

# Decentralized Legislative Oversight of Bureaucratic Policy Making\*

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## Abstract

Congressional oversight is a potentially potent tool to affect policy making and implementation by executive agencies. However, oversight of any agency is dispersed among several committees across the House and Senate. How does this decentralization affect the strategic incentives for oversight by each committee? And how do the strategic incentives of oversight committees align with the collective interest of Congress as a whole? We develop a formal, spatial model of decentralized oversight to investigate these questions. The model shows that when committees have similar interests in affecting agency policy, committees attempt to free ride on each other and oversight levels are inefficiently low. But if committees have competing interests in affecting agency policy, they engage in “dueling oversight” with little overall effect, and oversight levels are inefficiently high. Overall, we contend that committee oversight incentives do not generally align with the collective interests of Congress, and the problem cannot be easily solved by structural changes within a single chamber.

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# 1 Introduction

From 2017 to 2018, during the 115th Congress, neither the House Committee on Financial Services, chaired by Rep. Jeb Hensarling (R - TX) nor the Senate Committee on Banking, Housing, and Urban Affairs, chaired by Sen. Michael Crapo (R - ID) held oversight hearings on financial regulators. Their lack of oversight on regulators was notable, given the regulators' deregulatory activity during the time period. For example, the National Credit Union Administration (NCUA) amended a risk-based capital rule from 2015 to postpone the effective date and exempt 90% of all credit unions from the rules effects.<sup>1</sup> The chair of the NCUA Board, J. Mark McWatters, had voted against this risk-based capital rule as a board member in 2015 and lost. Three years later, he was a part of the effort to gut the rule. Neither the House nor Senate committee with oversight jurisdiction over the NCUA held a hearing about deregulation of credit unions or with financial regulators in general.<sup>2</sup>

Yet when Democrats took control of the House in the 116th Congress, these same two committees held what some have called “dueling hearings”<sup>3</sup> with the NCUA. The House Committee on Financial Services, now chaired by Rep. Maxine Waters (D - CA), and the Senate Committee on Banking, Housing, and Urban Affairs, still chaired by Sen. Michael Crapo (R - ID), held full-committee hearings overseeing the NCUA within one day of each other.<sup>4</sup>

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<sup>1</sup>See [ncua.gov/about-ncua/historical-timeline](https://ncua.gov/about-ncua/historical-timeline).

<sup>2</sup>J. Mark McWatters, the Chair of the NCUA at the time, was connected to the Chair of the House Financial Services Committee, Jeb Hensarling (R - TX). McWatters was a donor to Hensarling's campaigns in 2002 and 2004 (see [FEC.gov](https://www.fec.gov)), and before joining the NCUA, he worked as counsel to Hensarling. On the Senate side, the Chair of the Committee on Banking, Housing, and Urban Affairs was Senator Michael Crapo (R - ID). Crapo, known for his affinity for bipartisanship, has long been interested in rolling back some of the regulations in the Dodd-Frank financial reforms passed after the financial crisis, and in late 2018, he succeeded in passing the Economic Growth, Regulatory Relief, and Consumer Protection Act, which eliminated several protections passed in the 2010 Dodd Frank law.

<sup>3</sup>For another example of dueling hearings, see the simultaneous drug pricing hearings held by Elijah Cummings (D - MD), Chair of the House Oversight Committee, and Chuck Grassley (R - IA), Chair of the Senate Finance Committee on January 29, 2019. See [politico.com/newsletters/prescription-pulse/2019/01/28/dueling-drug-pricing-hearings-in-house-and-senate-491700](https://politico.com/newsletters/prescription-pulse/2019/01/28/dueling-drug-pricing-hearings-in-house-and-senate-491700).

<sup>4</sup>See <https://www.govinfo.gov/app/collection/CHRG/> for these two hearings titled “Oversight of Prudential Regulators: Ensuring the Safety, Soundness and Accountability of Megabanks and Other Depository

The phenomenon of “dueling hearings” by committees with differing policy goals is an area of congressional oversight that, to our knowledge, has gone largely unexplored. Existing studies have characterized congressional oversight as makeshift and fragmented (Wood and Waterman 1991) and argued that too many committees’ involvement can undermine congressional oversight (Clinton et al. 2014). One NPR story revealed that 108 committees, subcommittees, and caucuses were overseeing the Department of Homeland Security.<sup>5</sup> But to our knowledge, no study has systematically analyzed the burst in oversight by committees with overlapping jurisdictions that disagree about policy—this phenomenon of “dueling hearings”—alongside insufficient oversight by those same committees when they agree about policy.

Existing studies have dealt to some degree with the question of how much congressional oversight is optimal. While it was once considered alarming that Congress did so little oversight (e.g. Ogul 1976), Aberbach (1990, 2002) demonstrated empirically that on-the-record oversight has grown considerably and often is relatively high. Moreover, as McCubbins and Schwartz (1984) argued, on-the-record oversight need not be extensive to be effective. Nevertheless, noting the collective action problem between multiple committees with common interests, Gailmard (2009) argued that committees may do less oversight than is in their collective interest.

This article contributes a spatial model of oversight by multiple committees in order to systematically examine how the strategic incentives of oversight committees align with the collective interest of Congress as a whole. In our model, multiple committees can have common or competing interests. The model reveals an interesting dynamic: when oversight committees have competing interests, they use oversight in part to “undo” the influence of other oversight committees. In equilibrium, committees may engage in extensive oversight

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Institutions” and “Oversight of Financial Regulators” held on May 15 and May 16, 2019.

<sup>5</sup><https://www.npr.org/templates/story/story.php?storyId=128642876>

with little or no effect on the enacted policy—which matches the empirical finding in Clinton et al. (2014). Time spent on oversight presumably has other publicly valuable uses, so in this case Congress as a whole provides more oversight than is in its collective (or the public) interest. On the other hand, when oversight committees have similar interests in shifting the enacted policy, a collective action problem similar to that noted by Gailmard (2009) holds, and committees provide too little oversight to promote their collective interest.

## Background

Major pieces of legislation typically leave important details to be worked out by bureaucratic agencies. For example, the Patient Protection and Affordable Care Act delegates to the Secretary of Health and Human Services everything from the reimbursement structure for insurance companies, to determination of reasonable rate increases, to the establishment of a high risk health insurance pool. Because agency employees are subject-area experts, congressional delegation can result in more efficient and expert policies. Civil servants, however, have inherent opportunities to bend public policy in the direction of their preferred alternatives (Potter 2019; Nou 2019). The costs of congressional delegation to Congress are well theorized: When it delegates to agencies, Congress entrusts policy-making authority to actors with different goals and conceptions of good public policy, and a weaker connection to the electorate, than Congress itself. An agency problem results.

There are multiple channels by which Congress can mitigate this agency problem. Taken broadly, these include structural elements of agency design, statutory constraints on agency policy discretion, and ex post oversight of agencies after authority has been delegated (McCubbins and Schwartz 1984; McCubbins et al. 1987; Aberbach 1990, 2002; Bawn 1997; Epstein and O'Halloran 1999). Approaches for ex-post oversight, the focus of this article, include: submitting a public comment to an agency's rulemaking docket (Hall and Miler

2008), requesting a report from the Government Accountability Office, holding a hearing (Aberbach 1990, 2002; Feinstein 2017; Kriner and Schickler 2016; Kriner and Schwartz 2008; McGrath 2013; Marvel and McGrath 2016; MacDonald and McGrath 2016), and using its veto power under the Congressional Review Act to overturn agencies' final rules. All of these approaches can be thought of as efforts to bend public policy back in a committee's preferred direction and away from the agency's, or the President's, or even other subsets of Congress not involved in the oversight hearing in question.

Does Congress use these channels effectively to promote its collective interests with respect to agencies? Agency design and ex ante constraints are embedded in statutes passed by Congress as a whole, so presumably reflect its collective interests reasonably well (cf. Shipan 1997; MacDonald 2010; Palus and Yackee 2016; Bolton and Thrower 2019; Potter and Shipan 2017). On the other hand, ex post oversight is decentralized to individual committees. Thus, strategically, we should expect oversight committees to use this tool to pursue their own members' interests (Bawn 1997), which need not coincide with those of the whole Congress.<sup>6</sup>

We model congressional oversight as an activity that multiple committees with overlapping oversight jurisdictions can carry out. Thus, our model has at its core an important feature of congressional oversight that other studies have noted but that has not to our knowledge been formally theorized: multiple committees with overlapping jurisdictions can carry out oversight. House and Senate committees lack a set of agencies that they are responsible for overseeing (Clinton et al. 2014). Any given committee can oversee any given agency if it so chooses. Moreover, multiple committees can be interested in the same agencies (Aberbach 1990; Jones et al. 1993; King 1997; Evans 1999; Baumgartner and Jones 2010).

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<sup>6</sup>This point is significantly amplified by Lowande (2018), who shows that oversight enquiries by individual members of Congress are driven by their own committee interests and district-level considerations. Moreover, Miller and Ruder (2019) sheds light on the rewards to members of Congress from citizens for their oversight activity depending on the members partisanship, the citizens partisanship and agency ideology.

Moreover, we model oversight as having an effect on final content of public policy, after civil servants working in agencies have chosen a policy to (attempt to) implement. Thus, this article dovetails with recent empirical studies of congressional oversight that directly connect congressional hearing activity with agency actions and/or the ideological leanings of agencies (Feinstein 2017; MacDonald and McGrath 2016; McGrath 2013).<sup>7</sup>

This article, along with Feinstein (2017); MacDonald and McGrath (2016); McGrath (2013), are in contrast to the analysis of Aberbach (1990, 2002) because they take agencies into account. Aberbach, on the other hand, places oversight in a framework centered on Congress and the broad contours of the national policy-making environment. Oversight's costs and benefits are understood by Aberbach in terms of resources available to congressional committees, such as staff sizes; and the wider constraints Congress faces in fashioning new policy initiatives, such as budget deficits. Aberbach argues that both the resources available for legislative oversight of bureaucracy and the costs of building grand new policy initiatives contributed to the growth of oversight activity through the 1970's and 1980's. Thus his account emphasizes factors internal to Congress and the wider policy environment as determinants of oversight.

In sum, Congress faces an agency problem when it delegates to agencies. There are many ways that Congress can go about attempting to mitigate this agency problem, some prior to or at the time of delegation and some after delegation. For congressional oversight that occurs after delegation, one of the interesting and potentially problematic features is that oversight is carried out by multiple committees with overlapping oversight interests. We argue that committee oversight incentives do not generally align with the collective interests of Congress, a point that has been largely overlooked in existing studies of congressional

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<sup>7</sup>Feinstein (2017) analyzes congressional hearings alongside instances of agency misconduct as reported in Inspectors General semiannual reports, Government Accountability Office annual "top management challenges" lists, and *New York Times* and *Wall Street Journal* editorials. MacDonald and McGrath (2016) and McGrath (2013) analyze congressional hearings taking into account ideological (dis)agreement between committees and agencies.

oversight. We formalize this argument and its implications in the following section.

## The Model

We model oversight as an activity that multiple committees may undertake, that reveals information about the policy actions implemented by an executive agency, and that may affect that policy going forward. We first present the model formally then discuss the substantive motivation.

### Formalities

The model is a game with three players: the agency  $A$  and two committees,  $C_1$  and  $C_2$ . The two committees could be in the same chamber or different chambers. The game determines an implemented policy  $x \in \mathbb{R}$ .<sup>8</sup>

Each player has symmetric and single peaked preferences over policies, with a commonly known ideal point denoted  $\hat{x}_A, \hat{x}_1, \hat{x}_2$  respectively and  $\hat{x}_i \in (-1, 1)$  for all players. From committee  $i$ 's point of view, the strategically relevant<sup>9</sup> ideal point configurations are: *flanking*  $\hat{x}_j < \hat{x}_A < \hat{x}_i$ ; *stacked-inside*  $\hat{x}_A < \hat{x}_i < \hat{x}_j$ ; and *stacked-outside*  $\hat{x}_A < \hat{x}_j < \hat{x}_i$ .

Each player's utility is composed of a spatial policy utility and a cost of oversight. Committee  $i$ 's oversight level is denoted  $s_i$ . For an implemented policy  $x$ , committee  $i$ 's utility is

$$u_i = - \left( \frac{b}{2} \right) s_i^2 - |x - \hat{x}_i|$$

where  $b > 0$  is an exogenous, commonly known cost parameter.<sup>10</sup> Thus, a committee's utility is decreasing in the distance between  $x$  and  $\hat{x}_i$ , and in its oversight level  $s_i$ . We

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<sup>8</sup>One can suppose there is an exogenous status quo policy  $q$ , but this plays no role in the analysis presented below.

<sup>9</sup>Any other ordering of ideal points can be translated into one of these orderings.

<sup>10</sup>We assume  $b$  is the same for  $i$  and  $j$ , and  $\frac{b}{2} > 2$  to ensure an interior optimum  $s_i^*$ .

assume  $s_i \in [0, 1]$ , so that  $s_i$  can be thought of as the proportion of a committee's effective work time that is devoted to oversight. For the agency,

$$u_A = -c(s_1 + s_2)^2 - |x - \hat{x}_A|$$

where  $c > 0$  is a cost parameter. Thus, the agency's utility is decreasing in the total oversight to which it is subjected, and in the distance between  $x$  and  $\hat{x}_A$ .

The sequence of policy making is as follows. First,  $A$  makes a commonly observed choice of whether to initiate policy change ( $P = 1$ ) or not ( $P = 0$ ). If  $P = 0$ , the game ends and the policy is  $x = q$ .

If  $P = 1$ ,  $A$  chooses a policy  $x_A$ . Then without observing  $x_A$ ,  $C_1$  allocates a proportion of its effective work time to oversight  $s_1 \in [0, 1]$ , simultaneously with  $C_2$ .  $C_i$  then observes  $x_A$  with probability  $s_i$ .

To facilitate analysis, we reflect the policy influence of oversight in a very simple way. If both  $C_1$  and  $C_2$  observe  $x_A$ , then  $x = \frac{\hat{x}_1 + \hat{x}_2}{2}$ . If only  $C_i$  observes  $x_A$ , policy is  $x = \hat{x}_i$ . If neither committee observes  $x_A$ , then  $x = x_A$ . We discuss this setup and alternative specifications below.

When the committees choose oversight levels, they choose in ignorance of the agency's choice  $x_A$ . So the natural equilibrium concept is sequential equilibrium. Given agency policymaking ( $P = 1$ ), the sequential equilibrium consists of optimal oversight levels and agency policy choice,  $s_1^*$ ,  $s_2^*$ , and  $x_A^*$ , in terms of the exogenous parameters  $\hat{x}_1$ ,  $\hat{x}_2$ ,  $\hat{x}_A$ , and  $b$ .

### Substantive motivation

We comment briefly on some of the key assumptions in the model. Foremost is that multiple committees may be involved in oversight. This is clearly true for any federal policy area, where agencies must contend at least with committees from both the House and Senate, as

well as appropriations and often multiple authorizing committees in the same chamber. We are agnostic about the sources of committee spatial preferences, and particularly whether they are driven by the chamber median, majority party, etc. We take these preferences as given and analyze equilibrium behavior under any possible configuration.

Committee oversight “jurisdiction” in the model is endogenous. Each committee has the right, but not obligation, of oversight; each can opt out of oversight jurisdiction by setting  $s_i = 0$ .<sup>11</sup> As noted above, the motivation for this is that both House and Senate committees lack a set of agencies that they are responsible for (or prevented from) overseeing (Clinton et al. 2014).<sup>12</sup> Moreover, committees can oversee any agency they so choose and will frequently be interested in the same agencies as other committees (Aberbach 1990; Jones et al. 1993; King 1997; Evans 1999; Baumgartner and Jones 2010).

Oversight is costly for committees, represented by  $-(\frac{b}{2})s_i^2$  in  $C_i$ ’s utility function. This is because oversight takes time away from drafting and analyzing legislation, constituency service to aid in reelection, fundraising, or hob-nobbing with lobbyists.<sup>13</sup> However, oversight may also be beneficial to committees because it affects agency policy implementation. A committee’s problem is to balance these costs and benefits.

Oversight is also costly for agencies, represented by  $-c(s_1 + s_2)^2$  in  $A$ ’s utility function. There are several reasons for this, including diverting staff time from program implementation and maintenance to preparing for oversight hearings, as well as the possible reputational costs for agencies if they are subject to withering contumely at the hands of congressional committees (Marvel and McGrath 2016).

Our model considers two basic functions of oversight: first, to discover exactly what an

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<sup>11</sup>In equilibrium,  $s_i^* > 0$  for each committee. Corner solutions would be possible in a more general model with more committees and binding resource constraints, or in a model where some committees are unconcerned with the agency’s policy domain.

<sup>12</sup>One approach to defining oversight jurisdictions used by Lewis and Richardson (2017) is to ask government agencies about their perceptions of which committees are overseeing them.

<sup>13</sup>To say nothing of actual resource costs of oversight, which are not modeled here and therefore can be thought of as borne by the whole Congress, not internalized by a given committee.

agency has done (or proposed); second, to influence the committee to change its policy. The first point is equivalent to assuming that committees cannot condition their oversight levels on the agency's policy choice; they use oversight in part to determine what that policy is. The second is equivalent to assuming that oversight has policy consequences (cf. Bawn 1997). Clearly there are many ways to model this aspect. Essentially, we think of oversight as opening a bargaining process between the committee and the agency over policy implementation, and our model posits that all the bargaining power lies with the committees. This is a special case of any model in which oversight discontinuously shifts policy toward the oversight committee's ideal, with the probability increasing in its oversight. The stark assumption of moving exactly to the committee's ideal is less formally cumbersome than, but yields the same comparative statics as, assuming that effective oversight moves policy some proportion of the difference between the committee ideal and the agency proposal.

## Analysis

When the agency enacts a policy ( $P = 1$ ), the probability distribution over policy  $x$  is

$$x^* = \begin{cases} \frac{\hat{x}_i + \hat{x}_j}{2} & \text{with probability } s_1 s_2 \\ \hat{x}_1 & \text{with probability } s_1(1 - s_2) \\ \hat{x}_2 & \text{with probability } s_2(1 - s_1) \\ x_A & \text{with probability } (1 - s_1)(1 - s_2). \end{cases} \quad (1)$$

where  $x_A$  is the agency's enactment and  $s_i$  is committee  $i$ 's oversight.

In view of this distribution, first consider agency policy  $x_A$ . If the agency changes policy, it always enacts its ideal. This is because oversight does not depend on  $A$ 's actual choice  $x_A$ , but the policy outcome  $x$  does. Implementing  $x_A = \hat{x}_A$  delivers the best possible distribution over policy outcomes for  $A$  but does not affect costs of oversight.

**Lemma 1.** *If  $P = 1$ , then  $x_A^* = \hat{x}_A$ .*

In view of lemma 1,  $C_i$ 's problem when the agency enacts a policy ( $P = 1$ ) is

$$\begin{aligned} \max_{s_i} U_i(s_i) = & -s_i s_j \left| \frac{\hat{x}_i - \hat{x}_j}{2} \right| - s_j(1 - s_i)|\hat{x}_i - \hat{x}_j| \\ & - (1 - s_i)(1 - s_j)|\hat{x}_i - \hat{x}_A| - \frac{b s_i^2}{2} \end{aligned} \quad (2)$$

which is concave in  $s_i$ . The first order condition yields  $C_i$ 's best response function

$$s_i^* = \frac{s_j \left| \frac{\hat{x}_i - \hat{x}_j}{2} \right| + (1 - s_j)|\hat{x}_i - \hat{x}_A|}{b}. \quad (3)$$

Equation 3 is informative about  $C_i$ 's incentives for oversight.<sup>14</sup>  $C_i$ 's optimal oversight depends on the ideological conflict between  $C_i$  and  $A$ , and the ideological conflict between  $C_i$  and  $C_j$ . The weight on these two factors is given by  $C_j$ 's oversight level  $s_j$ . If  $C_j$  does little oversight ( $s_j$  is near 0),  $C_i$ 's incentive for oversight comes from the chance to move  $x$  from  $\hat{x}_A$  toward  $\hat{x}_i$ . If  $C_j$  does extensive oversight ( $s_j$  near 1),  $C_i$ 's incentive depends on the conflict between  $C_i$  and  $C_j$ . If there is little conflict ( $\hat{x}_i$  is close to  $\hat{x}_j$ ),  $C_i$  prefers to free ride on the oversight efforts of  $C_j$ , so  $s_i^*$  is small. If there is a lot of conflict,  $C_i$  ramps up its oversight to counteract the influence of  $C_j$  on  $A$ , so  $s_i^*$  is large.

The strategic problem for  $C_j$  yields a symmetric best response  $s_j^*$ . Inserting this into equation 3 gives  $C_i$ 's optimal oversight in equilibrium,

$$s_i^* = \frac{b|\hat{x}_i - \hat{x}_A| + \left( \left| \frac{\hat{x}_i - \hat{x}_j}{2} \right| - |\hat{x}_i - \hat{x}_A| \right) |\hat{x}_j - \hat{x}_A|}{b^2 - \left( \left| \frac{\hat{x}_i - \hat{x}_j}{2} \right| - |\hat{x}_i - \hat{x}_A| \right) \left( \left| \frac{\hat{x}_i - \hat{x}_j}{2} \right| - |\hat{x}_j - \hat{x}_A| \right)}. \quad (4)$$

This helps to unpack the phenomenon of dueling oversight. For instance, suppose  $\hat{x}_A = 0$

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<sup>14</sup>Note that  $s_i^* > 0$  for any  $s_j$ , and  $b/2 > 2$  ensures  $s_i^* < 1/2$ , which matches the typical empirical case on time allocation in committees.

and  $\hat{x}_i = \hat{x}_j = 1$ : the committees are conservative allies. Then equilibrium oversight for each committee is  $s^A = \frac{b-1}{b^2-1}$ . Now suppose  $\hat{x}_j = -1$ ,  $\hat{x}_A = 0$ , and  $\hat{x}_i = 1$ : the committees are ideological opposites. Then equilibrium oversight for each committee is  $s^O = \frac{b}{b^2} > s^A$ . When the committees are allies, they free ride on each others' oversight efforts. When they are opposites, they engage in an oversight "arms race" to counteract each others' advantage in swaying policy, but the expected net effect is that they do not sway policy at all.

Additional strategic insights are provided by the following comparative statics, which are derived in the appendix.

**Proposition 1.** *For flanking committees ( $\hat{x}_j < \hat{x}_A < \hat{x}_i$ ), oversight for  $C_i$  is increasing in  $\hat{x}_i$  and decreasing in  $\hat{x}_A$ . If  $|\hat{x}_i - \hat{x}_A| \leq |\hat{x}_j - \hat{x}_A|$ , then oversight for  $C_i$  is decreasing in  $\hat{x}_j$ .*

**Proposition 2.** *For inside stacked committees ( $\hat{x}_A < \hat{x}_i < \hat{x}_j$ ), oversight for  $C_i$  is increasing in  $\hat{x}_i$  and decreasing in  $\hat{x}_A$ . If  $|\hat{x}_j - \hat{x}_i| > |\hat{x}_A - \hat{x}_i|$ , then oversight for  $C_i$  is increasing in  $\hat{x}_j$ .*

**Proposition 3.** *For outside stacked committees ( $\hat{x}_A < \hat{x}_j < \hat{x}_i$ ), oversight for  $C_i$  is increasing in  $\hat{x}_i$ , decreasing in  $\hat{x}_A$ , and decreasing in  $\hat{x}_j$ .*

Figure 1 illustrates these effects. It shows the oversight level of each committee as  $\hat{x}_2$  varies, with  $\hat{x}_1$  and  $\hat{x}_A$  held fixed.

In all cases, committee  $i$ 's oversight is always increasing in its ideological conflict with the agency,  $|\hat{x}_A - \hat{x}_i|$ . This is apparent from the best response (equation 3), where  $|\hat{x}_A - \hat{x}_i|$  has a direct positive effect on  $C_i$ 's oversight, and is weighted by  $1 - s_j^* > 1/2$ . It is also intuitive: greater conflict between the committee and agency implies that when the agency is left to its own devices in policymaking, the committee will be more displeased with the result. The committee ramps up its oversight to counteract this threat.

The effect of the other committee's ideal point  $\hat{x}_j$  on committee  $i$ 's oversight  $s_i^*$  is more subtle. Intuitively, greater conflict between  $C_i$  and  $C_j$  makes  $C_i$  less happy when  $C_j$ 's oversight is effective, and this induces  $C_i$  to increase its oversight (the "direct effect"). But

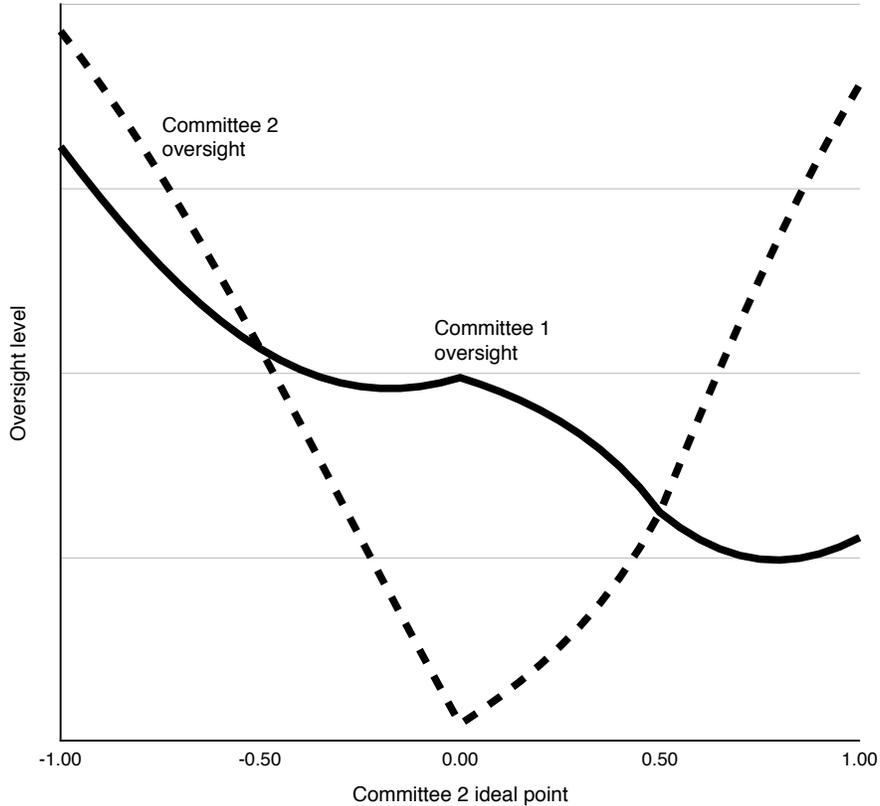


Figure 1: Oversight levels by committee. Assumes  $\hat{x}_1 = .5$  and  $\hat{x}_A = 0$ .

greater conflict between committees may also be associated with lower conflict between  $C_j$  and  $A$  (cf. outside stacked case), and thus less oversight by  $C_j$ ; this induces  $C_i$  to reduce its oversight (the “indirect effect”). In theory, either effect can dominate. Formally,  $C_j$ ’s ideal point also enters  $C_i$ ’s best response, but weighted by  $\frac{1}{2}$  (because  $C_i$  values the benefit of moving  $x$  from  $\hat{x}_j$  to the midpoint of committee ideals) and again by  $s_j^* < 1/2$ . Because of this weighting, the direct effect of  $\hat{x}_j$  on  $C_i$ ’s utility of oversight can be outweighed by the effect of  $\hat{x}_j$  on  $C_j$ ’s own level of oversight. Provided that this indirect effect is not too large,  $C_i$ ’s oversight responds to  $|\hat{x}_i - \hat{x}_j|$  as indicated by the direct effect in equation 3.

## Strategic Incentives vs. Collective Interest

How do the strategic incentives delineated above compare to the collective interest of Congress?

We address this by identifying the optimal oversight levels assuming that a pan-congressional planner directs each committee's oversight, with equal weight on each committee's utility.

This is a decidedly narrow take on Congress's "collective interest," but already broad enough to reveal problems. Incorporating the interests of additional members besides those on oversight committees would not alleviate these problems, as will become clear.

The planner's optimization problem is

$$\begin{aligned} \max_{s_1, s_2} U_P = & -s_1 s_2 |\hat{x}_1 - \hat{x}_2| - s_1(1 - s_2) |\hat{x}_1 - \hat{x}_2| - s_2(1 - s_1) |\hat{x}_2 - \hat{x}_1| \\ & - (1 - s_1)(1 - s_2) (|\hat{x}_A - \hat{x}_1| + |\hat{x}_A - \hat{x}_2|) - \frac{b}{2}(s_1^2 + s_2^2) \end{aligned} \quad (5)$$

which is concave given assumptions on  $b$  and the range of ideal points. The first order condition for the committees' jointly optimal oversight is

$$s_i^+ = \frac{(1 - s_j^+) \Delta}{b} \quad (6)$$

where  $\Delta = |\hat{x}_A - \hat{x}_1| + |\hat{x}_A - \hat{x}_2| - |\hat{x}_1 - \hat{x}_2|$ .<sup>15</sup> The divergence between the collective optimum and equilibrium behavior is highlighted by comparing equation 6 with the best response function, equation 3. On one hand, when committee  $j$  does little oversight ( $s_j$  is small), the social optimum for  $s_i$  includes the benefits of effective oversight to both  $C_i$  and to  $C_j$ . But  $C_i$ 's best response function considers the benefits only to  $i$  in this case. So this factor may push  $s_i^* < s_i^+$ : equilibrium oversight may be too low.

On the other hand, when  $C_j$  does extensive oversight ( $s_j$  is large), the collective optimum

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<sup>15</sup>Note  $\Delta \geq 0$  by the triangle inequality, and  $b > 4 > \Delta$  given prior assumptions on the range of ideal points. Therefore,  $0 \leq s_i^+ < 1$  for each committee.

for  $s_i$  assigns little benefit for moving  $x$  from  $\hat{x}_j$  to  $\frac{\hat{x}_1 + \hat{x}_2}{2}$ . This is merely a transfer of utility from  $C_j$  to  $C_i$  and does not affect their sum total utility. Yet this term receives positive weight in  $C_i$ 's best response function. This factor may push  $s_i^* > s_i^+$ : equilibrium oversight may be too high.

The collectively optimal level of oversight for each committee (solving equation 6 for  $i, j$ ) is

$$s_1^+ = s_2^+ = s^+ = \frac{b\Delta - \Delta^2}{b^2 - \Delta^2} \quad (7)$$

Equal oversight levels by each committee is necessary, but not sufficient, for a collective optimum.<sup>16</sup>

Comparing equilibrium and collectively optimal oversight (equations 4 and 7) yields:

**Proposition 4.** *For flanking committees ( $\hat{x}_2 < \hat{x}_A < \hat{x}_1$ ), equilibrium oversight is inefficiently high. For stacked committees ( $\hat{x}_A < \hat{x}_2 < \hat{x}_1$ ), equilibrium oversight is inefficiently low.*

In the flanking case,  $\hat{x}_2 < \hat{x}_A < \hat{x}_1$  implies  $\Delta = 0$ , so optimal oversight is  $s^+ = 0$  for each committee. Intuitively, since  $\hat{x}_A$  is between the committee ideal points and policy utilities are linear,  $\hat{x}_A$  maximizes the sum of committee payoffs. Therefore, the congressional planner obtains no benefits from oversight. Yet equilibrium oversight is  $s_i^* > 0$  for each committee. The committees collectively waste valuable time neutralizing each other, and more so as their ideal points diverge around  $\hat{x}_A$ . Even though the committees are highly active in oversight, it has no net effect on the expected policy implemented by  $A$  (cf. Clinton et al. 2014). This corresponds to the “dueling oversight” case of opposing committees. Oversight is inefficiently high in equilibrium.

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<sup>16</sup>If  $s_i^+ > s_j^+$ , then oversight could be shifted from  $i$  to  $j$ . Because  $\frac{\partial^2 bs^2}{\partial s^2} > 0$ , this lowers  $i$ 's cost more than it raises  $j$ 's. In addition, it raises the probability that at least one committee's oversight is effective, and thus they obtain any collective interest in shifting  $x$  from  $\hat{x}_A$ .

In the stacked case,  $\hat{x}_A < \hat{x}_2 < \hat{x}_1$  implies  $\Delta = 2(\hat{x}_j - \hat{x}_A)$ , and optimal oversight is  $s^+ = \frac{(b-2(\hat{x}_j-\hat{x}_A))2(\hat{x}_j-\hat{x}_A)}{b^2-4(\hat{x}_j-\hat{x}_A)^2}$ . For  $\hat{x}_A = -1, \hat{x}_1 = \hat{x}_2 = 1$ , and  $b = 4$ , this converges to  $s^+ = 1/2$  for each committee, but equilibrium oversight is  $s_1^* = s_2^* = 1/3$  in this case. Thus, when the committees have a shared interest in moving policy away from the agency’s ideal in the same way, each committee’s oversight will be too meager relative to their collective interest. Each committee prefers to let the other do the heavy lifting of costly oversight, and devote its time to other matters, but neither committee considers the benefits of its oversight for the other committee. Oversight is inefficiently low in equilibrium.

The problem stems from the decentralized structure of Congress. Given that structure, any ideological configuration among committees and agencies leads to one collective action problem or another. Moreover, given decentralization across chambers, it is not the case that greater centralization within a single chamber will necessarily alleviate the problem. For instance, given autonomous Senate committees, the collective inefficiency of oversight may be either greater or smaller when all House oversight is coordinated by the leadership.

## Conclusion

This article considers incentives for oversight of the executive branch by multiple, decentralized congressional committees. We develop a formal model to provide a strategic rationale for “dueling oversight,” in which ideologically opposed committees use oversight in an “arms race” to neutralize each others’ influence on executive branch policy making and implementation. The model shows how both dueling oversight, and the opposite case of sluggish committee oversight, emerge from the same underlying strategic forces.

In addition, the model shows that decentralized oversight among multiple committees across chambers essentially always creates a collective action problem of some sort for Congress. When committees have competing policy goals with regard to an agency, they

use oversight to counteract each other's influence. The benefits of oversight (relative to everything else a committee can be working on) increase for each committee as the other committee invests in oversight. This is because each committee seeks to “undo” the influence of the other committee's oversight efforts. In equilibrium, the competing committees conduct a lot of oversight but with little or no effect on policy outcomes. As we have noted, this matches the empirical finding in Clinton et al. (2014).

On the other hand, when committees have shared policy goals with regard to an agency, neither considers the benefit of its oversight for the other committee and committee efforts at oversight are too low in equilibrium. This is because committees each prefer to free ride on the oversight efforts of the other committee, reserving their time and other resources for other non-oversight activities. This follows the logic of a collective action problem and is similar to the one noted by Gailmard (2009).

With some modifications, the model developed here can apply to oversight by multiple principals across branches of government, for example by Congress and the president. Similar issues to those examined here, but different from those in other models of congressional and presidential oversight of the bureaucracy, arise when oversight is conducted by different branches with competing or aligned policy goals. With this modification, a committee's optimal level of oversight would depend on its ideological conflict with the president and on its ideological conflict with the agency, weighted by how much oversight the president is doing.

This extension could apply, for example, to congressional committee oversight and oversight by the president's Office of Information and Regulatory Affairs (OIRA). Unlike the model of OIRA oversight in Wiseman (2009), our model always entails the agency proposing its ideal policy because oversight does not depend on the agency's proposed policy but the policy outcome does. Moreover, in our model, a congressional committee would benefit from OIRA review when the committee and OIRA were aligned (and in fact could find them-

selves faced with a collective action problem) and would find itself needing to conduct more oversight to “undo” the effects of OIRA review when the two disagreed about agency policy.

The model could be extended to consider the interests of additional members besides those on the oversight committees in how the “collective interest” of Congress is determined. This would further illuminate the answer to the question of how the strategic incentives of oversight committees compare to the collective interest of Congress. Moreover, the model could be extended to consider the interests of the majority party in how the “collective interest” is determined.

Finally, the model could be tested empirically on oversight committees across chambers of bicameral legislatures with overlapping oversight jurisdiction. The model could also be tested empirically on oversight committees within the same chamber with overlapping jurisdiction. The key feature of any application is to multiple committees with shared oversight jurisdiction that can have common or differing preferences over policy.

## References

- Aberbach, J. D. (1990). *Keeping a Watchful Eye: The Politics of Congressional Oversight*. Washington, DC: Brookings Institution Press.
- Aberbach, J. D. (2002). What’s happened to the watchful eye? *Congress and the Presidency* 29(1), 3–23.
- Baumgartner, F. R. and B. D. Jones (2010). *Agendas and instability in American politics*. University of Chicago Press.
- Bawn, K. (1997). Choosing Strategies to Control the Bureaucracy: Statutory Constraints, Oversight, and the Committee System. *Journal of Law, Economics, and Organization* 13(1), 101–126.

- Bolton, A. and S. Thrower (2019). The constraining power of the purse: Executive discretion and legislative appropriations. *The Journal of Politics* 81(4), 1266–1281.
- Clinton, J. D., D. E. Lewis, and J. L. Selin (2014). Influencing the bureaucracy: The irony of congressional oversight. *American Journal of Political Science* 58(2), 387–401.
- Epstein, D. and S. O’Halloran (1999). *Delegating Powers: A Transaction Cost Politics Approach to Policy Making Under Separate Powers*. New York, NY: Cambridge University Press.
- Evans, C. L. (1999). Legislative Structure: Rules, Precedents, and Jurisdictions. *Legislative Studies Quarterly* 24(4), 605–642.
- Feinstein, B. D. (2017). Congress in the administrative state. *Wash. UL Rev.* 95, 1187.
- Gailmard, S. (2009). Multiple principals and oversight of bureaucratic policy-making. *Journal of Theoretical Politics* 21(2), 161–186.
- Hall, R. L. and K. C. Miler (2008). What happens after the alarm? interest group subsidies to legislative overseers. *The Journal of Politics* 70(4), 990–1005.
- Jones, B. D., F. R. Baumgartner, and J. C. Talbert (1993). The destruction of issue monopolies in congress. *American Political Science Review* 87(3), 657–671.
- King, D. C. (1997). *Turf Wars: How Congressional Committees Claim Jurisdiction*. Chicago, IL: University of Chicago Press.
- Kriner, D. and L. Schwartz (2008). Divided government and congressional investigations. *Legislative Studies Quarterly* 33(2), 295–321.
- Kriner, D. L. and E. Schickler (2016). *Investigating the President: Congressional Checks on Presidential Power*. Princeton University Press.

- Lewis, D. E. and M. D. Richardson (2017). Personnel system under stress: Results of the 2014 survey on the future of government service. Technical report, Working paper.
- Lowande, K. (2018). Who polices the administrative state? In *Annual Meeting of the American Political Science Association, San Francisco*. Available at: <https://sites.lsa.umich.edu/lowande/wp-content/uploads/sites/581/2018/04/ksloversight-v4.pdf>.
- MacDonald, J. A. (2010). Limitation riders and congressional influence over bureaucratic policy decisions. *American Political Science Review* 104(4), 766–782.
- MacDonald, J. A. and R. J. McGrath (2016). Retrospective congressional oversight and the dynamics of legislative influence over the bureaucracy. *Legislative Studies Quarterly* 41(4), 899–934.
- Marvel, J. D. and R. J. McGrath (2016). Congress as manager: oversight hearings and agency morale. *Journal of Public Policy* 36(3), 489–520.
- McCubbins, M., R. Noll, and B. Weingast (1987). Administrative Procedures as Instruments of Political Control. *Journal of Law, Economics, and Organization* 3(2), 243–277.
- McCubbins, M. and T. Schwartz (1984). Congressional Oversight Overlooked: Police Patrols versus Fire Alarms. *American Journal of Political Science* 28, 165–179.
- McGrath, R. J. (2013). Congressional oversight hearings and policy control. *Legislative Studies Quarterly* 38(3), 349–376.
- Miller, S. M. and A. I. Ruder (2019). Holding agencies accountable: Exploring the effect of oversight on citizens’ approval of members of congress. *Journal of Public Policy*, 1–22.
- Nou, J. (2019). Civil servant disobedience. *Chi.-Kent L. Rev.* 94, 349.

- Ogul, M. S. (1976). *Congress Oversees the Bureaucracy: Studies in Legislative Supervision*. Pittsburgh, PA: University of Pittsburgh Press.
- Palus, C. K. and S. W. Yackee (2016). Clerks or kings? partisan alignment and delegation to the us bureaucracy. *Journal of Public Administration Research And Theory* 26(4), 693–708.
- Potter, R. A. (2019). *Bending the Rules: Procedural Politicking in the Bureaucracy*. University of Chicago Press.
- Potter, R. A. and C. R. Shipan (2017). Agency rulemaking in a separation of powers system. *Journal of Public Policy*, 1–25.
- Shipan, C. (1997). *Designing Judicial Review*. Ann Arbor, MI: University of Michigan Press.
- Wiseman, A. E. (2009). Delegation and positive-sum bureaucracies. *The Journal of Politics* 71(03), 998–1014.
- Wood, B. D. and R. W. Waterman (1991). The dynamics of political control of the bureaucracy. *American Political Science Review* 85(3), 801–828.

## Appendix: Formal Proofs

*Proof of Lemma 1.* Anticipating oversight levels  $s_1, s_2$ ,  $A$ 's objective function is

$$U_A(x_A) = -s_1(1-s_2)|\hat{x}_1 - \hat{x}_A| - s_2(1-s_1)|\hat{x}_2 - \hat{x}_A| - s_1s_2 \left| \frac{\hat{x}_i + \hat{x}_j}{2} - \hat{x}_A \right| - (1-s_1)(1-s_2)|x_A^* - \hat{x}_A| - c(s_1+s_2)^2. \quad (8)$$

Suppose  $x_A^* \neq \hat{x}_A$  is  $A$ 's optimal policy choice, and let  $s_i^*(x_A^*)$  denote optimal oversight levels for each committee in response.<sup>17</sup>  $A$ 's expected utility is equation 8 evaluated at  $x_A = x_A^*$  and  $s_i = s_i^*(x_A^*)$ , denoted  $U_A^*$ .

If  $A$  deviates to choose  $x_A = \hat{x}_A$ , then its expected utility is  $\hat{U}_A = U_A^* + (1-s_1^*(x_A^*))(1-s_2^*(x_A^*))|x_A^* - \hat{x}_A| > U_A^*$ . Therefore,  $x_A^* \neq \hat{x}_A$  cannot be an equilibrium.  $\square$

*Proof of Proposition 1.* For flanking committees,  $\hat{x}_j < \hat{x}_A < \hat{x}_i$  so equation 4 simplifies to

$$s_i^* = \frac{b(\hat{x}_i - \hat{x}_A) - \left(\frac{\hat{x}_i + \hat{x}_j}{2} - \hat{x}_A\right)(\hat{x}_A - \hat{x}_j)}{b^2 + \left(\frac{\hat{x}_i + \hat{x}_j}{2} - \hat{x}_A\right)^2}. \quad (9)$$

First consider the effect of  $\hat{x}_i$  on  $s_i^*$ :

$$\frac{\partial s_i^*}{\partial \hat{x}_i} = \frac{\left(b - \left(\frac{\hat{x}_A - \hat{x}_j}{2}\right)\right) - \left(\frac{\hat{x}_i + \hat{x}_j}{2} - \hat{x}_A\right) s_i^*}{b^2 + \left(\frac{\hat{x}_i + \hat{x}_j}{2} - \hat{x}_A\right)^2} > 0. \quad (10)$$

The first numerator term is always positive given prior assumptions on  $b$ . Thus a sufficient condition for  $\frac{\partial s_i^*}{\partial \hat{x}_i} > 0$  is  $\frac{\hat{x}_1 + \hat{x}_2}{2} \leq \hat{x}_A$ . If  $\frac{\hat{x}_1 + \hat{x}_2}{2} > \hat{x}_A$ , then  $b - \frac{\hat{x}_A - \hat{x}_j}{2} > b/2 > 1$ . But  $\hat{x} \in [-1, 1]$  implies  $\frac{\hat{x}_1 + \hat{x}_2}{2} - \hat{x}_A < 1$  for flanking committees. Therefore, the numerator is positive and  $\frac{\partial s_i^*}{\partial \hat{x}_i} > 0$ .

<sup>17</sup>This logic assumes that there is a unique interior optimal  $s_i^*$ , which will be shown below.

Second, consider the effect of  $\hat{x}_A$  on  $s_i^*$ :

$$\frac{\partial s_i^*}{\partial \hat{x}_A} = \frac{-b + (\hat{x}_A - \hat{x}_j) - (1 - 2s_i^*) \left( \frac{\hat{x}_i + \hat{x}_j}{2} - \hat{x}_A \right)}{b^2 + \left( \frac{\hat{x}_i + \hat{x}_j}{2} - \hat{x}_A \right)^2} < 0 \quad (11)$$

Since  $b > 4$  it follows that  $1 - 2s_i^* > 0$ . But  $\hat{x}_A - \hat{x}_j < 2$  and  $\frac{\hat{x}_i + \hat{x}_j}{2} - \hat{x}_A > -2$ . It follows that the numerator is negative, so  $\frac{\partial s_i^*}{\partial \hat{x}_A} < 0$ .

Third, consider the effect of  $\hat{x}_j$  on  $s_i^*$ :

$$\frac{\partial s_i^*}{\partial \hat{x}_j} = \frac{-\left( \frac{\hat{x}_A - \hat{x}_j}{2} \right) + (1 - s_i^*) \left( \frac{\hat{x}_i + \hat{x}_j}{2} - \hat{x}_A \right)}{b^2 + \left( \frac{\hat{x}_i + \hat{x}_j}{2} - \hat{x}_A \right)^2}. \quad (12)$$

The first numerator term is always negative. Thus a sufficient condition for  $\frac{\partial s_i^*}{\partial \hat{x}_j} < 0$  is  $\frac{\hat{x}_i + \hat{x}_j}{2} \leq \hat{x}_A$ . However, for  $\frac{\hat{x}_i + \hat{x}_j}{2} > \hat{x}_A$  the sign of  $\frac{\partial s_i^*}{\partial \hat{x}_j}$  for any ideal points depends on  $b$ , and thus cannot be signed unambiguously. Note that for any configuration of flanking committees,  $\frac{\partial s_i^*}{\partial \hat{x}_j} < 0$  for exactly one committee (the one further from the agency), and  $\frac{\partial s_i^*}{\partial \hat{x}_j}$  is ambiguous for the other committee.  $\square$

*Proof of Proposition 2.* In the stacked case,  $\hat{x}_A < \hat{x}_i < \hat{x}_j$  for the inside committee, so equation 4 simplifies to

$$s_i^* = \frac{b(\hat{x}_i - \hat{x}_A) + \left( \frac{\hat{x}_j - \hat{x}_i}{2} - (\hat{x}_i - \hat{x}_A) \right) (\hat{x}_j - \hat{x}_A)}{b^2 + \left( \frac{\hat{x}_j - \hat{x}_i}{2} - (\hat{x}_i - \hat{x}_A) \right) \left( \frac{\hat{x}_j + \hat{x}_i}{2} - \hat{x}_A \right)}. \quad (13)$$

First consider the effect of  $\hat{x}_i$  on  $s_i^*$ :

$$\frac{\partial s_i^*}{\partial \hat{x}_i} = \frac{b - \frac{3}{2}(\hat{x}_j - \hat{x}_A) + s_i^* \left( \hat{x}_i + \frac{\hat{x}_j + \hat{x}_i}{2} - 2\hat{x}_A \right)}{b^2 + \left( \frac{\hat{x}_j - \hat{x}_i}{2} - (\hat{x}_i - \hat{x}_A) \right) \left( \frac{\hat{x}_j + \hat{x}_i}{2} - \hat{x}_A \right)} > 0. \quad (14)$$

In the numerator, the term weighted by  $s_i^*$  is positive. Because  $\hat{x}_j - \hat{x}_A < 2$  and  $b > 4$ , the

numerator is positive. Given  $b > 4$ , the denominator must be positive as well.

Second, consider the effect of  $\hat{x}_A$  on  $s_i^*$ :

$$\frac{\partial s_i^*}{\partial \hat{x}_A} = \frac{-b + \frac{\hat{x}_j + \hat{x}_i}{2} - 2\hat{x}_A - 2s_i^* (\hat{x}_i - \hat{x}_A)}{b^2 + \left(\frac{\hat{x}_j - \hat{x}_i}{2} - (\hat{x}_i - \hat{x}_A)\right) \left(\frac{\hat{x}_j + \hat{x}_i}{2} - \hat{x}_A\right)} < 0. \quad (15)$$

In the numerator, the term weighted by  $s_i^*$  is positive. Further,  $\frac{\hat{x}_j + \hat{x}_i}{2} - 2\hat{x}_A < 3$ . Therefore, given  $b > 4$ , the numerator is negative. The denominator is positive, so the whole expression is negative.

Third, consider the effect of  $\hat{x}_j$  on  $s_i^*$ :

$$\frac{\partial s_i^*}{\partial \hat{x}_j} = \frac{\frac{\hat{x}_j - \hat{x}_A}{2} - (\hat{x}_i - \hat{x}_A) + (1 - s_i^*) \left(\frac{\hat{x}_j - \hat{x}_i}{2}\right)}{b^2 + \left(\frac{\hat{x}_j - \hat{x}_i}{2} - (\hat{x}_i - \hat{x}_A)\right) \left(\frac{\hat{x}_j + \hat{x}_i}{2} - \hat{x}_A\right)} \quad (16)$$

which can be positive or negative, depending on  $b$ . A sufficient condition for  $\frac{\partial s_i^*}{\partial \hat{x}_j} > 0$  is  $\frac{\hat{x}_j - \hat{x}_A}{2} > \hat{x}_i - \hat{x}_A$ , or  $|\hat{x}_j - \hat{x}_i| > |\hat{x}_A - \hat{x}_i|$ .  $\square$

*Proof of Proposition 3.* In the stacked case for the outside committee ( $\hat{x}_A < \hat{x}_j < \hat{x}_i$ ), equation 4 simplifies to

$$s_i^* = \frac{b(\hat{x}_i - \hat{x}_A) - \left(\frac{\hat{x}_i + \hat{x}_j}{2} - \hat{x}_A\right) (\hat{x}_j - \hat{x}_A)}{b^2 + \left(\frac{\hat{x}_i + \hat{x}_j}{2} - \hat{x}_A\right) \left(\frac{\hat{x}_i - \hat{x}_j}{2} - (\hat{x}_j - \hat{x}_A)\right)}. \quad (17)$$

First consider the effect of  $\hat{x}_i$  on  $s_i^*$ :

$$\frac{\partial s_i^*}{\partial \hat{x}_i} = \frac{b - \frac{\hat{x}_j - \hat{x}_A}{2} - s_i^* \left(\frac{\hat{x}_i - \hat{x}_j}{2}\right)}{b^2 + \left(\frac{\hat{x}_i + \hat{x}_j}{2} - \hat{x}_A\right) \left(\frac{\hat{x}_i - \hat{x}_j}{2} - (\hat{x}_j - \hat{x}_A)\right)} > 0. \quad (18)$$

The numerator and denominator are both always positive given assumptions on  $b$  and  $\hat{x} \in (-1, 1)$  for each player.

Second, consider the effect of  $\hat{x}_A$  on  $s_i^*$ :

$$\frac{\partial s_i^*}{\partial \hat{x}_A} = \frac{-b + (1 - s_i^*) \left( \frac{\hat{x}_i + \hat{x}_j}{2} - 2\hat{x}_A + \hat{x}_j \right) + s_i^* \left( \frac{\hat{x}_i - \hat{x}_j}{2} \right)}{b^2 + \left( \frac{\hat{x}_i + \hat{x}_j}{2} - \hat{x}_A \right) \left( \frac{\hat{x}_i - \hat{x}_j}{2} - (\hat{x}_j - \hat{x}_A) \right)} < 0. \quad (19)$$

The denominator is always positive given  $b$ . The sum of numerator terms weighted by  $s_i^*$  and  $1 - s_i^*$  is always less than 4, but  $-b < -4$ , so the numerator is always negative.

Third, consider the effect of  $\hat{x}_j$  on  $s_i^*$ :

$$\frac{\partial s_i^*}{\partial \hat{x}_j} = \frac{s_i^* \left( \frac{\hat{x}_j - \hat{x}_A}{2} \right) - (1 - s_i^*) \left( \frac{\hat{x}_i - \hat{x}_A}{2} + (\hat{x}_j - \hat{x}_A) \right)}{b^2 + \left( \frac{\hat{x}_i + \hat{x}_j}{2} - \hat{x}_A \right) \left( \frac{\hat{x}_i - \hat{x}_j}{2} - (\hat{x}_j - \hat{x}_A) \right)} < 0. \quad (20)$$

Because  $s_i^* < 1/2$ , and the numerator term weighted by  $s_i^*$  is smaller than that weighted by  $1 - s_i^*$ , the numerator is negative. The denominator is positive; therefore the expression is negative. □