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Legislative committees as information intermediaries: A unified theory of committee selection and amendment rules☆

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ABSTRACT

This paper considers a model of legislative decision-making, in which information must be collected from a strategic lobbyist. The legislature appoints a committee to communicate with the lobbyist and propose a bill, and determines whether the proposal is processed under open or closed rule. Consistent with empirical evidence, it can be optimal for the legislature to appoint a biased committee and, depending on the lobbyist's bias, both open and closed rule are used in equilibrium. For small lobbyist bias, it is optimal to choose closed rule and a committee whose interests are perfectly aligned with the lobbyist's. For intermediate lobbyist bias, closed rule remains optimal with a committee whose preferences lie between those of the legislature and those of the lobbyist. For large lobbyist bias, open rule and a committee biased against the lobbyist become optimal.

1. Introduction

Many aspects of legislative decision-making, despite being discussed at length in the political science literature, remain only partially understood in scholarly research. For instance, why do legislative bodies sometimes limit their involvement bygranting restrictive rules to amending proposals, thereby giving specialized committees agenda-setting power? Moreover, given the power committees are granted, whydo legislative bodies appoint preference outliers (members whose preferences are strongly biased, relative to the median legislator)?.[1]

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[1] There is an ongoing debate about the extent to which committees are biased. However, most scholars agree that at least some committees consist of preference outliers, and some argue that this is a feature of most committees. Ray (1980), Weingast and Marshall (1988), Dion and Huber (1996) present results indicating that many or most committees consist of outliers, while Krehbiel (1990, 1991) and Cox and McCubbins (1993) find there is no convincing evidence that committees systematically consist of preference outliers. Poole and Rosenthal (1997) find a dramatic shift toward less representative committee contingents among democratic representatives after the 83rd House, concentrated in four committees: Agriculture, Armed Services, Veterans' Affairs, and Education and Labor.

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Motivated by these questions, we analyze a model involving both procedural rule and committee selection, in following tradition of informational theories of legislative committees, started by the seminal paper of Gilligan and Krehbiel (1987; hereafter GK).[2] Our analysis builds on recent developments in the game theoretic literature of intermediated communication and delegation (Dessein, 2002; Ivanov, 2010, and Ambrus et al. (2012; hereafter AAK)). We assume that, initially, an outside interest group (lobbyist) has information that is relevant to the legislature for a new piece of legislation. The lobbyist is a strategic actor whose preferences are biased relative to the legislature. The legislature can appoint a committee, with preferences possibly differing from its own, to act as an information intermediary between itself and the lobbyist. More concretely, the committee communicates with the lobbyist and then makes a proposal to the legislature. Besides selecting the committee, we also assume that the legislature can ex ante choose whether to process the ensuing legislation through open rule or closed rule.[3] Under open rule, the legislature retains the right to decide upon the legislation that ultimately becomes law (for ease of exposition, we will say 'choose the action' from hereafter) Hence, the committee's proposal only represents cheap talk from the committee to the legislature. Under closed rule, the legislature essentially delegates the right to choose an action to the committee. We are interested in the optimal committee and procedural rule chosen by the legislature, as a function of the lobbyist bias.[4]

Our main findings are as follows. If the lobbyist bias is small, then it is optimal for the legislature to grant closed rule and appoint a committee whose preferences are perfectly aligned with the lobbyist's. For intermediate levels of lobbyist bias, it remains optimal for the legislature to grant closed rule, but with a committee whose preferences are only partially aligned with the lobbyist's; that is, whose preferences lie strictly between the legislature's and the lobbyist's. Finally, when the lobbyist's bias is large enough, it is optimal for the legislature to choose open rule and appoint a committee biased against the lobbyist.[5] Our model thus accounts for both why the legislature wants to form biased committees, and for why some bills are passed under closed rule while others are passed under open rule.

Our results shed light on the mixed empirical findings regarding the relationship between committee bias and the use of either open or closed rule. In a series of papers, Dion and Huber (1996, 1997) and Krehbiel (1997a,b) offer mixed evidence, sometimes finding a positive, sometimes a negative, and sometimes an insignificant effect of the magnitude of committee bias on rule selection.[6] This is consistent with our finding that there is no simple relationship between the magnitude of committee bias and the chosen procedural rule. The optimality of either closed or open rule is compatible with either small or large committee bias.

One simple prediction of our model is that the optimal committee is never more biased, in absolute terms, than the lobbyist. Moreover, the committee is strictly less biased unless the lobbyist's bias is small. This is consistent with Poole and Rosenthal (1997) finding that lobbyists tend to be more extreme advocates of policy issues than committee members.

The intuition behind the main results can be summarized as follows. For small biases, the loss of the legislature from delegating the decision right is second-order, relative the loss caused by strategic communication, as pointed out in Dessein (2002).[7] For this reason, it is optimal to fully delegate the decision to the lobbyist. For intermediate biases, there is a nontrivial trade off between decreasing the committee's bias and decreasing the loss arising from strategic communication between

[2] Other theories of legislative committees include: (i) the distributive benefits theory, which argues that the power granted to committees is private benefit (pork) to the corresponding members of the legislature; (ii) the majority-party cartel theory, which argues that committees help the ruling party achieve its goals; and (iii) the bicameral rivalry theory, which argues that committees serve as hurdles in the legislative procedure that help legislators extract more rents from lobbyists. For a survey paper on the topic, see Groseclose and King (2001).

[3] We follow GK in assuming that the legislature can ex ante commit to a procedural rule. In practice, the Rules Committee decides what procedural rule to use after the committee submitted the proposal. However, as GK discusses, given that the Rules Committee makes procedural decisions repeatedly with high frequency, reputational concerns are thought to make it possible for the Rules Committee to act according to a precommitted rule of behavior that is ex ante optimal for the legislature. GK points out that this is also consistent with empirical evidence on the composition and decisions of the Rules Committee (see also Groseclose and King (2001)).

[4] An alternative modeling approach would be to assume that acquiring information requires effort on the committee members' part. Both Gerardi and Yariv (2008) and Che and Kartik (2009) point out that in settings with costly information acquisition, bias can increase incentives to gather information. In our model, there are no information acquisition costs; instead, we focus on the strategic aspects of acquiring information. Nevertheless, the resulting trade-offs are similar, since the committee is better informed, but more biased. The above papers do not investigate the interplay between open vs. closed rule (cheap talk vs. delegation) and the bias of the committee (agent). Hence, it is an open question whether a model of costly information acquisition could provide a theory of committee bias and amendment rules that is in line with the empirical observations.

[5] These findings are at odds with those in Li (2007), which is the first paper we are aware of that introduces a strategic outside expert into the legislative decision-making framework. Li (2007) only analyzes the case of open rule and only considers pure strategy equilibria. As a consequence, he finds that committees cannot facilitate better information transmission. Hence, the assumption of strategic outside experts does not lead to a theory of committees. Contrastingly, we show that committees can enhance information transmission both in the case of closed and open rule (in the latter case, when one allows for mixed strategies).

[6] Both Dion and Huber and Krehbiel have examined the effect of committee bias on the use of restrictive rules, using data from the 94–98th congress. They report results for different econometric specifications, subsamples and controls. The results are inconclusive and extremely sensitive to the specification. For example, Dion and Huber find a significant negative coefficient in one of their specifications, and both positive and negative insignificant coefficients in other specifications. Krehbiel finds a large, positive significant coefficient in one specification, but negative insignificant coefficients in others. The point estimates are also very different among specifications.

[7] Kydd (2003) makes the counterpart of this point in the context of mediating conflict resolution. He claims that a party involved in the conflict is more likely to believe a piece of information from a mediator if the latter is "on his side." As opposed to this, what matters in our model, in case of closed rule, is how close the committee's interests are to the lobbyist (the original source of information), not how close they are to the legislature (the ultimate recipient). Clearly, the important difference between our model and Kydd's is that, in the latter, the information transmission from the original source of information to the mediator is unmodeled.

the committee and the lobbyist. Lastly, for large biases, delegating the decision to a committee yields few benefits, as informative communication between the committee and the lobbyist would require an overly biased committee. However, intermediated cheap talk can have substantially in these cases (pointed out first by Ivanov (2010)), implying that open rule becomes optimal. For large biases the optimal intermediary is biased in the opposite direction than the lobbyist. An intermediary can thus ease the lobbyist's incentive constraints to reveal information. For example, a negatively biased budget committee can offset a positively biased interest group, by sometimes proposing a low budget even when the interest group's original request was high. This induces the legislature to allocate a relatively high budget even after low proposals from the committee, there by reducing the gap between the amount of money the legislature allocates when receiving a high vs. a low proposal from the committee. This makes a relatively low budget request more attractive for the interest group when their budget need is indeed low.

The central assumption in our model, namely that interest groups are those who originally possess the relevant information necessary for the new legislature, is in line with the way most scholars think about the legislative procedure and the role of lobbyists (see for example Rothenberg (1989) and Hansen (1991)).[8] In fact, in a typical situation, the first drafts of new bills tend to be written by interest groups before the relevant committee reworks it as a proposal. Lowi et al. (2010) summarize this point in the following way:

> "Interest groups also have substantial influence in setting the legislative agenda and in helping craft specific language in legislation. Today, sophisticated lobbyists win influence by providing information about policies to busy members of Congress. As one lobbyist noted, "You can't get access without knowledge. . . I can go into see [former Energy and Commerce Committee chair] John Dingell, but if I have nothing to offer or nothing to say, he's not going to want to see me." (p. 531)

Our model connects two strands of literatures: informational theories of interest groups and informational theories of legislative committees. The former strand of literature, surveyed in Austen-Smith (1997), abstracted away from the role of committees in the legislative process. Informational theories of committees, starting with GK, emphasize the role of committees in gathering specialized information and transmitting it to the legislative body. However, they do not model the gathering of information as interaction with a strategic lobbyist and instead focus on the information exchange between a committee and the legislature. Using the communication model of Crawford and Sobel (1982; hereafter CS), GK point out that if a committee's preferences differ from the median legislator, it does not want to truthfully transmit all information to the legislature. This can provide a rationale for closed rule, since it obligates the legislature to accept proposals that are biased toward the committee's preferences, inducing the committee to reveal more information. However, the model of GK does not explain why committees sometimes consist of preference outliers. If the committee and the legislature share the same preferences, strategic information transmission would not be an issue, invalidating the argument for the use of closed rule.[9]

The rest of the paper is as follows. Section 2 formally describes the model. In Section 3, we derive and discuss our main results. Section 4 considers two extensions of the main model. In the first extension, we assume that the bias of the committee is exogenous and that the legislature can only choose the procedural rule. In the second extension, we suppose the legislature can endogenously determine a status quo action in case of closed rule. Section 5 concludes.

2. Model

We consider a multi-stage game of legislative decision-making with three players: a lobbyist, a committee and the legislature. The outcome of the game is a policy action $x \in \mathbb{R}$. The players' preferences over available policy actions depend on an ex ante unknown state of the world $\theta \in [0, 1]$.

The respective payoffs of the legislature, the committee, and the lobbyist are given by $-l(x-\theta)$, $-l(x-\theta-b_C)$, and $-l(x-\theta-b_L)$. We assume that l attains its minimum at $l(0)=0$. Following standard terminology, we refer to l as the loss function. Note that, given θ, the legislature's optimal policy is θ, while the optimal policies of the lobbyist and the committee are given by $\theta+b_L$ and $\theta+b_C$. We refer to b_L and b_C as the biases of the lobbyist and the committee. Without loss of generality we assume $b_L \geq 0$ (the case of a negatively biased lobbyist is perfectly symmetric).

[8] An alternative view is that interest groups influence legislation directly by offering monetary contributions in exchange for policy outcomes they favor. This is reflected, for example, in Snyder (1991), Diermeier and Myerson (1999), and Grossman and Helpman (1999, 2001). Austen-Smith (1993a) offers a model in which monetary contributions grant interest groups access to politicians with limited time, but do not grant direct influence over policy decisions. For a survey covering both strands of the literature, see Austen-Smith (1997).

[9] Gilligan and Krehbiel (1989), Austen-Smith (1993b) and Krishna and Morgan (2001) investigate the possibility of heterogeneous committees, whose members can send separate messages to the legislature. Krishna and Morgan (2001) show that, in the case of oppositely biased committee members, there exist equilibria in which the committee reveals full information to the legislature. Nevertheless, the Plausibility of such equilibria is questioned in several papers, starting with Krehbiel (2001). Moreover, it is still puzzling why the legislature would ever appoint a heterogeneous committee of biased members and try to induce a relatively complicated truthtelling equilibrium, rather than simply appoint a homogeneous committee with the same preferences as the legislature.

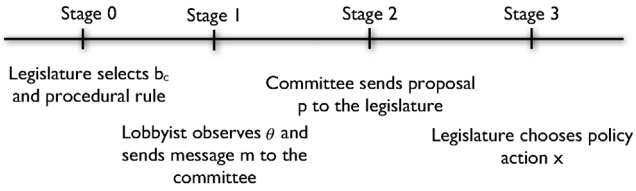

Fig. 1. The model's timeline.

Throughout the main text we restrict attention to the case when $\theta \sim U([0,1])$ and $l(y) = y^2$ (this specification is introduced by CS and often referred to as the uniform-quadratic specification). In a Supplementary appendix we investigate how the qualitative conclusions we derive extend to more general specifications.

We assume that the distribution of the state and the preferences of players are common knowledge.

The game starts with an ex ante stage (stage 0), in which the legislature selects b_C and the procedural rule, which can be either open or closed.[10]

After the ex ante stage, the choices of the legislature become commonly known.

In stage 1, the lobbyist observes the realization of θ, and sends a private message $m \in \mathbb{R}$ to the committee. This message does not directly influence the payoffs and does not change the available actions of players at later stages of the game. Hence, communication between the lobbyist and the committee is assumed to be cheap talk. In real life the message can correspond to a draft proposal written by the lobbyist.

In stage 2 the committee sends a proposal (bill) $p \in \mathbb{R}$ to the legislature.

Finally, in stage 3, the legislature chooses a policy action $x \in \mathbb{R}$. The set of possible choices of the legislature in stage 3 depends on the procedural rule chosen in the ex ante stage. With open rule, the legislature in stage 3 can select any policy action in $\mathbb{R}$. Hence, in this case the communication between the committee and the legislature is cheap talk, too. However, with closed rule, the legislature can only choose between p, the policy action corresponding to the proposal and $s \in \mathbb{R}$, an exogenously given status quo policy commonly known from the beginning of the game.

The sequence of moves in the model is depicted in Fig. 1.

The solution concept we use throughout the paper is perfect Bayesian Nash equilibrium, as defined in AAK.[11] From now on, we simply refer to it as equilibrium. Moreover, following GK and Krishna and Morgan (2001), we assume that, in any subgame following the legislature's stage 0 choices, the equilibrium most preferred by the legislature prevails.

For analytical convenience, we assume that the status quo policy is so bad that, irrespective of the realized state, the legislature always accepts the committee's proposal in case of closed rule. A sufficient condition for this is $l(s-\theta) > l(x-\theta)$, for all $x \in [0, 1+b_L]$ and all $\theta \in [0,1]$.

3. Optimal committee and rule selection

The following is the main theorem of this paper. Let $\underline{b} = 1/6$ and $\overline{b} = ((2+\sqrt{3/2})/10)$.

Theorem 1. *The optimal choices of the legislature are given by:*

- *For $b_L \leq \underline{b}$, using closed rule and a committee with interests fully aligned with the lobbyist's: $b_C^* = b_L$.*
- *For $\underline{b} < b_L < \overline{b}$, using closed rule and a committee with interests strictly between the lobbyist's and the legislature's: $b_C^* \in (0, b_L)$.*
- *For $\overline{b} < b_L < 1/2$, using open rule and a committee with interests opposite to the lobbyist's: $b_C^* = -(1-2b_L)/3 < 0$.*
- *For $b_L \geq 1/2$, either open rule with any b_C^*, or closed rule with an unbiased committee $b_C^* = 0$ are optimal. In either case, no information is transmitted to the legislature.*

Fig. 2 shows how the optimal committee bias varies with b_L. The dashed line above the horizontal axis depicts the optimal committee bias under closed rule (b_C^{cl}), while the dashed line below the horizontal axis depicts an optimal committee bias under open rule (b_C^{op}). The relative positions of lobbyist and committee bias are quite distinct under these two possibilities. Under closed rule, the legislature selects a committee that is biased toward the lobbyist. Furthermore, if b_L is small enough, the committee selected has interests fully aligned with the lobbyist's. In stark contrast, under open rule, the optimal committee is biased in the direction opposite the lobbyist.

The solid line in Fig. 2 depicts the optimal committee bias, taking into account the endogeneity of the rule choice (b_C^*). We see that switching from closed to open rule generates a rich pattern of optimal committee bias. For very low b_L, the legislature

[10] The specification implies that the legislature can appoint an optimal committee, given the exogenously given parameters. For a discussion on exogeneously given committee bias, see Section 4.

[11] There is no standard definition of perfect Bayesian Nash equilibrium in continuous settings. AAK, besides the usual requirements of sequential rationality and consistency of beliefs, poses an additional weak consistency requirement for beliefs along equilibrium paths that occur with probability 0.

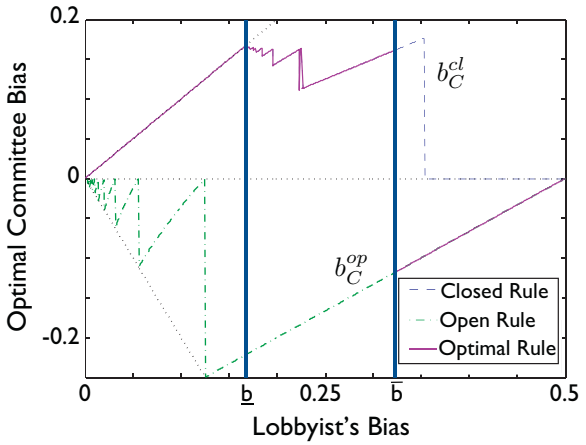

Fig. 2. Optimal committee bias as a function of the lobbyist's bias, under different amendment rules. The optimal committee bias under closed rule is depicted by the dashed line (upper half of the picture), under open rule by the dotted-dashed line (lower half of the picture), and under the optimal rule by the solid line. For lobbyist's bias b_L lower than $\underline{b}$, closed rule with a committee perfectly aligned with the lobby is optimal. For b_L between $\underline{b}$ and $\overline{b}$, closed rule with a committee with bias between the lobby and the legislature is optimal. For b_L greater than $\overline{b}$ open rule with a committee biased in the opposite direction as the lobby is optimal.

chooses closed rule and elects a fully captured committee. For intermediate biases, the legislature chooses closed rule and delegates power to a committee partially aligned with the lobbyist's interests. However, when the divergence between the legislature and the lobbyist is large, the legislature switches to open rule and selects a committee biased against the lobbyist. For even higher biases, the legislature induces an uninformed but unbiased choice.[12]

To gain intuition for the above result, first note that the expected payoff of the legislature under closed rule is equal to the loss from the committee's bias plus the information loss from the communication between the lobbyist and the committee:

$$U_F = -[(b_C^{cl})^2 + l_{CS}(|b_C^{cl} - b_L|)],$$

where $l_{CS} : \mathbb{R}_+ \to \mathbb{R}_+$ is an increasing function with $l(0) = 0$.[13]

For small b_L, the loss from biasing the decision by the complete delegation, b_L^2, is second order, but the loss from imperfect information transmission in CS can be shown to be of first order in the bias.[14] This implies that under closed rule, for small b_L, it is optimal for the legislature to appoint a committee that is *fully aligned* with the lobbyist's interests. Moreover, Ivanov (2010) shows that the legislature's loss remains first order in the lobbyist's bias even when an optimally biased intermediary is used. This concludes that for small b_L, closed rule is better for the legislature than open rule.

For intermediate values of b_L, closed rule remains optimal, but the optimal committee choice trades off making somewhat biased decisions to improve information transmission. The optimal committee bias is highly nonmonotonic in this interval (see Fig. 2).

For large values of b_L, closed rule yields little or no improvement to the legislature relative to direct communication, as improving information transmission would require appointing a substantially biased committee. In contrast, the optimal committee under open rule can increase the legislature's payoff significantly for such large levels of committee bias. See Fig. 3 for the comparison of losses under the two procedural rules and under direct communication between the lobbyist and the legislature.

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[12] This can either be achieved through open rule or closed rule, requiring an unbiased committee in the latter case. If there is a small uncertainty regarding the committee's bias, open rule becomes a strictly better choice for the legislature, under closed rule, the realized policy may be slightly different than the legislature's optimal choice (which is 0).

[13] More specifically, from CS:

$$l_{CS}(z) = \frac{1}{12N^2} + \frac{z^2(N^2-1)}{3}, \quad \text{with } N = \left\lceil \frac{\sqrt{1+2/z}-1}{2} \right\rceil, \tag{1}$$

where N denotes the size of the partition associated with the most informative equilibrium.

[14] From the formula in (1), $1/N^2 = 2b + O(b^2)$, and

$$l_{CS}(b) = \frac{1}{12N^2} + \frac{b^2N^2 - b^2}{3} = \frac{1}{6}b + \frac{b/2 - b^2}{3} + O(b^2) = b/3 + O(b^2),$$

where for a function $f : \mathbb{R} \to \mathbb{R}$, $f(b) = O(b^2)$ means that there exists a constant $M < \infty$ such that $|f(b)| < M|b^2|$ for all b.

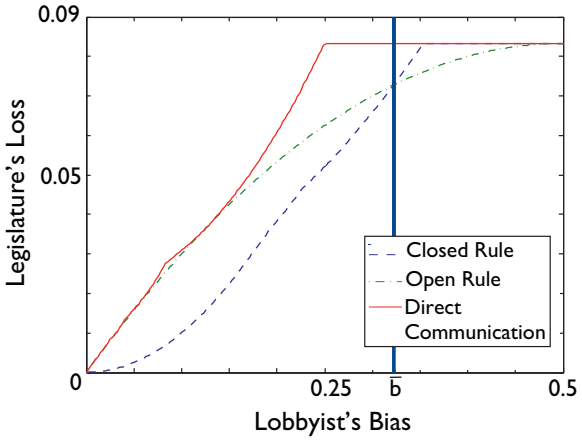

Fig. 3. The legislature's expected losses, when the committee bias is chosen optimally, under different amendment rules. The loss under closed rule is depicted by the dashed line, under open rule by the dotted-dashed line, and under direct communication by the solid line. To the left of the vertical line $b_L = \bar{b}$, closed rule is optimal, and to the right of the vertical line, open rule is optimal.

To understand how a biased committee can benefit the legislature under open rule, first note that committees serve as intermediaries in the communication between the legislature and the lobbyist. Such intermediation can improve information transmission between the sender and the receiver, even in a pure cheap talk context. The reason is that for certain types of intermediators there can be mixed equilibria in which the intermediary's mixing behavior introduces noise into the communication in a way that induces the sender to transfer more information.

Fig. 4 illustrates such an equilibrium when $b_L = (3/10)$ and the legislature selects a committee with $b_C = -(2/15)$. In this case the lobbyist's bias is so large that the only equilibrium in a direct communication game between the lobbyist and the legislature would be the noninformative equilibrium. In particular, there is no equilibrium with two partition cells, given that for any such partition, there would be states in the lower cell at which the lobbyist would rather induce the action corresponding to the higher cell than the action corresponding to the lower cell. However, in a game with intermediated communication through a committee with the above bias, there exists a two-cell equilibrium. In this equilibrium, the lobbyist partitions the state space into two cells and sends a message corresponding to the cell that a realized state lies in. The committee sends a "low" proposal after receiving a "low" message from the lobbyist, but mixes between the "low" and "high" proposals after receiving a "high" message from the lobbyist. This behavior raises the action chosen by the legislature following a "low" proposal, since it has a certain probability of being sent in high states as well, making the "low" message more attractive for the upward-biased lobbyist. This eases the incentive constraints of the lobbyist in revealing information, and facilitates the informative equilibrium illustrated in the figure.[15]

One interpretation of this scenario is that the legislature appoints a negatively biased committee because the latter makes it possible that even after high messages from the lobbyist, the implemented action is the lower action, as the negatively biased committee "offsets" the positively biased lobbyist. Nevertheless, exactly because of this interaction, the lower action implemented in this equilibrium is relatively high, which facilitates more information transmission by the lobbyist.

We also note that, as remarked in AAK, in the spirit of Harsányi (1973), the above mixed equilibria can be arbitrarily approximated by pure strategy equilibria of games in which there is a small degree of uncertainty regarding the committee's actual bias.[16] In these equilibria, the committee almost always strictly prefers one equilibrium proposal to any of the others, and acts deterministically. From the legislature's perspective, though, the committee's strategy seems to be random. In a similar way, the mixed equilibria we consider can also be approximated by pure strategy equilibria of games in which the committee also receives a (weak) private signal, besides gathering information by talking to the lobbyist. The intuition is the same: the private signal can tilt a committee that is almost indifferent between two equilibrium proposals, to either direction.

Notice that Theorem 1 implies that a committee close to the legislature's preference is consistent with both closed rule (when the lobbyist's bias is sufficiently small) and open rule (when the lobbyist's bias is sufficiently large). Similarly, a substantially biased committee is also consistent with both open and closed rule (when the lobbyist's bias is in an intermediate range). These observations apply, despite the fact that the optimal rule is monotonic in the magnitude of the lobbyist's bias (However, the relationship between the optimal rule and the committee bias is nonmonotonic).

Lastly, below is a summary of how we obtained Theorem 1.

[15] This intuition is similar to why nonstrategic noise can improve information transmission, as in Blume et al. (2007).

[16] See the online Supplementary note of AAK. For a cheap talk model in which there can be large uncertainty about a player's preferences, see Li and Madarász (2008).

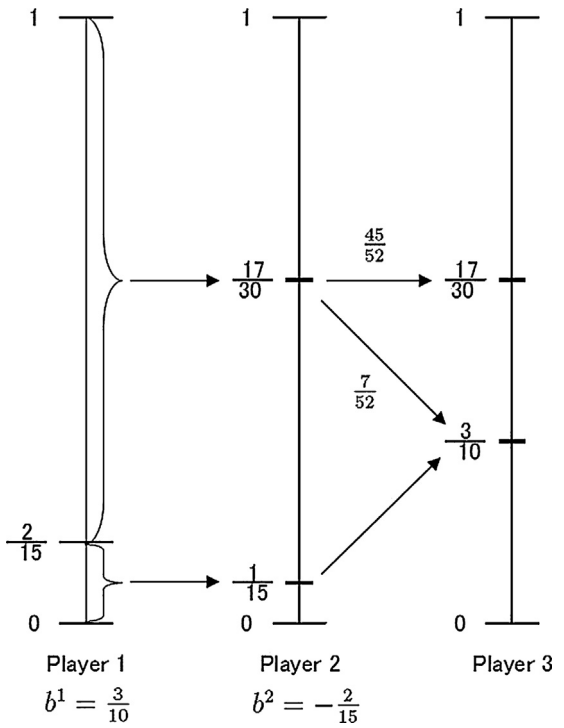

Fig. 4. Welfare-improving mixed equilibrium with biased committee.

GK and Dessein (2002) investigate the problem of whether an uninformed principal wants to delegate decision power to an informed but biased agent, or just communicate with the agent and retain the decision power.[17] They show that delegation can benefit the principal (in our case, the legislature), even though it introduces a systematic bias in the policy choice. The intuition is that delegation facilitates more information transmission from the informed party.

Dessein (2002) also extends the above analysis to the case when the principal can delegate decision power to an intermediary, which is exactly the continuation game that results in our model under closed rule. In this case, the trade-off for the legislature is clear: appointing a committee with preferences closer to the lobbyist's increases information transmission, at the expense of greater bias in the policy choice.

Regarding open rule, as shown in Goltsman et al. (2009), $b_L \geq 1/2$ implies that there does not exist any mechanism which that induces the lobbyist to transmit information. This particularly implies that no strategic committee could induce information transmission and that, irrespective of the choice of committee, the legislature's expected loss is $\frac{1}{12}$, corresponding to a babbling equilibrium (choosing $ax = (1/2)$ in every state). For smaller biases, Ivanov (2010) shows that the loss with an optimal intermediary is the same as the loss when using a nonstrategic mediator as in Goltsman et al. (2009), thereby deriving the maximum ex ante payoff that the legislature can achieve under open rule. In particular, for almost every $b_L \in (0, \frac{1}{2})$, there exists a value of b_C that facilitates an equilibrium that is strictly better for the legislature than any equilibrium without appointing a committee (equivalently, when appointing a nonbiased committee). Moreover, the maximum ex ante payoff with open rule can be achieved by appointing a committee with bias between $-2b_L$ and 0 that is in the opposite direction than the lobbyist's bias (see Fig. 2).

Theorem 1 combines the above findings. In particular, we show that there is a critical lobbyist bias level $\bar{b}$, below which it is optimal for the legislature to use closed rule and above which it is optimal to use open rule. To obtain this critical value, we conjecture that the optimum closed rule equilibrium near the threshold involves $N = 2$ messages (we verify this in the proof). Given this, it can be shown that the loss with closed rule is $(1/48) + (1/2)b_L^2$. Setting this loss equal to the loss with open rule, shown to be $b_L(1 - b_L)/3$ in Ivanov (2010), yields the value of $\bar{b}$ given in the theorem. Although it is not generally known whether there is a unique optimal choice of b_C under open rule, we use a result from AAK to show that, in the region where open rule is optimal, there is indeed a unique optimal choice of b_C and it is negative. See Appendix for the full proof.

[17] See also Krishna and Morgan (2001). Aghion and Tirole (1997) examine the tradeoff between delegation and communication in a technically distinct framework.

4. Discussion

Here we discuss two modifications of the model presented above.

4.1. Exogenous committee bias

So far, the analysis assumed that the legislature can select the optimal committee, given the bias of the relevant lobbyist. This essentially assumes that a separate ad-hoc committee is created to process each bill. While this is a good approximation of how the legislative process worked in the early years of the United States Congress (see Canon and Stewart (2001)), efficiency considerations led to a system where standing committees consisting of infrequently changing membership are responsible for proposing most amendments to the legislature.

Our model is still a good approximation of the process if the jurisdiction of standing committees is specified in a way such that all relevant interest groups consulted by a given committee have roughly the same bias. Nevertheless, the prevalence of standing committees in the legislative process makes it important to analyze the case when the committee bias is exogenously given and the legislature can only choose the procedural rule for each bill. The procedural rule can indeed be chosen on a case-by-case basis in the legislature, and the same committee's proposals for different bills can be processed under different procedural rules.

Formally, consider the same timing and payoff structure as in the base model, but now suppose b_C is not the choice variable of the legislature, but rather an exogenous parameter determined before stage 0. Hence, the legislature's problem becomes choosing the procedural rule, as a function of b_L and b_C.

Our first observation is that Theorem 1 implies that if $b_L > \bar{\bar{b}} := 1/\sqrt{8}$, then open rule is optimal. This follows because, in this range, choosing closed rule yields a payoff to the legislature that is strictly worse than its payoff in babbling equilibrium, for any $b_C \neq 0$. Hence, closed rule cannot be optimal if the lobbyist's bias is too large.

Our second observation is that $b_C > 1/\sqrt{12}$ implies that the legislature's loss from the committee's bias under closed rule exceeds the informational loss in the babbling equilibrium.[18] Hence, closed rule cannot be optimal if the committee's bias is too large.

Third, the next result states that closed rule cannot be optimal if the committee is biased against the lobbyist.

Theorem 2. *If $b_C < 0$, then open rule is optimal.*

The intuition behind this result is easy to see: the legislature's payoff under open rule is the same as the payoff under direct communication between the lobbyist and the legislature, as shown in AAK. Since the committee's interests are further from the lobbyist's than the legislature's interests, the committee's payoff under closed rule is no greater than this direct communication payoff. However, the committee's payoff is strictly greater than the legislature's payoff under closed rule, as the committee's decision is biased.

The above result, along with the two preceding observations, implies that the region in the $b_L \times b_C$ space where closed rule is better than open rule is contained in the box defined by the two axis and the lines $b_L = 1/\sqrt{8}$ and $b_C = 1/\sqrt{12}$.[19]

Within this region, we use numerical analysis to compare the legislature's payoff between open rule and closed rule. For any (b_L, b_C), the legislature's ex ante payoff under closed rule is easily computable, as the sum of $-b_C^2$ and the informational loss in the maximum partition direct communication equilibrium between the lobbyist and the committee. On the other hand, we cannot generally compute the legislature's ex ante payoff under open rule, as there is no known characterization of the best equilibrium for intermediated communication for general (b_L, b_C) pairs. However, it is possible to obtain bounds on the latter payoffs, leading to an incomplete characterization of the region where closed rule is optimal.

First, we observe that whenever the best pure strategy equilibrium under open rule (which is fully characterized in AAK) yields a higher payoff for the legislature than its payoff under closed rule, closed rule is clearly suboptimal. The set of (b_L, b_C) pairs where this is the case is depicted in Fig. 5 as the area marked with diagonal lines texture, outside the bounded region surrounded by curves OQ, QR, RS, and SO. We will refer to the remaining set of bias pairs (where closed rule can be better than open rule) as the OQRS region.

Second, both Proposition 5 of AAK and Lemma 4 of Ivanov (2010) imply that below the 45-degree line, the best equilibrium under open rule is a pure strategy equilibrium. This implies that in the OQRS region, closed rule is better than open rule for all the points below the 45-degree line.

Third, the payoff of the legislature under open rule with a given committee bias is bounded from above by $-b_L(1-b_L)/3$, which is shown in Goltsman et al. (2009) to be the maximum payoff of the legislature when using a nonstrategic intermediary to communicate with the lobbyist. Hence, when the payoff under open rule is smaller than the payoff that can be attained by closed rule, the former is surely suboptimal. This consideration establishes that, for points enclosed by the dotted curve, closed rule is better than open rule.

Finally, AAK show that there is no mixed equilibrium with two possible actions induced in equilibrium if $b_C > b_L > 0.25$. The arguments can be extended to show that there is no nontrivial mixed equilibrium in this region. As this extension is

[18] $(1/12)$ is the variance of θ uniformly distributed over [0, 1].

[19] This is under the assumption that $b_L > 0$. There is a corresponding region in the half space defined by $b_L < 0$.

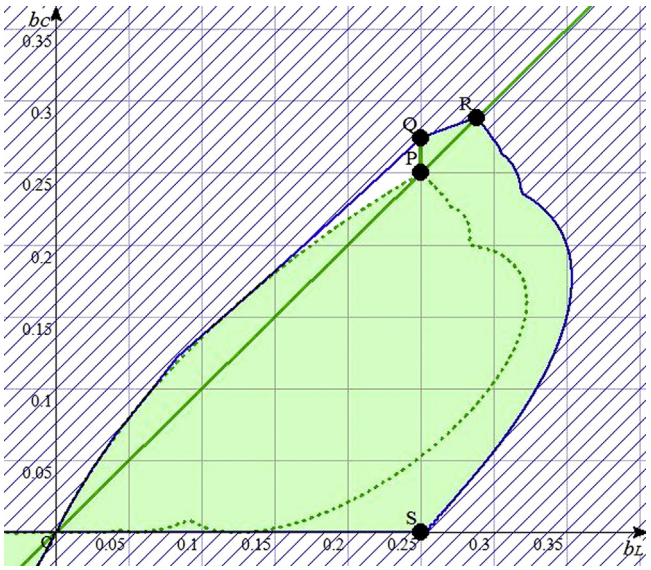

Fig. 5. Optimality of closed vs. open rule for different biases of the lobbyist and the committee.

straightforward, we omit it from the current paper. This reasoning implies that, at points in the OQRS region that are above the 45-degree line and to the right of the $b_L = 0.25$ line, closed rule is optimal.

The (b_L, b_C) pairs for which the above arguments establish the optimality of closed rule are depicted as the shaded region. The small white region surrounded by curves OQ, QP, and PO represents the remaining set of (b_L, b_C) pairs, at which the above arguments do not determine whether open or closed rule is better.

To summarize, the analysis reveals similar qualitative findings regarding optimal procedural rules as in the endogenous committee bias case: closed rule is optimal if the lobbyist's bias is not too large and the committee is biased in the same direction, as long as the latter is not too biased relative to the former.

4.2. Endogenously chosen status quo

In an analogous setting, Mylovanov (2008) shows that delegating decision power to the informed player, subject to veto power by the principle, can achieve the same ex ante payoff for the principal as the optimal arbitration rule, provided that the status quo outcome can be selected by the legislature ex ante.[20] Arbitration implies that the principal can ex ante commit to a possibly stochastic policy after any possible message from the informed agent. If such commitment is possible, the principal can do no worse than his optimal payoff in the game we analyzed in Section 3.[21]

An important implication of the above result is that, with an endogenously selected status quo, closed rule is always (at least weakly) better for the legislature than open rule. This is a stark result and does not conform with the empirical observations on legislative decision-making. In most cases, however, the assumption that the status quo outcome can be endogenously selected is unrealistic. A procedure like that would involve first working out a proposal that changes the current status quo to a new reference point that the legislature finds optimal ex ante. This would require creating a different (unbiased) committee than the one that works out the final proposal, thus increasing the workload of the legislature, and lengthening the legislative process. Nevertheless, we regard the optimality of closed rule under an endogenously-selected status quo as an intriguing theoretical result, with possible implications to future institutional design in legislatures.[22]

[20] The term "arbitration rule" is introduced in Goltsman et al. (2009). Other papers in the economics literature refer to it as a constrained delegation schedule without monetary transfers (see for example Holmstrom (1977), Melumad and Shibano (1991), Alonso and Matouschek (2008) and Kováč and Mylovanov (2009)).

[21] The legislature can potentially achieve an even higher payoff if it makes different proposals differentially costly for the committee through bureaucratic procedural rules, as in Ambrus and Egorov (2012). We do not pursue this direction here.

[22] An existing institutional channel that can potentially be used in implementing the above optimal arbitration outcome is discharge petitions. Any member of legislature may file such a petition calling for a measure to be brought out of a committee. When half of the House members (218) have signed the petition, the measure is taken from the committee and considered by the legislature. If the legislature can commit to carry out such an action only if the committee proposal is above a cap corresponding to the ex ante optimal status quo, the threat of a discharge petition implements the optimal arbitration scheme. This possibility is consistent with the fact that discharge petitions are often used as a threat and that there have been increases in both the use of closed rule and the number of discharge petitions in the past three decades (see Burden (2005) and Theriault (2009)).

5. Conclusion

The findings of this paper show that the relatively complicated patterns of committee biases and procedural rules observed in legislative decision-making can be explained by a model in the tradition of the informational theories of committees. Namely, if the legislative process requires informational input from outside interest groups, it can be in the legislature's interest to appoint a biased committee to communicate with the expert. The use of both open and closed rule can be optimal, depending on the interest group's bias, and there is no monotonic relationship between the magnitude of the committee's bias and the chosen procedural rule. A testable new prediction of our model is that closed rule tends to be associated with committees biased in the same direction as the relevant interest groups, while open rule tends to be associated with committees that are either representative of the median legislator, or biased in the opposite direction than the relevant interest groups. We leave an empirical investigation of these issues to future work.

Appendix A.

A.1. Proof of Theorem 1

To prove Theorem 1, we begin by collecting some results from the existing literature.

Conditional on selecting closed rule, the optimal committee choice of the legislature is characterized in Dessein (2002).

Proposition A1 (Proposition 5 Dessein (2002)). *Under closed rule, the legislature always elects a committee with bias* $b_C^{cl} \in [0, b_L]$. *Furthermore,*

- *If* $0 \le b_L \le \underline{b} = 1/6$, *the optimal committee is fully aligned with the lobbyist's interests:* $b_C^{cl} = b_L$.
- *If* $\underline{b} < b_L < \overline{\overline{b}} = 1/\sqrt{8}$, *the optimal committee has a bias strictly between the legislature's and the lobbyist's:* $b_C^{cl} \in (0, b_L)$.
- *If* $b_L > \overline{\overline{b}}$, *the optimal committee is fully aligned with the legislature's interests:* $b_C^{cl} = 0$.

In the case of open rule, Ivanov (2010) shows the following result.

Proposition A2 (Ivanov (2010)). *Under open rule, and* $b_L \le 1/2$, *the legislature's minimum loss with an endogenously selected committee is*

$$l^{op} = b_L(1 - b_L)/3, \tag{2}$$

and it can be attained with a committee with bias $b_C^{op} \in (-2b_L, 0]$.

In addition to these two results, we will need an auxiliary result, Lemma 1, before proving Theorem 1. Although Proposition A2 characterizes the payoffs attainable under the open rule, the results in Ivanov do not fully characterize the optimal committee bias. Therefore we use Lemma 1 in the proof of Theorem 1 to characterize the optimal committee bias, in the case where the open rule is optimal. For Lemma 1, we will use some terminology from AAK. In Proposition 4 (and in greater detail in Section 3 of the online Supplementary note) of AAK, it is shown that any equilibrium can be partitioned in a finite number of components, such that whenever the lobbyist announces a state in a component, the committee mixes only between adjacent actions in that component. We will denote a component with K actions as a K-component.

Lemma 1. *If* $b_L > \overline{b}$ *and* $K \ge 4$, *then there is no equilibrium with a* K*-component.*

Proof of Lemma 1. Suppose the contrary.

Let the boundaries of the interval partition of a component be $t_0, \ldots, t_K$, with $t_{k-1} < t_k$ for all $k = 1, \ldots, K$, where t_0 and t_K are the endpoints of the component itself. Let the equilibrium actions be $x_1, \ldots, x_K$ with $x_{k-1} < x_k$ for all $k = 2, \ldots, K$.

First suppose $b_C > 0$. Then we know that $b_C > b_L$ from Proposition 5 of AAK. After messages $k = 1, \ldots, 3$, the committee is indifferent between $x_k \le \frac{t_k + t_{k-1}}{2}$ and x_{k+1}. This implies that $x_{k+1} - x_k \ge 2b_C$ for every $k = 1, \ldots, 3$ (otherwise the committee would prefer the higher message of the two). Hence, $t_K - t_0 \ge 6b_C > 1$, a contradiction.

Next, suppose $b_C < 0$.

First, note that $x_2 - t_1 > b_L$. This is because at t_1 the lobbyist is indifferent between inducing x_1 and $x_2 > t_1$, which is inconsistent with $x_2 - t_1 \le b_L$ (in this case he should strictly prefer x_2 to x_1). Second, note that $x_K - t_{K-1} > b_L$, otherwise at t_{K-1} the committee would strictly prefer sending the highest message in the component). Third, note that $t_K - x_K > b_L$, since $x_K - t_{K-1} > b_L$ (as shown in the previous step) and because x_K is the midpoint of t_{K-1} and t_K. Fourth, note that $\frac{t_{K-1} + t_{K-2}}{2} - x_{K-2} > |b_C|$, otherwise when receiving the second highest message, the committee would strictly prefer x_{K-2} to x_{K-1}, contrary to the assumed equilibrium.

The above arguments establish that

$$t_K - t_0 > 3b_L + t_{K-1} - x_{K-2} > 3b_L + \frac{t_{K-1} + t_{K-2}}{2} - x_{K-2} > 3b_L + |b_C|. \tag{3}$$

Consider first $|b_C| \ge 0.04$. Then $b_L > 0.32$ and inequality (3) imply $t_K - t_0 > 1$, a contradiction.

Consider next $|b_C| < 0.04$. This implies $x_K - x_{K-1} = 2|b_C| < 0.08$. Then $x_K - t_{K-1} > b_L$ implies that $x_{K-1} - t_{K-1} > 0.24$, which implies $x_{K-1} - \frac{t_{K-1}+t_{K-2}}{2} > 0.24$. Then $\frac{t_{K-1}+t_{K-2}}{2} - x_{K-2} > 0.24 + 2|b_C|$, otherwise when receiving the second highest message, the committee would strictly prefer x_{K-2} to x_{K-1}, contrary to the assumed equilibrium. Then inequality (3) leads to a contradiction. □

Having collected these results, we can proceed to the proof of Theorem 1. Propositions A1 and A2 are used to derive the boundary between the regions where the open or closed rule is optimal. Proposition A1 then characterizes the optimal committee bias in the closed rule region. In the open rule region, the characterization of the optimal committee bias depends on a more detailed argument based on Lemma 1.

Proof of Theorem 1. The argument builds on Propositions A1 and A2. Since $\bar{b} = \frac{2+\sqrt{3/2}}{10} < 1/\sqrt{8} = \bar{\bar{b}}$, it only remains to be shown that (i) closed rule is optimal for $b_L < \bar{b}$ and open rule for $b_L > \bar{b}$; and (ii) for $b_L > \bar{b}$ the optimal committee bias given open rule is as stated in Theorem 1.

First, we prove (i).

In the range $b_L \in (0, 1/4)$, using closed rule with $b_C = b_L$ gives a loss of b_L^2, which is strictly less than the loss with open rule given by Eq. (2), which is $b_L(1 - b_L)/3$.

In the range $b_L \in [1/4, \bar{b})$, using closed rule with $b_C = b_L/2$ results in a partition of size $N = 2$ and a loss of

$$b_C^2 + l_{CS}(b_L - b_C) = b_C^2 + \frac{1}{48} + (b_L - b_C)^2 = \frac{b_L^2}{2} + \frac{1}{48},$$

which is also strictly less than $b_L(1 - b_L)/3$, where we used Eq. (1) in footnote 13.

Now we have to show that, in the range $b_L \in (\bar{b}, 1/2)$, open rule is strictly better. Take b_L in this range, and assume by contradiction that there exists b_C in $[0, b_L]$ such that closed rule with a committee with bias b_C has a loss no more than $b_L(1 - b_L)/3$. This particularly implies that $b_C^2 \le b_L(1 - b_L)/3$. Rearranging, this implies

$$b_L - b_C \ge \frac{4b_L^2 - b_L}{3(b_L + b_C)} \ge \frac{4b_L^2 - b_L}{6b_L} = \frac{2}{3}b_L - \frac{1}{6} > \frac{2}{3}\bar{b} - \frac{1}{6} > 0.048.$$

This and the formula for the size of partitions in the CS equilibria given in the text imply that the number of partitions under closed rule equilibrium is $N \le 3$. So we only have to check that, for the three cases $N = 1$, 2, and 3, there is no b_C such that closed rule is weakly better. We omit this straightforward verification.

What remains to show is (ii), i.e. that for $b_L \in (\bar{b}, \frac{1}{2})$ the optimal committee bias is as stated. It is straightforward to check that the committee bias in the proposition yields the minimum loss to the legislature. Indeed, Ivanov (2010) uses a committee with this bias in the proof of Propositions A2. Therefore, we only have to prove that this optimal committee bias is unique, in the region where the open rule is optimal. The idea of the proof is to show that the optimal equilibrium must have a very specific structure: the lobbyist's partition has two possible messages, and a negatively biased committee only mixes when receiving the higher message. That is, the equilibrium partition is composed of a single 2-component. Then it is easy to explicitly describe equilibrium and calculate the unique optimal bias.

The first step in the proof is to show that in the given range, equilibria with any committee cannot have components with four or more actions. This is shown in Lemma 1 above.

Furthermore, in AAK Section 4.2 and online supplementary note Section 2.2 the authors completely characterize equilibria with a single 3-component, and show in particular that if $|b_L| > 1/10$, then there cannot be such equilibria. This result also implies that there cannot be any equilibrium with a 3-component, since the equilibrium play within such a component would correspond to a single 3-component equilibrium with a restricted state space corresponding to the component. Given such a state space, the AAK characterization implies that there cannot be an equilibrium consisting of a single 3-component. This concludes that for any committee, equilibria can have 2-components at most.

Equilibria with 2-components are easy to characterize. Consider a 2-component with endpoints t_0, t_1, t_2. By the characterization in Section 2.1 of the online supplementary note to AAK, we have that

$$t_2 - t_1 = 2(b_L - b_C).$$

Also, for $b_L > \bar{b}$, we have $b_C \le 0$. So $t_2 - t_1 \ge 2\bar{b} > 0.64$. In particular, there can be no equilibria with two or more 2-components. Also, if an equilibrium has a 2-component with a 1-component on either the right or the left, the indifference condition of the lobbyist gives that one of these components has to have size at least $4b_L > 1$. So no equilibria with both 1-components and 2-components exist.

Given that CS show that no informative equilibria composed exclusively of 1-components exist, we have that the only possibility for a non-babbling equilibrium consists of a single 2-component. This case is fully characterized in Section 2.1 of the online supplementary note to AAK. In the case $b_C \ge 0$, a straightforward calculation shows that it is not possible to improve on direct communication. In the case $b_C < 0$, the component is partitioned by the point $t_1 = 1 - 2(b_L - b_C)$. Having

this characterization of the equilibrium partition, one can simply calculate the loss of using a given committee bias b_C. It is given by

$$\frac{1}{3} + \Delta(1+\Delta) + b_C(1+2\Delta),$$

where $\Delta = b_C - b_L$. This gives the unique value of the optimal bias $b_C = -(1-2b_L)/3$. □

A.2. Proof of Theorem 2

Proof of Proposition 2. First, notice that the legislature's payoff under closed rule is worse than the committee's payoff by $b_C^2 > 0$. Hence, it suffices to show that the legislature's payoff under open rule is weakly greater than the committee's payoff under closed rule. To see this, we show that the legislature's payoff in a pure strategy equilibrium under open rule is weakly greater than the committee's payoff under closed rule.

Proposition 2 in AAK implies that a necessary and sufficient condition for a strategy profile to constitute a pure strategy equilibrium under open rule is that the lobbyist's and the legislature's strategies correspond to an equilibrium in direct communication between them, and that two adjacent actions that are assigned positive probability have distance at least $2|b_C|$ between them. On the other hand, by the same proposition, a necessary and sufficient condition for a strategy profile to constitute an equilibrium under closed rule is that the lobbyist's and the committee's strategies correspond to an equilibrium in direct communication between them, and that two adjacent actions that are assigned positive probability have distance at least $2(b_L - b_C)$ between them. Since $2(b_L - b_C) > 2|b_C|$, the payoff that the committee achieves under closed rule can always be attained by the legislature under open rule. Thus the proof is complete. □

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