pi^*(\phi, s), s)] = 0.2662 < (\pi^*(\phi, s) + s)/2 = 0.3324$. Therefore, by Proposition 1, there exists an influential voting stage lobbying strategy such that $\lambda_v^*(t, \cdot) \in M_H \; \forall \; t \in \hat{T}(\pi^*(\phi, s), s)$ and $\lambda_v^*(t, \cdot) = \phi$ otherwise. Figure 6 illustrates the equilibrium.

Figure 5. Equilibrium in Example 3

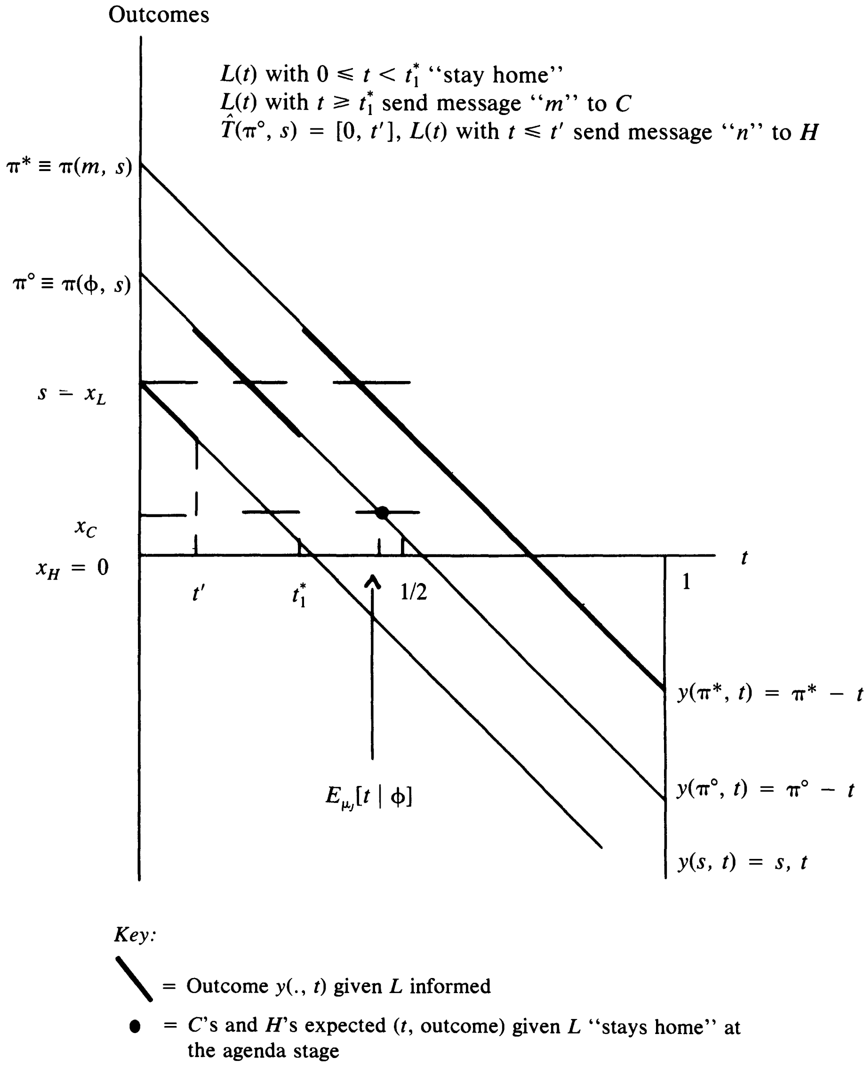
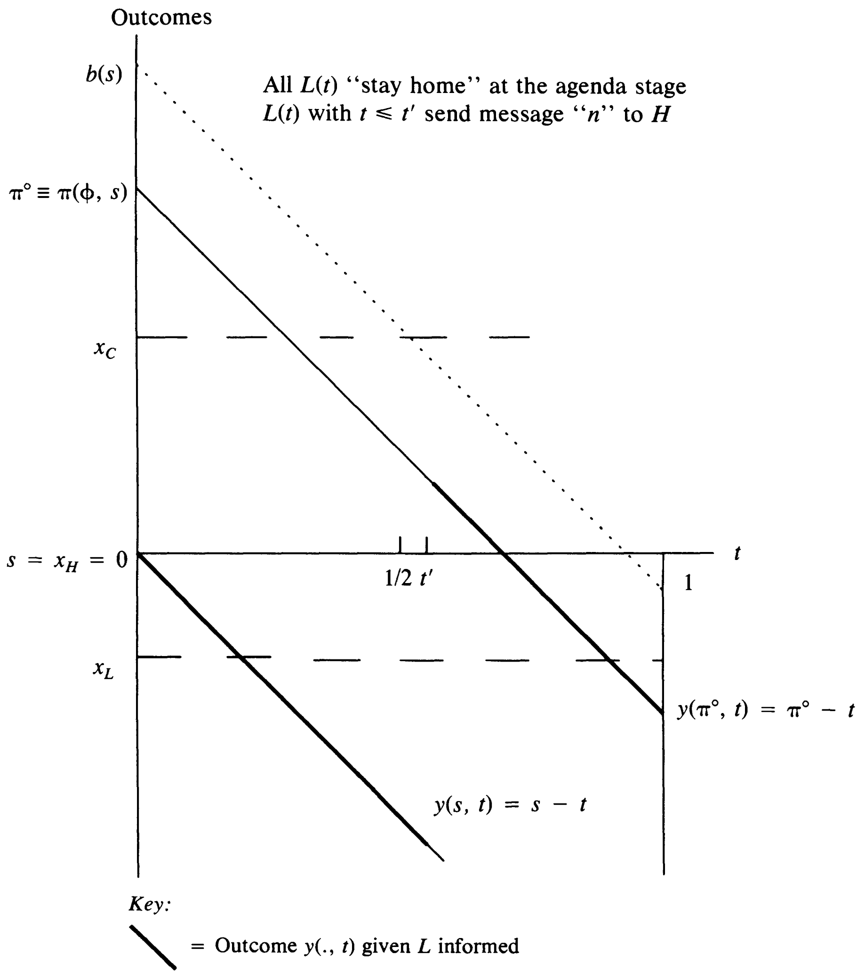


Figure 6. Equilibrium in Example 4



6. Conclusion

This paper is concerned with the extent to which interest group lobbying, modeled exclusively as information transmission, can be informative or influential at agenda-setting and voting stages of legislative decision making. Among the results are that informed lobbyists who choose not to lobby at the agenda stage are those whose information is "low" ("high") when L's ideal point in consequence is higher (lower) than that of the committee; that there can coexist influential lobbying at both stages of the process; that while informative agenda stage lobbying is generically influential, the same is not true of vote stage lobbying; that not all lobbyists will choose to become informed; and that uncertainty about whether a lobbyist has information can induce more information transmission than when there is no such uncertainty. And with the exception of the final claim, all of these results are more or less testable. More generally, the model suggests empirical work that focuses on lobbying patterns over the history of a bill's passage, from its formulation in committee to its treatment on the floor.

In the real world, there are many interest groups and legislators; uncertainty is often multidimensional; and groups and legislators interact through time, developing reputations and so forth. The model here is parsimonious in the extreme in these respects, and as such the results must be interpreted cautiously. Nevertheless, they are suggestive. In particular, while it is intuitive that legislators' information about whether a group is informed should affect the ability of a lobbyist to influence decision making, it is surprising that such uncertainty in principle leads to more influential behavior at the agenda-setting stage rather than less. Although by no means a test, the result is consistent with Hansen (1991), whose study reveals widespread transmission of information from the farm lobby—whose preferences over issues like price supports for agriculture are clearly biased away from those of the House as a whole—to legislators on committee.

Among the assumptions that it is desirable to relax is the assumption that the lobbyist may only lobby the committee, if anyone, at the agenda-setting stage. If the lobbyist chose to lobby only the House at the agenda-setting stage, the committee would make some inference about what information the lobbyist offered the House; and it may well be in the lobbyist's interests to induce such an inference. Similar issues arise if the group lobbies both the committee and the House at the agenda-setting stage. Since it is known that "who lobbies who" is important for legislators' decisions (Kingdon 1973), there is good empirical reason to extend the model in this way. However, I conjecture that without multiple sources of uncertainty, little would change with the qualitative results given here.

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APPENDIX

Definition of an Equilibrium: An *equilibrium* is a list of strategies $\sigma^* \equiv ((\delta_a^*, \lambda_a^*, \delta_v^*, \lambda_v^*), \pi^*, \nu^*)$ and a set of beliefs $\mu \equiv (\mu_C, \mu_H)$ such that:

(e1) $\forall\, p \in [0, 1]$, $\delta_a^*(p, s) = 1$ iff $E[u_L(\cdot)|\lambda_a^*, \lambda_v^*, \pi^*, \nu^*] - p \geq E[u_L(\cdot)|\delta_v^*, \lambda_v^*, \pi^*, \nu^*]$;

(e2) $\delta_a^*(\cdot) = 0 \Rightarrow \lambda_a^* \equiv \phi$; $\delta_a^*(\cdot) = 1 \Rightarrow \forall\, t \in T$, $\lambda_a^*(t, s) \in \underset{\lambda \in Z_C}{\operatorname{argmax}}\, E[u_L(\cdot)|t, \lambda_v^*, \pi^*(\lambda, s), \nu^*(\lambda, \pi^*, s)]$;

(e3) $\forall\, m \in Z_C$, $\pi^*(m, s) \in \underset{b \in \mathbb{R}}{\operatorname{argmax}}\, E_{\mu_C}[u_C(\cdot)|m, \delta_v^*(\cdot, b, s), \lambda_v^*(\cdot, b, s), \nu^*(\cdot, b, s)]$;

(e4) $\forall\, (p, b) \in [0, 1] \times \mathbb{R}$, $\delta_v^*(p, b, s) = 1$ iff, $\delta_a^*(p, s) = 0$ and $E[u_L(\cdot)|\lambda_v^*(\cdot, b, s), \nu^*] - p \geq E[u_L(\cdot)|\nu^*]$;

(e5) $\delta_a^* + \delta_v^* = 0 \Rightarrow \lambda_v^* \equiv \phi$; $\delta_a^* + \delta_v^* > 0 \Rightarrow \forall\, t \in T$, $\lambda_v^*(t, b, s) \in \underset{\lambda \in Z_H}{\operatorname{argmax}}\, E[u_L(\cdot)|t, \nu^*(\cdot, \lambda, b, s)]$;

(e6) $\forall\, (k, m, b) \in (\{C\} \cup \phi) \times Z_H \times \mathbb{R}$, $\nu^*(k, m, b, s) = 0\ (\in [0, 1])\ [= 1]$ as $E_{\mu_H}[U_L(b)|k, m, b] < (=)\ [>]\ E_{\mu_H}[U_L(s)|k, m, b]$;

(e7) μ_C and μ_H are derived from the priors and σ^* by Bayes Rule where defined.

Because H may only randomize in equilibrium if H is indifferent between the status quo and the committee's proposal, Lemma 1 in the text amounts to the following statement.

Lemma 1: Let $\pi^*(\cdot) = b$.

(1) If $\lambda_v^*(\cdot)$ is not influential then, $E_{\mu_H}[U_H(b)|k, m, b] = E_{\mu_H}[U_H(s)|k, m, b] \Rightarrow \nu^*(k, m, b, s) = 1$;

(2) If $\lambda_v^*(\cdot)$ is influential then, $E_{\mu_H}[U_H(b)|k, m, b] = E_{\mu_H}[U_H(s)|k, m, b] \Rightarrow \nu^*(k, m, b, s) \in \{0, 1\}$.

Proof of Lemma 1.1: This follows from sequential equilibria being subgame perfect: specifically, if $\nu^* \in (0, 1)$ then C can do better than b by choosing some proposal arbitrarily close to b that H strictly prefers to s; but then this is not a best response, since C's strategy space is $\mathbb{R}$; hence, the equilibrium requirement of mutual best responses implies H cannot randomize when indifferent (see, e.g., Banks and Gasmi 1987).

Lemma 1.2: Follows easily from Lemma 1.1 and the definition of most influential. QED

The formal statement of Lemma 2 is simply,

Lemma 2: $\delta_v^*(\cdot) = 0$ is always a best response.

Proof: Let $\pi°$ be the proposal C offers if C is not lobbied by L. Since C cannot verify that L is not informed, $\pi°$ will be offered irrespective of L's data acquisition decision. Since this is a pure strategy decision, $\pi°$ (in equilibrium) is fully anticipated by L. Therefore, because L is free to choose not to lobby C at the agenda stage and because the price of information is invariant between stages, L can never be made worse off by choosing to acquire information at the start of the process rather than after the agenda is set. QED

Proof of Proposition 1: Suppose $b > s$. Using equation (3), deduce:

$$u_j(b) > (\leq)\ u_j(s) \text{ as } E[t|\cdot] > (\leq)\ (b + s)/2 - x_j, \forall j \in \{C, H, L\}. \tag{A.1}$$

By (A.1), $\hat{T}(b, s) = \{t \in T | t \leq (b + s)/2 - x_L\}$. Let $\lambda_v(t, b, s) = n\ \forall\, t \in \hat{T}(b, s)$, and $\lambda_v(t, b, s) = \phi\ \forall\, t \in T \backslash \hat{T}(b, s)$, and suppose $\nu(\cdot, n, b, s) = 0 < \nu(\cdot, \phi, b, s) = 1$. By sequential rationality, $\lambda_v(\cdot)$ is a best response to H's strategy ν. And since t is uniformly distributed on $T = [0, 1]$,

$$E_{\mu_H}[t|n] = E_{\mu_H}[t|t \in \hat{T}(b, s)] = ((b + s)/2 - x_L)/2;$$
$$E_{\mu_H}[t|\phi] = E_{\mu_H}[t|t \notin \hat{T}(b, s)] = (1 + (b + s)/2 - x_L)/2.$$

Substituting these values into (A.1) for $x_j = x_H = 0$ and collecting terms yields the inequalities of Proposition 1; the result now follows from sequential rationality and Lemma 1.1. The case of $b < s$ follows similarly. QED

Proposition 2.1 follows directly from the committee's best response proposal strategy. In part, this is given by

LEMMA 3: Assume $\lambda_v(\cdot) \equiv \phi$. Fix $\lambda_a(\cdot)$ and $\forall\ m \in \cup_T \lambda_a(t, s)$, let $\hat{t}(m) \equiv E_{\mu_C}[t|m]$. Then,
(1) $\hat{t}(m) \notin (s - x_C, s + 3x_C) \Rightarrow \pi^*(m, s) = x_C + \hat{t}(m)$;
(2) There can exist at most one proposal $\pi^*(\cdot, s) \in (s, s + 2x_C)$;
(3) $[\pi^*(m', s) < \pi^*(m, s) \in (s, s + 2x_C)] \Rightarrow \hat{t}(m) - \hat{t}(m') \geq x_C$;
(4) $\hat{t}(m) \in (s - x_C, s] \Rightarrow \pi^*(m, s) = s$;
(5) $(\sim [\exists\ \hat{t}(\cdot) > s|\pi^*(\cdot, s) = s]) \Rightarrow \min[\pi^*(\cdot, s) \geq s + 2x_C] = x_C + \hat{t}(\cdot)$.

PROOF: Fix $\lambda_a(\cdot)$ and let $\hat{t}(m_1) \leq \hat{t}(m_2) \leq \ldots \leq \hat{t}(m_N)$. Then in equilibrium, (e3) requires the following incentive compatibility conditions to hold (whether or not vote stage lobbying is influential):

$$E_{\mu_C}[u_C(\pi^*(m_i, s))|\hat{t}(m_i), \cdot] \geq E_{\mu_C}[u_C(\pi^*(m_j, s))|\hat{t}(m_i), \cdot], \forall\ i, j. \tag{A.2}$$

Equations (A.2) and (3) easily yield

$$\pi^*(m_i, s) \leq \pi^*(m_{i+1}, s)\ \forall\ i = 1, \ldots, N - 1. \tag{A.3}$$

And, using (3), the inequalities (A.2) hold iff,

$$\hat{t}(m_i) \leq [\pi^*(m_i, s) + \pi^*(m_{i+1}, s)]/2 - x_C, \forall\ i = 1, \ldots, N - 1. \tag{A.4}$$

Finally, note that (e7) implies, in equilibrium, that H knows C's information is characterized by some $\hat{t} \in \{\hat{t}(m_i)|i = 1, \ldots, N\}$.

LEMMA 3.1: Let $\hat{t}(m_i) \leq s - x_C$. Then (A.1) implies $E[U_H(x_C)|\hat{t}(m_i)] \geq E[U_H(s - t)|\hat{t}(m_i)]$, and Lemma 1 implies H will vote for $\pi_i^* \equiv \pi^*(m_i, s) = x_C + \hat{t}(m_i)$ against s whenever this inequality holds. Therefore π_i^* is a best response so long as $E_{\mu_H}[u_H(\pi_i^*)|\pi_i^*] \geq E_{\mu_H}[u_H(s)|\pi_i^*]$. But since $\hat{t}(m_i) \leq s - x_C$, (A.3) and (A.4) directly imply this inequality. An identical argument applies for $\hat{t}(m_i) \geq s + 3x_C$.

LEMMA 3.2: Suppose not. Then $\exists\ \hat{t}(m_1), \hat{t}(m_2) \in (s, s + x_C)$ such that, by (e3), (e6), and Lemma 1, $\pi_1^* = 2\hat{t}(m_1) - s$ and $\pi_2^* = 2\hat{t}(m_2) - s$. By (A.4), therefore, $\hat{t}(m_1) \leq \hat{t}(m_1) + \hat{t}(m_2) - x_C - s$. But this means $s + x_C \leq \hat{t}(m_2)$: contradiction.

LEMMA 3.3: Let $\pi_i^* < \pi_{i+1}^* \in (s, s + 2x_C)$. Then, $\pi_{i+1}^* = 2\hat{t}(m_{i+1}) - s$ and:
$$\hat{t}(m_{i+1}) - \hat{t}(m_i) < x_C \Rightarrow 2\hat{t}(m_{i+1}) - s < 2\hat{t}(m_i) + 2x_C - s$$
$$\Rightarrow \hat{t}(m_i) > [\pi_{i+1}^* + s]/2 - x_C;$$
contradicting (A.4).

LEMMA 3.4: Let $\hat{t}(m_i) \in (s - x_C, s]$. Then there are no alternatives preferred to s by both C and H. Therefore, conditional on C's proposal signaling $\hat{t}(m_i)$, H will reject any proposal $b \neq s$ that C prefers to H. By (A.3) and (A.4), C has no incentive to make a proposal $\pi^*(m_j, s), j < i$. Wlog, let π_{i+1}^* be the smallest proposal greater than s; there are two possibilities. First, $\pi_{i+1}^* \in (s, s + 2x_C)$: but then Lemma 3.3 implies that C cannot profitably deviate. And second, $\pi^*_{i+1} > s + 2x_C$: C can profitably deviate here only if $\hat{t}(m_i) > [s + \pi^*_{i+1}]/2 - x_C$. By (A.3) and sequential rationality, $\pi^*_{i+1} \geqslant x_C + \hat{t}(m_{i+1})$. Therefore, C will only deviate from s if $\hat{t}(m_i) > [s + x_C + \hat{t}(m_{i+1})]/2 - x_C$ or, $2\hat{t}(m_i) - \hat{t}(m_{i+1}) > s - x_C$. But $\hat{t}(m_i) \leqslant s$ by assumption, so this last inequality implies $s + x_C > \hat{t}(m_{i+1})$. Hence, $\pi^*_{i+1} \in [s, s + 2x_C)$: contradiction.

LEMMA 3.5: Let $\pi^*_i = s$ and $\pi^*_{i+1} \geqslant s + 2x_C$. By assumption, $\hat{t}(m_i) \leqslant s$. If the claim is false then, by (A.4), $\hat{t}(m_i) > [s + \pi^*_{i+1}]/2 - x_C \geqslant s$: contradiction. QED

REMARK 1: When the vote stage lobbying strategy is influential the number of cases increases dramatically (recall, there are three independent parameters, $\{x_C, x_L, s\}$). In particular, given influential vote stage lobbying, the computation of the committee's expected payoffs as a function of its proposals becomes considerably more complicated. Exactly what is involved is illustrated later in the discussion of how Examples 3 and 4 are computed. Moreover, as the computations for these examples demonstrate, such biases are continuous in perturbations of the agenda stage lobbying strategy.

PROOF OF PROPOSITION 2: Proposition 2.1: Immediate from Lemma 3 and Remark 1.

Proposition 2.2: Clearly, at most two actions can be elicited at the voting stage. Hence, any message sent will be equivalent either to the speech "Choose b" or to the speech "Choose s"; so essentially only two messages can be sent in equilibrium. The second part of the proposition now follows from (A.1) (with $j = L$) and sequential rationality. QED

LEMMA 4: Assume $\lambda^*_a(\cdot)$ is influential. Then $T°(s) \neq T$; $T°(s)$ is an interval; and $T°(s) = \varnothing \Rightarrow \{t | \pi^*(\lambda^*_a(t, s), s) = \pi^*(\phi, s)\} \neq \varnothing$.

PROOF: Because $\lambda^*_a(\cdot)$ is influential, $T°(s) \neq T$ by definition of an influential strategy. Suppose $T°(s) = \varnothing$; then $\lambda^*_a(t, s) \neq \phi\ \forall\, t \in T$. Therefore, by (e7), if C is not lobbied C knows L is surely uninformed in which case $E_{\mu C}[t|\phi] = 1/2$. Let $\pi° \equiv \pi^*(\phi, s)$ be the equilibrium proposal conditional on C not being lobbied. Suppose, by way of contradiction, that $\pi^*(\lambda^*_a(t, s), s) \neq \pi°\ \forall\, t \in T$. Since $\lambda^*_a(\cdot)$ is influential, there exist at least two elicited proposals, say $\pi < \pi'$. Let π $[\pi']$ be the smallest [largest] proposals elicited by $\lambda^*_a(\cdot)$. By the supposition, either $x_L > \pi°$ and $\pi° < \pi$, or $x_L < \pi° - 1$ and $\pi' < \pi°$. To this, suppose $x_L \in [\pi° - 1, \pi°]$. Then $\pi° - x_L \in [0, 1]$, in which case $L(\pi° - x_L)$ strictly prefers not to lobby since, by (3), this yields the maximal payoff to $L(\cdot)$. If $x_L > \pi°$ and $\pi^*(\lambda^*_a(t, s), s) = \pi < \pi°$, then $L(t)$ is strictly better off deviating to "ϕ" and inducing $\pi°$. And similarly, if $x_L < \pi° - 1$ and $\pi^*(\lambda^*_a(t, s), s) = \pi' > \pi°$, then $L(t)$ is strictly better off deviating to "ϕ" and inducing $\pi°$. So assume $x_L > \pi°$ and $\pi° < \pi$. Condition (e2) implies the following incentive compatibility conditions on $\lambda^*_a(\cdot)$:

$$E[u_L(\pi^*(\lambda^*_a(t, s), s))|t, \cdot] \geqslant E[u_L(\pi^*(\lambda^*_a(t', s), s))|t, \cdot], \forall\, t, t' \in T. \tag{A.5}$$

And $\forall\, t, t'$ such that $\pi^*(\lambda^*_a(t, s), s) < \pi^*(\lambda^*_a(t', s), s)$, (A.5) holds iff,

$$\begin{aligned} &t \leqslant [\pi^*(\lambda^*_a(t, s), s) + \pi^*(\lambda^*_a(t', s), s)]/2 - x_L; \text{ and} \\ &t' \geqslant [\pi^*(\lambda^*_a(t, s), s) + \pi^*(\lambda^*_a(t', s), s)]/2 - x_L. \end{aligned} \tag{A.6}$$

Therefore, if $T' \subset T$ is such that $\pi^*(\lambda^*_a(t, s), s) = \pi^*(\lambda^*_a(t', s), s)\ \forall\, t, t' \in T'$, then T' must be an interval, as required. Let $t \in T_1$ send the message, say $m \in M_C$, that elicits π. Because π is the smallest actively elicited proposal, (A.6) implies $T_1 = [0, t_1)$ for some $t_1 < 1$. Since $T°(s) = \varnothing$, $E_{\mu C}[t|m] = t_1/2 < 1/2$. But (A.4) and $\pi° < \pi$ imply $E_{\mu C}[t|m] = t_1/2 > 1/2$: contradiction. The remaining case ($x_L < \pi° - 1$) follows similarly. So the supposition that $\pi^*(\lambda^*_a(t, s), s) \neq \pi°\ \forall\, t \in T$ must be false. This proves the lemma. QED

LEMMA 5: Suppose $x_L \neq x_C$ and assume $\lambda^*_a(\cdot)$ is most influential. Then $T°(s) \neq \varnothing$.

PROOF: Suppose not. Then by Lemma 4, $R(s) = \{t | \pi^*(\lambda_a^*(t, s), s) = \pi^\circ\} \neq \varnothing$. If $\lambda_a^*(\cdot)$ is an equilibrium strategy, then it is a partition strategy. Moreover, such strategies are essentially the only equilibrium strategies possible (Crawford and Sobel 1982). So given an equilibrium σ, let $\mathbb{P}(s, N(\sigma)) = \langle t_0 \equiv 0, t_1, t_2, \ldots, t_{N(\sigma)} \equiv 1 \rangle$ denote the partition of T such that $\lambda_a^*(t, s) = m_i \in Z_C \ \forall\ t \in [t_{i-1}, t_i)$ and $m_i \neq m_{i-1}$, $i = 1, \ldots, N(\sigma)$. And by (A.3), (A.4), and (A.6), $\mathbb{P}(s, N(\sigma))$ must satisfy

$$t_i = [\pi^*(m_i, s) + \pi^*(m_{i+1}, s)]/2 - x_L, \forall\, i = 1, \ldots, N - 1. \tag{A.7}$$

In particular, since $R(s)$ is an interval, say $[t_j, t_{j+1})$, $\lambda_a^*(t, s) = m_j \neq \phi\ \forall\ t \in R(s)$. Then from the argument for Lemma 4, $R(s) \neq \varnothing$ implies

$$E_{\mu C}[t | m_j] = E_{\mu C}[t | \phi] = 1/2. \tag{A.8}$$

Now suppose, first, that s is such that there can be no influential vote stage lobbying.[11] Then by Lemma 1 and (e3), the House always chooses the committee's proposal. Let $\Delta \equiv x_L - x_C > 0$ (a symmetric argument applies for $\Delta < 0$ and is omitted). By Lemma 3, $\pi^*(m_i, s) = \hat{t}(m_i) + x_C$, and (A.7) can be solved (Crawford and Sobel 1982) to yield the condition characterizing any equilibrium partition:

$$t_i = t_1 i + 2i(i-1)\Delta, \forall\, i = 1, \ldots, N, \tag{A.9}$$

with $t_0 \equiv 0$ and $t_N \equiv 1$. Since $\lambda_a^*(\cdot)$ is influential, $N \geqslant 2$; indeed, $N \geqslant 3$ since, by (A.8), $E[t | t \in R(s)] = [t_j + t_{j+1}]/2 = 1/2$. But (A.9) implies $t_{i+1} - t_i > t_i - t_{i-1}$, $\forall\, i = 1, \ldots, N - 1$. Therefore (A.8) cannot possibly hold. Hence, $T^\circ(s) \neq \varnothing$, proving the lemma when s is irrelevant. Now suppose s is such that vote stage lobbying can be influential. But then the result follows a fortiori, since (A.4) and (A.7) must continue to hold in equilibrium, and by Proposition 4.1 below, the maximal equilibrium partition size when s is relevant can be no greater than when s is irrelevant. QED

PROOF OF PROPOSITION 3: By Lemmas 4 and 5, it only remains to establish the claims on $E[t | t \in T^\circ(s)]$. Suppose $\Delta > 0$ (a symmetric argument applies for $\Delta < 0$ and is omitted) and set $T^\circ(s) = [t_j, t_{j+1})$. As for Lemma 5, it suffices to prove the claim when s is irrelevant; so assume this. By (e7),

$$\begin{aligned} E_{\mu C}[t | \phi] &= \text{prob}[L \text{ informed} | \phi][t_{j+1} + t_j]/2 + \text{prob}[L \text{ uninformed} | \phi] Et \\ &= (p(t_{j+1} - t_j)/[1 - p + p(t_{j+1} - t_j)])[t_j + t_{j+1}]/2 \\ &\quad + (1 - p)/[1 - p + p(t_{j+1} - t_j)])/2 \\ &= [1 - p + p(t_{j+1}^2 - t_j^2)]/2[1 - p + p(t_{j+1} - t_j)], \end{aligned} \tag{A.10}$$

where p is the equilibrium price above which L chooses not to acquire information (that this is well defined is proved below). Now, since s is irrelevant, Lemma 3 implies $\pi^*(\lambda_a^*(\cdot), s) = x_C + E_{\mu C}[t | \lambda_a^*(\cdot)]$, in which case (A.7) (which necessarily holds in equilibrium) and (A.10) can be solved to yield the system (*):

$$\begin{aligned} (*)\quad & t_i = t_1 i + 2i(i-1)\Delta, \forall\, i = 1, \ldots, j - 1; \\ & t_j = (t_{j-1} - 4\Delta + [1 - p + p(t_{j+1}^2 - t_j^2)]/[1 - p + p(t_{j+1} - t_j)])/3; \\ & t_{j+1} = (t_{j+2} - 4\Delta + [1 - p + p(t_{j+1}^2 - t_j^2)]/[1 - p + p(t_{j+1} - t_j)])/3; \\ & t_{j+1+i} = i(t_{j+2} - t_{j+1}) + t_{j+1} + 2i(i-1)\Delta, \forall\, i = 1, \ldots, N(\sigma^*) - j - 1, \end{aligned}$$

[11] In general, this will depend on the relative locations of s, x_L, and x_C. An unambiguous sufficient condition for influential vote stage lobbying to be impossible for all x_L is $s \notin (-(1 + x_C), (2 - x_C))$.

with $t_0 \equiv 0$ and $t_N \equiv 1$. It follows directly from this system and $\Delta > 0$ (in particular, from the fact that on $T \backslash T^\circ$, $t_{i+1} - t_i > t_i - t_{i-1}$) that in any most influential equilibrium, j is such that $[t_j + t_{j+1}]/2 < E_{\mu C}[t|\phi] < 1/2 < [t_{j+1} + t_{j+2}]/2$; and this establishes the claim on $E[t|t \in T^\circ]$. And as $\Delta \to 0$, the maximal partition size goes to infinity, and so all informed types separate in the limit; the last statement of Proposition 3 now follows from Lemma 4. QED

Proof of Proposition 4: By Crawford and Sobel (1982), if there exists an equilibrium in which $\lambda_a(\cdot)$ is influential, then there exists an equilibrium σ^* with $\mathbb{P}(s, N(\sigma^*)) = \langle 0, t(\sigma^*), 1\rangle$. Hence, it suffices to consider such binary partition equilibria. Moreover, since there always exist equilibria in which there is no influential vote stage lobbying, set $\lambda_v^*(\cdot) \equiv \phi$ wlog.

Proposition 4.1: Let $s \notin (-x_C, x_C + 1)$, and $\Delta \equiv x_L - x_C$. Suppose $\langle 0, t^\circ, 1\rangle$ is an equilibrium binary partition of T such that $\lambda_a(t, s) = \phi \ \forall\, t < t^\circ$, and $\lambda_a(t, s) = m \neq \phi \ \forall\, t \geqslant t^\circ$. By (A.3), $\pi^\circ \equiv \pi(\phi, s) < \pi \equiv \pi(m, s)$; and by (A.7), $t^\circ \in (0, 1)$ implies

$$t^\circ = [\pi^\circ + \pi]/2 - x_L. \tag{A.11}$$

Further, (e7) implies $E_{\mu C}[t|\phi] = [1 - p + pt^{\circ 2}]/2[1 - p + pt^\circ]$ and $E_{\mu C}[t|m] = (1 + t^\circ)/2$. By Lemma 1, (e1) implies

$$p = \int_{t^\circ}^{1} [U_L(\pi - t) - U_L(\pi^\circ - t)]\,dt = (\pi - \pi^\circ)(1 - t^\circ)^2, \tag{A.12}$$

with the second equality following on substitution from (A.11). By Lemma 3 and $s \notin (-x_C, x_C + 1)$, $\pi(\cdot, s) = x_C + \hat{t}(\cdot)$; so, $\pi^\circ = x_C + E_{\mu C}[t|\phi]$ and $\pi = x_C + [(1 + t^\circ)/2]$. Substituting into (A.11) and (A.12) and rearranging yields,

$$3t^\circ = [1 - 4\Delta + (1 - p + pt^{\circ 2})/(1 - p + pt^\circ)]; \tag{A.13}$$

$$p = p^2(1 - t^\circ) + t^\circ(1 - t^\circ)^2/2. \tag{A.14}$$

Then $\Delta \in (1/4, 1/2)$ implies:

$$t^\circ(0) = (2 - 4\Delta)/3 > 0 > t^\circ(1) = (1 - 4\Delta)/2.$$

Moreover, implicitly differentiating (A.13) and collecting terms yields

$$dt^\circ/dp = -(1 - t^\circ)t^\circ/[(1 - p + pt^\circ)(3(1 - p) + pt^\circ) + (p(1 - p + pt^{\circ 2})] < 0.$$

Finally,

$$p(0) = p(1) = 0; \text{and } \forall\, t^\circ \in (0, 1), 0 < p(t^\circ) < 1.$$

Therefore, $\forall\, \Delta \in (1/4, 1/2)$, $\exists (p(t^\circ), t^\circ(p)) \in (0, 1) \times (0, 1)$ solving (A.13) and (A.14). Mutatis mutandis, a symmetric argument shows that, $\forall\, \Delta \in (-1/2, -1/4)$, there can exist an influential equilibrium in which $\lambda_a(t, s) = m \neq \phi \ \forall\, t < t^\circ$, $\lambda_a(t, s) = \phi \ \forall\, t \geqslant t^\circ$. Since the number of elicited actions in a most influential equilibrium is nonincreasing in Δ, this establishes the required result for $s \notin (-x_C, x_C + 1)$. Clearly, if there exists no equilibrium when s is essentially irrelevant, there can exist no influential equilibrium agenda stage lobbying when s might be elicited; hence, the bounds derived above are necessary for such equilibrium strategies. To see that they are not sufficient, suppose $x_L = 3/4 - \varepsilon$, $\varepsilon > 0$ and small, and $x_C = 1/4$. Then $\Delta = 1/2 - \varepsilon$, and by the preceding argument, there is a unique influential equilibrium partition of T, $\langle 0, t^\circ, 1\rangle$, if, say, $s > 7/4$; furthermore, $\lambda_a(t, s) = \phi \ \forall\, t \leqslant t^\circ$ necessarily. By (A.13) and (A.14), $(t^\circ, p) \approx (0, 0)$, so $E_{\mu C}[t|\phi] = 1/2 - \eta$, $\pi(\phi, s)$

$= x_C + 1/2 - \eta$ and $\pi(m, s) = x_C + 1/2 + \eta'$, with $\eta, \eta' > 0$ and small. Now let $s = 1/2$. Then, $s - x_C = 1/4 < 1/2 - E_{\mu_C}[t|\phi] < s = 1/2$. But by Lemma 3, s will be elicited by $\lambda_a(t, s) = \phi$. Hence, $\langle 0, t^{\circ}, 1\rangle$ cannot be an equilibrium partition, in which case, if there is an influential equilibrium here, s must be elicited by the message ϕ. Let t' be the type indifferent between eliciting s and eliciting the proposal $(1 + t')/2$. By (A.11), $t' = 2[s - x_L + 1/2 - \Delta]/3$. Substituting, $t' = 2[2\varepsilon - 1/4]/3 < 0$, which is absurd. So there is no influential agenda stage lobbying in this case.

Proposition 4.2: Let $\{\pi_1^*, \pi_2^*, \ldots, \pi_N^*\}$ denote equilibrium proposals; where $\pi_i^* = \pi^*(m_i, s)$, $m_i \in Z_C$. Let $\mathbb{P}(s, N) = \langle t_0 \equiv 0, t_1, \ldots, t_N \equiv 1\rangle$ be such that $\forall\, t \in [t_{i-1}, t_i)$, $\lambda_a^*(t, s) = m_i \in Z_C$, $i = 1, \ldots, N - 1$, $m_i \neq m_{i-1}$. Set $m_j = \phi$. Then (e1) implies $\delta^*(p, s) = 1$ iff,

$$p \leqslant \sum_{i=1}^{i=N} \int_{t_{i-1}}^{t_i} U_L(\pi^*(m_i, s) - t)\,dt - \int_0^1 U_L(\pi_j^* - t)\,dt.$$

Since U_L is strictly concave and $\pi^*(\cdot)$ is a well-defined function of its arguments, the RHS of the inequality lies in $\mathbb{R}_+$ and is uniquely defined by the partition of T. QED

Proof of Proposition 5: Proposition 5.1: Follows straightforwardly from Proposition 1 and $x_H = 0$.

Proposition 5.2: See Example 3.

Proposition 5.3(i): Since σ^* is an equilibrium, (A.7) holds and implies that if s is elicited, then $\lambda_a^*(\cdot)$ and $\lambda_v^*(\cdot)$ cannot both be influential; so assume s is not elicited and $s \in (\pi_i^*, \pi_{i+1}^*)$ for some $i = 1, \ldots, N - 1$. Then by (A.1) and (A.7),

$$\hat{T}(\pi_i^*, s) = [(\pi_i^* + s)/2 - x_L, (\pi_i^* + \pi_{i+1}^*)/2 - x_L) \neq \varnothing; \text{and}$$
$$\hat{T}(\pi_{i+1}^*, s) = [(\pi_i^* + \pi_{i+1}^*)/2 - x_L, (s + \pi_{i+1}^*)/2 - x_L) \neq \varnothing.$$

By (A.7),

$$E_{\mu_H}[t|t \in \hat{T}(\pi_i^*, s)] < [\pi_i^* + s]/2 \Rightarrow E_{\mu_H}[t|t \in \hat{T}(\pi_{i+1}^*, s)] \leqslant [\pi_{i+1}^* + s]/2;$$
$$E_{\mu_H}[t|t \in \hat{T}(\pi_{i+1}^*, s)] > [\pi_{i+1}^* + s]/2 \Rightarrow E_{\mu_H}[t|t \in \hat{T}(\pi_i^*, s)] \geqslant [\pi_i^* + s]/2.$$

Wlog, assume the former case obtains: then $t \in \hat{T}(\pi_i^*, s)$ will deviate from the conjectured strategies by, first, sending the agenda stage message m_{i+1} to elicit $\pi^*(m_{i+1}, s)$ and, second, lobbying H with the vote stage message otherwise sent by $t \in \hat{T}(\pi_{i+1}^*, s)$ to elicit (by Proposition 1) a vote for s against π_{i+1}^*. Therefore, neither of the cases above can occur; that is,

$$E_{\mu_H}[t|t \in \hat{T}(\pi_{i+1}^*, s)] \leqslant [\pi_{i+1}^* + s]/2 \text{ and } E_{\mu_H}[t|t \in \hat{T}(\pi_i^*, s)] \geqslant [\pi_i^* + s]/2$$

must hold. But given (A.7) and s exogenous, this is nongeneric.

Proposition 5.3(ii): Let $x_L > x_C$ and consider a most influential equilibrium σ^* in which exactly two committee proposals are elicited by $\lambda_a^*(\cdot)$. let $\Pi = \{\pi^{\circ}, \pi^*\}$ be the proposals, where $\pi^{\circ} \equiv \pi^*(\phi, s)$; by Proposition 3 and $x_L > x_C$, $\pi^{\circ} < \pi^*$. Since $\lambda_v^*(\cdot)$ is influential by assumption, $s \notin \Pi$. By Proposition 5.3(i), $s \notin [\pi^{\circ}, \pi^*]$. Now suppose the result is false, so $s > \pi^*$. Then, since $s \notin \Pi$, $\pi^* = \pi^*(m, s)$ with $m = \lambda_a^*(t, s) \in M_C\ \forall\, t \in [t_1, 1]$. By $\lambda_v^*(\cdot)$ influential, $\exists\, t' > t_1$ such that: $\forall\, t \in [t', 1]$, $\lambda_v^*(t, \pi^*, s) = n \neq \phi$; $\forall\, t < t'$, $\lambda_v^*(t, \pi^*, s) = \phi$; and $\nu^*(C, n, \pi^*, s) = 0 < \nu(C, \phi, \pi^*, s) = 1$. (In words, there exists a set of $L(t)$ that actively elicit a proposal (specifically, π^*) at the agenda stage, some of which subsequently actively lobby the House to secure a vote for the status quo against π^*.) By (A.1), $t' = (s + \pi^*)/2 - x_L$. By (A.7), $t_1 = (\pi^{\circ} + \pi^*)/2 - x_L$. But by (e7), on hearing the agenda stage message "m," C knows for sure that L is informed. So given the partition $\langle 0 \equiv t_0, t_1, t_N \equiv 1\rangle$, C knows for sure that s will be the outcome if $L(t)$ is such that $t \geqslant t'$; in particular, given $\{s, \pi^\circ, \pi^*\}$, t' is common knowledge and a known function of π^*. Hence, sequential rationality requires

$$\pi^* \equiv \underset{b}{\operatorname{argmax}} \cdot \operatorname{Prob}[t \leqslant t' \mid \delta^*(p) = 1, t \geqslant t_1]. E_{\mu C}[u_C(b) \mid t_1 \leqslant t \leqslant t'] + \operatorname{prob}[t > t' \mid \delta^*(p) = 1, t \geqslant t_1]. E_{\mu C}[u_C(s) \mid t' < t \leqslant 1].$$

Clearly, $\pi^* \leqslant \underset{b}{\operatorname{argmax}}.\ E_{\mu C}[u_C(b) \mid t_1 \leqslant t \leqslant 1] \equiv b(t_1)$, C's best response if $\lambda_v^*(\cdot)$ is not influential. By (A.1) and $x_L > x_C > 0$, therefore, if ever both $\lambda_a^*(\cdot)$ and $\lambda_v^*(\cdot)$ can be influential as specified here, then they must be so when s is such that $t' = 1 - \varepsilon$, $\varepsilon > 0$ and arbitrarily small. For ε sufficiently small, $t' \approx 1$, $\operatorname{prob}[t > t' \mid \cdot] \approx 0$, and so $\pi^* \approx b(t_1)$. Consider $s = 2(1 + x_L - \varepsilon) - b(t_1)$. Then $s > \pi^*$. (If not, $s \leqslant \pi^* \leqslant b(t_1)$, implying $(1 + x_L - \varepsilon) \leqslant b(t_1)$. Now $b(t_1) < 1 + x_C$ by (e3), so $(1 + x_L - \varepsilon) < 1 + x_C$; but this is impossible since $\varepsilon \approx 0$ and $x_L > x_C$.) By Proposition 1, $\lambda_v^*(\cdot)$ influential implies,

$$1 - x_L > (\pi^* + s)/2 \approx (b(t_1) + s)/2 = 1 + x_L - \varepsilon.$$

Hence, $x_L < \varepsilon/2$. But $\varepsilon \approx 0$ by construction and $x_C > 0$. Therefore, $\lambda_v^*(\cdot)$ cannot be influential here: contradiction. QED

Computational Details for the Examples

Examples 1 and 2 are computed by first assuming x_L and x_C are such that the most influential equilibrium involves a binary partition at the agenda-setting stage and presuming that the status quo is irrelevant. Then by Lemma 3, the committee will choose $\pi^*(m, s) = x_C + \hat{t}(m)$. The equilibrium partitions $\langle 0, t^\circ, 1\rangle$ and associated proposals are then derived using the equilibrium conditions (A.11) through (A.14) (mutatis mutandis). For Example 2, the status quo is then chosen to ensure informative but not influential vote stage lobbying, for in this case the committee's proposal choices are unaffected. Deriving Examples 3 and 4, as indicated in Remark 1, is somewhat more complex. Consider Example 3; the technique for Example 4 is similar and omitted here.

As before, first assume $x_L > x_C$ such that the most influential equilibrium agenda lobbying strategy is binary, say $\langle 0, t^\circ, 1\rangle$. Let $\pi^\circ \equiv \pi^*(\phi, s)$ and $\pi \equiv \pi^*(m, s)$ where, by Proposition 3, $\lambda_a^*(t, s) = \phi\ \forall\ t < t^\circ$ and $\lambda_a^*(t, s) = m\ \forall\ t \geqslant t^\circ$. So $\pi^\circ < \pi$. Since $\lambda_v^*(\cdot)$ is to be influential, Proposition 5 and (A.1) yield $s < \pi^\circ$ and $\lambda_v^*(t, \pi^\circ, s) = n\ \forall\ t \leqslant t' \equiv (s + \pi^\circ)/2 - x_L$, $\lambda_v^*(t, \cdot) = \phi$ otherwise. Because $s < \pi^\circ < \pi$, it follows from Lemma 3 that $\pi = x_C + (1 + t^\circ)/2$. By (A.7), $t^\circ = (\pi^\circ + \pi)/2 - x_L$. Hence, we can write (in equilibrium) π as a function of π° and $\underline{x} = (x_L, x_C)$: $\pi = \pi(\pi^\circ, \underline{x})$. Now, (e7) implies

$$\operatorname{prob}[L \text{ informed} \mid \phi] = pt^\circ/[1 - p + pt^\circ].$$

And since $\lambda_v^*(\cdot)$ is influential, s will be the outcome if H hears the message n when the agenda is $\{\pi^\circ, s\}$. So given $\{s, \pi^\circ, \pi\}$, the argument for Proposition 4.2 yields

$$p = (\pi^\circ - s)t'^2 + (\pi - \pi^\circ)(1 - t^\circ)^2.$$

Hence, we can write p (in equilibrium) as a function of π°, $\underline{x}$, and s: $p = p(\pi^\circ, \underline{x}, s)$. Hence, $\operatorname{prob}[L \text{ informed} \mid \phi]$ can also be written $P = P(\pi^\circ, \underline{x}, s)$. Finally, note

$$\operatorname{prob}[t \leqslant t' \mid \lambda_a^*(t, s) = \phi \text{ and } L \text{ is informed}] = t'/t^\circ,$$

which (in equilibrium) can be written $Q = Q(\pi^\circ, \underline{x}, s)$. Given these substitutions (legitimate only in equilibrium) and assuming influential vote stage lobbying for sure, consider the program:

$$\max_{\pi^\circ} . V(\pi^\circ, \underline{x}, s) \equiv P.\{Q. E_{\mu_C}[u_C(s)|t \leq t'] + (1 - Q). E_{\mu_C}[u_C(\pi^\circ)|t \in (t', t^\circ)]\} + (1 - P). E_{\mu_C}[u_C(\pi^\circ)|t \in T].$$

This problem is solved numerically for the parameterization ($\underline{x}$, s) given in the text. The implied values for t°, t', p, and π are then recovered from the solution (which is unique given $\pi^\circ \in [0, 1]$). By construction, these values constitute an equilibrium so long as the implied value of $(\pi^\circ + s)/2$ satisfies the conditions for influential vote stage lobbying (cf. Proposition 1); and it does. QED

REFERENCES

Austen-Smith, David. 1990. "Information Transmission in Debate." *American Journal of Political Science* 34:124–52.

———. 1993. "Interested Experts and Policy Advice: Multiple Referrals under Open Rule." *Games and Economic Behavior,* 5:3–43.

Austen-Smith, David, and John R. Wright. 1992. "Competitive Lobbying for a Legislator's Vote." *Social Choice and Welfare* 9:229–57.

Banks, Jeffrey, and Farid Gasmi. 1987. "Endogenous Agenda Formation in Three-Person Committees." *Social Choice and Welfare* 4:133–52.

Crawford, Vincent, and Joel Sobel. 1982. "Strategic Information Transmission." *Econometrica* 50:1431–51.

Denzau, Arthur, and Robert MacKay. 1983. "Gatekeeping and Monopoly Power of Committees: An Analysis of Sincere and Sophisticated Behavior." *American Journal of Political Science* 27:740–61.

Farrell, Joseph. 1993. "Meaning and Credibility in Cheap Talk Games." In *Mathematical Models in Economics,* ed. Michael Bacharach. Oxford: Oxford University Press.

Farrell, Joseph, and Robert Gibbons. 1989. "Cheap Talk with Two Audiences." *American Economic Review* 79:1214–23.

Gilligan, Thomas, and Keith Krehbiel. 1987. "Collective Decision Making and Standing Committees: An Informational Rationale for Restrictive Amendment Procedures." *Journal of Law, Economics, and Organization* 3:145–93.

———. 1989. "Asymmetric Information and Legislative Rules with a Heterogenous Committee." *American Journal of Political Science* 33:459–90.

———. 1990. "Organization of Informative Committees by a Rational Legislature." *American Journal of Political Science* 34:531–64.

Hall, Richard, and Frank Wayman. 1990. "Buying Time: Moneyed Interests and the Mobilization of Bias in Congressional Committees." *American Political Science Review* 84:797–820.

Hansen, John M. 1991. *Gaining Access: Congress and the Farm Lobby, 1919–1981.* Chicago: University of Chicago Press.

Kingdom, John. 1973. *Congressmen's Voting Decisions.* New York: Harper and Row.

Okuno-Fujiwara, Masahiro, Andrew Postlewaite, and Kotaro Suzumura. 1990. "Strategic Revelation of Information." *Review of Economic Studies* 57:25–48.

Rothenberg, Larry. 1989. "Do Interest Groups Make a Difference? Lobbying, Constituency Influence and Public Policy." Working Paper, University of Rochester.

Wright, John R. 1985. "PACs, Contributions, and Roll Calls: An Organizational Perspective." *American Political Science Review* 79:400–14.