GROUP TALK

A PREPRINT

Brian Libgober
Northwestern University
Department of Political Science

Christopher Li
Vanderbilt University
Department of Economics and Political Science

May 12, 2024

ABSTRACT

Persuading political adversaries is hard. Policymakers distrust interest groups with divergent agendas, and yet *organized* interests can sometimes persuade distrustful policymakers despite the lack of technologies for verifiable signaling. How? In this article, we propose that talking as a group can allow for credible cheap talk where uncoordinate communication by individuals would fail. Prior work treat lobbying organizations as unitary actors with unlimited discretion and credible information transmission is possible between approximate allies. We adopt the view that lobbying organization is a mechanism that aggregates the expressed views of its members. Through carefully selecting internal rules of decision and if it is of sufficient size, lobbying organizations can credibly persuade policymakers even when disagreement is large.

Keywords Formal Models, Political Economy, Lobbying, Money in Politics, Interest Groups, Cheap Talk

Introduction

At their first meeting in January of 1913, members of the newly-formed US Chamber of Commerce took a series of votes to determine the positions they would collectively take.[1] Whether or not to support a permanent commission on tariffs was a key issue they considered. Then as now, tariff policy was among the most important issues facing the national government. Shifting political winds, however, promised change. Woodrow Wilson had unified the government in Democratic hands for the first time in two decades and only the second time since the Civil War, largely on a "platform to lower tariffs and eliminate industrial privilege" (Schnietz 1998). Speaking to the attendees of the US Chamber's first meeting, former Republican President Taft urged that historically Republican-friendly constituencies would need to find new and different means to obtain influence over the government, including and especially the creation of lobbying associations like the Chamber. The Tariff Commission resolution passed by an overwhelming 715-9 margin. Despite their initial skepticism, Wilson and Congressional Democrats were ultimately persuaded to create an independent, expert fact-finding agency outside of Congress to inform tariff policy. By agreeing to speak as a group about the advisability of the tariff commission, the commercial interests making up the Chamber had achieved a policy victory that few would have expected upon Wilson's inauguration.

1. This episode is described in Katz's *The Influence Machine: The U.S. Chamber of Commerce and the Corporate Capture of American Life* (2015).

Interest groups such as the U.S. Chamber of Commerce have many strategies for influencing the policy environment. They may target reelection-minded politicians by donating to political campaigns or directly advertising themselves. More subtly, they may subsidize the mobilization of grassroots movements (Kollman 1998; Skocpol and Hertel-Fernandez 2016). Yet the amount of interest group investment in such activities is dwarfed by their expenditure on lobbying (Ansolabehere, Figueiredo, and Snyder 2003). The enormous investment in lobbying relative to campaigns creates many puzzles for interest group scholars. How can this information have any value given the conflicting interests between interest groups and politicians? Why should politicians believe anything that lobbyists have to say? Why are there lobbyists if politicians do not believe them?

Some scholars have resolved this puzzle by arguing that most of the lobbying we observe must not suffer from severe conflicts of interest, so it should occur mostly between allies (Chakraborty and Harbaugh 2010). In the account of Hall and Deardorff (2006), interest group lobbying takes the form of policy subsidy to like-minded politicians. Crawford and Sobel's famous model of cheap-talk allows the possibility of credible information transmission provided conflicts of interest are small, but not if conflicts are significant. Neither account can persuasively explain examples like the tariff commission, where a lobbying organization with significantly different interests from a decision-maker nevertheless succeeds in providing credible information that leads to policy change beneficial to the lobbying organization. Pressed to explain how such persuasion occurs, interest group scholars may explain the Chamber's success through costly investments demonstrating the credibility of the information they shared. Yet this account also has weaknesses. It presumes the availability of technology for establishing credibility, but such technologies may not exist. Outside experts may quickly lose credibility once an audience learns that a lobbyist has paid for their opinion. Even without obvious conflicts of interests, policymakers may distrust scientific research. The policy area may have a large degree of inherent uncertainty that makes "fact-finding" difficult. One has a hard time conceiving what contemporary social scientific evidence could "verify" the advisability of a tariff commission today, let alone in the 1910's. In short, theoretically, more work is needed to explain how interest groups can credibly convey information to opponents. Moreover, the literature must consider what those explanations imply about the kinds of information that policymakers do and do not receive.

This article presents an alternative account of how organized interests like the Chamber of Commerce can credibly transmit information in cheap talk settings. Lobbying organizations like the US Chamber of Commerce are agents that serve many principals with similar and at times divergent interests. To solve the problem of divergent preferences between stakeholders and to present a unified front, these lobbying organizations often adopt explicit by-laws determining the circumstances in which they advocate or oppose particular policies. Majority voting procedures such as the ones the Chamber used for deciding on their collective positions are a typical example. Alternatively, organizations may have more "informal" norms that would be hard to make explicit. Whether formal or informal, these *norms of aggregation* constrain the discretion of lobbying organizations in their advocacy, which helps make their communication believable. If the politician asks the lobbyist, "Why should I believe you?" then the lobbyist can respond, "if matters were different, my members would not allow me to be here today." Put differently, cheap talk only seems possible

between near allies because most models presume that the lobbying organization is a unitary organization with unlimited discretion. If one makes an alternative (and typically more realistic) assumption that the lobbying organization may have its own internal decision-making constraints, even enemies can credibly share information so long as the counter-party's decision constraints are known.

We illustrate our perspective and test its implications using a simple model, adapted from Gradwohl and Feddersen (2018), of informational lobbying by a group of actors seeking to persuade a decision-maker. In our model, firms[2] have private information about a common state of the world. The common state determines the benefit each individual expects from a policy, and also the advisability of a policy in the eyes of the decision-maker. Our primary goal is to contrast the extent of information transmission that occurs in equilibrium when (A) each individual is only able to lobby in a *decentralized* fashion with the decision-maker, with (B) when individuals are able to engage in "group talk" through collective rules of decision.

Analysis of the formal model arising from these assumptions confirms our hypothesis that institutional association is a technology that can allow credible communication in situations where, without organization, distrust would lead only to uninformative equilibria. Put differently, associations can have influence over public policy by providing a credible channel of elite communication, which policymakers would dismiss as noise if communicated and delivered in an uncoordinated way outside the institutional structure the association provides. Crucially, the credibility of the signal the association can provide to policymakers depends on the suitability of their preference aggregation procedures. We show that for some simple voting rules, groups can communicate effectively provided they are of sufficient size. But increasing size comes at a costs, in particular in the form of increasing diversity that makes cohesion harder. We consider alternative rules that tie the association's positions to the contributions that firms make and also revenue maximizing associations. Reports suggest that the Chamber of Commerce has increasingly tied its collective position taking to the contributions made by individual members (Swenson 2018), a shift from the more directly democratic procedures that characterized its lobbying earlier in the 20th century.

While our results are "optimistic" in the sense that associations provide a useful (if incomplete) information aggregation function, which improves the policymakers decision-making, these findings say nothing about when and where association occurs. We are mindful that groups do not automatically form (Wilson 1973). Some interests in society are in a better position to get and stay organized than others. Wealth and other resources have a lot to do with that position (Schlozman, Verba, and Brady 2012). To the extent that ease of association is not distributed equally in society, we should expect unequal influence over policy. The political economy literature of recent decades has made important strides in emphasizing the limits of lobbying power. The perspective that emerges from studying models of cheap talk, legislative subsidy, and costly verifiable information, all provide a ready antidote to a simple "vending-machine" model of government where money goes in and policy comes out. The literature has had much less to say about how and why organizations like the US Chamber of Commerce are able to influence policymakers who are often skeptics.

2. Following our motivating example, we will often assume that individual actors are firms, although this is a stylistic choice and in principle the results could relate to any kind of actor that has the potential to organize as a group for recommending a policy, for example: faculty members in a university, nation states in a multinational body such as the United Nations, and so forth.

Category	Notation	Description
Nature	$\omega \in \{H, L\}$	State of the world: H for high, L for low
	p	Accuracy of the signal: $p = \Pr(h \mid H) = \Pr(l \mid L) > \frac{1}{2}$
DM	$a \in \{\text{default}, \text{alternative}\}$	Policy choice of the decisionmaker: default or alternative
	$\bar{\tau}$	Belief threshold necessary for DM to prefer the alternative policy
Firms	τ_i	Belief threshold of firm i, ordered so $\tau_i \leq \tau_{i+1}$
	s_i	Signal that firm i receives, either h or l
	σ_i	Strategy of firm i, maps s_i into a probability of recommending the alternative

Table 1: Notation used in the paper

There is, of course, a large literature discussing notions such as the structural power of business (Lindblom 1977). However it is sometimes difficult to see concretely how such a "sociological" mechanism might work, and moreover such an approach often struggles to fit their accounts with findings that tend to find no or very limited effects of political spending.

The simple mechanism we document here highlights the importance of continuing to investigate important puzzles about the logic and power of association. How do associations combine member preferences? How do policymakers interpret unity and disunity of business interests? When and why do some firms go it alone? We discuss these and other possible future directions for formal as well as empirical research on this topic in our conclusion.

1 Model

Suppose there are $2N$ firms indexed by i, where N is a natural number, and a decision-maker (DM). The assumption of even number of firms simplifies notation and is inessential. The firms advise DM on a choice between a default policy and an alternative policy. The desirability of the alternative policy, which we will often call the policy when there is no possibility of confusion, depends on an unobserved state of the world, denoted as $\omega \in \{H, L\}$. All players share a common prior that $P(H) = 1/2$. The firms and DM have state dependent preferences over policies. Formally, let $u_i(a, \omega)$ and $u_{DM}(a, \omega)$, be the utility that firm i and DM receives from policy $a \in \{\text{default, alternative}\}$ and state ω. All players prefer policy that matches the state. In particular, both firms and DM prefer the alternative policy to the default if the state is H and vice versa if the state is L.[3] However, firms and DM may differ in their view of the benefits from matching and downside of failing to match. As a result, firms and DM have potentially different preferences about policy when facing uncertainty.

Observe that the a player's preferences over policies under uncertainty can be equivalently depicted in terms of a belief threshold which is the (posterior) probability of state H that makes them indifferent between the default and alternative policy. Formally, let $\bar{\tau}$ denote such belief threshold of the DM. Thus, if ρ is the (posterior) probability DM assigns to H, then he prefers the alternative if $\rho > \bar{\tau}$ and the default if $\rho < \bar{\tau}$. Similarly, we define the belief thresholds for firm i as τ_i and without loss of generality, we assume that $\tau_i \leq \tau_{i+1}$. For most of our analysis, it is simpler to work directly

3. Formally, $u_{DM}(\text{default}, L) > u_{DM}(\text{alternative}, L)$ and $u_{DM}(\text{alternative}, H) > u_{DM}(\text{default}, H)$, and that similar inequality holds for the firms.

with belief thresholds rather than utilities, thus henceforth we will suppress any explicit references to utilities unless it is necessary.[4] Table 1 summarizes the notation used throughout the paper.

In order to simplify the analysis that follows, we make the following assumption about the relative position of the DM and the firms.

ASSUMPTION 1. *The DM is status-quo biased* ($\bar{\tau} > \frac{1}{2}$)*, and the firms are uniformly more supportive of the alternative policy than the DM* ($\tau_{2N} < \bar{\tau}$).

The difference between τ_i's and $\bar{\tau}$ reflects the conflict of interest, or disagreement about the relative appeal of the alternative policy, between the firms and the DM. Our assumptions imply that absent any additional evidence the DM will reject the policy innovation. We allow for the possibility that the firms may also prefer the status quo. Our only requirement is that it is easier to convince the firms that the state is H and that the alternative is therefore preferred. Note that although we will often gloss the default policy as the "status quo", this is entirely stylistic and should not be regarded substantively. The terms "default" or "status quo' are justified by the fact that such a policy is what the DM will choose under the prior and without intervention. All that matters is that the firms are more inclined than the DM to choose one policy over the other.

At the beginning of the game, each firm receives an independent, identically distributed signal $s_i \in \{h, l\}$ of the state, with

$$\Pr(h \mid H) = \Pr(l \mid L) = p > \frac{1}{2}.$$

Thus firms possess private information that is potentially valuable to DM's decision-making. The parameter p captures the *accuracy* of the firm's signal. A firm can communicate its signals via cheaptalk. Specifically, firm i can send a message/report $m_i \in \{0, 1\}$ with 1 indicating it received signal h and 0 that it received signal l. More generally we can think of these messages as statements/rationales in favor of the default versus the alternative policy. For reasons that will become obvious, we will use the terms votes and messages interchangeably.

Our analysis centers around the comparison of two modes of communication between firms and DM. The first mode involves each firm sending a message privately and independently to the DM.[5] We shall refer to this as "uncoordinated" talk. The second mode of communication involves an intermediary representing the firms as a collective whole and communicating to the DM on behalf of the group. We refer to this communication protocol as group talk. For the purpose of this paper, we abstract from the potentially complex internal politics of an association and consider the association to be synonymous with a mechanism of aggregating recommendation from the firms. For example, the association can adopt a simple voting rule (e.g. three-fifths majority rule) whereby the firms vote between the two policies and the association makes an up-or-down recommendation to the DM based on the outcome of the vote. Upon observing the reports from the firms or from the association (depending on the mode of communication), the DM implements one of the policies. The two modes of communication are illustrated in Figure 1.

4. An explicit utility specification that induces belief threshold is given in Section 3.2.
5. We can relax the assumption of privacy if the firms announce messages simultaneously.

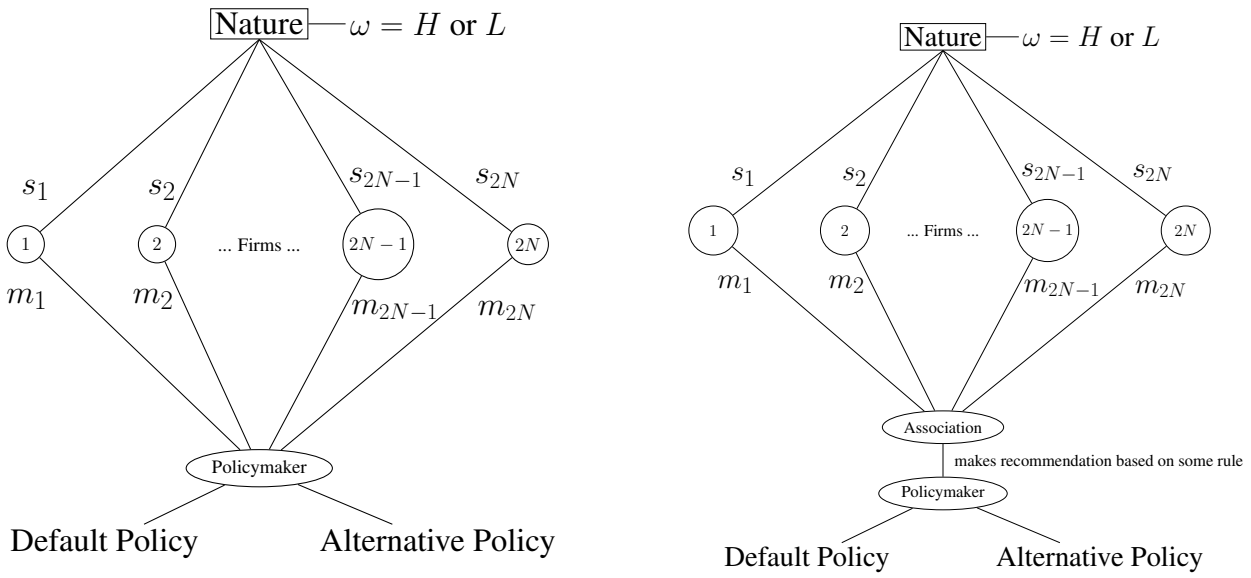

Figure 1: *Order of play*. Diagrams of the communication games we study. LEFT: Uncoordinated talk. RIGHT: Group talk.

Firm i's strategy is a function $\sigma_i : \{h, l\} \to [0, 1]$ that maps the set of signals into a probability of supporting the alternate policy. For example, $\sigma(h) = 1$ and $\sigma(l) = 0.5$ reflect that the firm *always* recommends the alternate policy if it has supportive information and flips a fair coin to decide whether to recommend if it receives unfavorable evidence. Denote the DM's information under a given communication mode as $r(\{m_1, m_2, \ldots, m_{2N}\}; C)$ where $C \in \{\text{uncoordinated , group}\}$. The DM's strategy is a function $d(r) \in \{\text{default}, \text{alternate}\}$. We consider the standard Bayesian equilibrium where the DM's beliefs on path are correct and off-path beliefs are freely specified.

2 Uncoordinated Talk

Recall under uncoordinated talk, firms communicate privately and independently to the DM by sending message m_i. The DM observes the profile of recommendations $\{m_1, m_2, \ldots, m_{2N}\}$, then decides which policy to implement. See Figure 1 left panel for an illustration of the game form. By definition of the belief thresholds, the DM implements the policy if and only if the posterior probability that he assigns to state H exceeds $\bar{\tau}$. Because the DM's decision affects all firms, each firm must consider how their message will sit in the context of messages the policymaker receives from other firms. And thus, as is in settings of collective decision in common value environment (e.g., jury/committee voting), honesty is not necessarily the optimal course of action for the firms (see for example Austen-Smith and Banks (1996) and Feddersen and Pesendorfer (1998)). As in a jury voting setting, the relevant strategic question for a firm is what it would find optimal in the event that its report is pivotal (i.e., the DM's decision is on a knife-edge). One complication relative to the canonical jury voting context is that the outcome is not determined by some exogenous voting rule such as "it takes 9 or 10 guilty votes to convict." Here, the strategic firms are faced with an equally rational

and farsighted DM who is aware of potential dishonesty from firms. In this sense, the model is a hybrid of jury voting and cheaptalk models.[6]

To give a road-map of our analysis, we will first establish that absent coordination, there is a complete unraveling of communication between firms and the DM if extent of the conflict of interest between the firms and the DM is large. This result is a straightforward extension of Lemma 1 of Gradwohl and Feddersen (2018) (but see also Wolinsky 2002; Battaglini 2017)). We then show that group talk can in fact help overcome such unraveling in communication. All proofs are contained in the Appendix.

PROPOSITION 1. *If the firm most tolerant of the default policy has a belief-threshold below a critical value i.e.,*

$$\tau_{2N} < \frac{\bar{\tau}(1-p)^2}{\bar{\tau}(1-p)^2 + (1-\bar{\tau})p^2} \equiv \bar{\tau} - \epsilon,$$

then there is no equilibrium in which the DM chooses the alternative policy with positive probability.

Note that this negative result about the impossibility of communication can occur despite the possibility that signals would have been persuasive enough to convince the DM to adopt the alternative, if they could be credibly revealed. Indeed, the signals from firms could be overwhelmingly positive for the alternative policy and the DM would still have difficulty believing the firms. As is typical of cheap talk models, this breakdown in trust occurs because the DM cannot ignore the strategic incentives of the firms to misrepresent given the size of the conflict of interest between them. In particular, each firm thinks strategically about what to tell the DM in the circumstance that their recommendation is pivotal. The firm should reason that the circumstance in which the DM is on the fence is clearly one in which the firm considers the evidence overwhelming. Therefore, it becomes rational for a firm to ignore *her own* private signal and "go with the crowd." Such dynamics leads to a breakdown of informative voting in a jury voting context, but in this context leads to a breakdown in credible communication. Indeed, the DM would be unsurprised by overwhelmingly lopsided communications from the firms in favor of the policy: that is the expected communication pattern regardless of whatever signals are realized.[7]

To the extent that the problem in communication occurs because of the conflict of interest as measured by $\bar{\tau} - \tau_{2N}$, it is natural to consider whether communication *is possible* if the conflict of interest between one or more firms and the DM were smaller. Proposition 7 in the appendix establishes a partial converse to Proposition 1 by showing that effective communication is indeed possible if there are enough firms that are closely aligned with the DM. If the DM is relatively indifferent between the default and the alternative policies, it is possible that one "trusty" firm with a similar outlook could suffice. On the other hand, if the DM is a bit more reluctant to adopt the alternative, it may take more than one firm with sufficiently similar preferences to have any chance of convincing the DM to adopt an alternative

6. Note that unlike in a standard cheaptalk model, the fact that there are multiple firms (senders) are what makes information transmission a non-trivial problem. In our setting if there were only one firm, then it is weakly dominant for the firm to report sincerely its private signal.

7. It is worth noting that this proposition generalizes the results of the Swing Voter's curse in important ways. In particular, in this context because firms do not face an exogenous mapping from the profile of votes to policy outcomes, but rather a sophisticated DM, it is less clear in this context whether some truthful communication is possible through clever calibration of (possibly mixed) strategies. The proposition provides a strong answer in the negative.

policy. That said, Proposition 7 shows that the conflict of interest is the primary culprit for communication breakdown, reminiscent of lessons from the cheap talk literature.

The following is a numerical illustration of Proposition 1 of the critical threshold in the conflict of interest between firms and the DM. Suppose the DM is indifferent between the default and alternative policy when state H is 70% likely i.e, $\bar{\tau} = 0.7$. Suppose the precision of firms signals is $p = 0.6$. In this case, $\bar{\tau} - \epsilon \approx 0.51$. Therefore if all of the firms have belief thresholds less than 0.51, no effective communication is possible under uncoordinated talk.

3 Group Talk

Under group talk, the firms sends messages m_i to an intermediary, which we call the trade association. The intermediary takes this set of messages and maps the reports to a binary recommendation (e.g., we support the alternative/default). The space of all potential aggregation rules is large, and here we focus on simple voting rules in the form of q-rules, i.e., the group recommends the alternative policy if and only if more than q of the firms vote in favor of the alternative. For some associations, these rules are written explicitly in their bylaws. Other associations may have a softer or unwritten rule requiring more than the bare minimum of majority support, or even requiring quasi-unanimity (Bauer, Pool, and Dexter 1963). Where to draw the line is at times debated by organizations (e.g. Nossiter 1962; Egerod, Libgober, and Thieme 2024). For our purpose, we abstract from the question of how the association come to select a voting rule and ask simply whether there exists a rule that can induce beneficial information transmission. Thus, the firms and the DM simply takes the rule as given. In a later section, we consider schemes that tie collective recommendations to firm's individual contributions, which has reportedly become an important part of contemporary practice at the Chamber since the 1990's (Katz 2015; Swenson 2018).

Before proceeding to the analysis, we wish to emphasize two points. First, we do not presume the firms are honest in their communication to the association anymore than they are with the DM under uncoordinated talk. This distinguishes us from previous work that also considers ways to overcome communication breakdown (e.g., Battaglini 2017; Gradwohl and Feddersen 2018). One of the key questions about the potential of group talk is whether one can come up with a simple rule that induces the firms to vote truthfully while otherwise uncoordinated talk fails. We also abstract away from any informal deliberation and discussion among the members prior to the votes. As we see below, such interactions are not necessary to make group talk a viable solution for information transmission.

We also wish to emphasize that inducing truthful recommendations from the members does not in itself suffice for group talk to be successful. A key difference between uncoordinated and group talk from the DM's point of view is that under the former the DM observes the entire profile of messages, $\{m_1, m_2 \ldots, m_{2N}\}$, while under the latter he observes a coarse summary of the reports. Specifically, given our focus of simple voting rule, the DM observes the value of the indicator function $\mathbb{1}\{\sum_i m_i \geq q\}$. Aggregating reports this way results in information loss, all else equal, and therefore it is not obvious that group talk will permit material information transmission to the DM even when the firms report truthfully to the association.

3.1 Homogeneous firms

The core mechanism of group talk can be best illustrated in the special case where $\tau_i = \tau$ for all i (i.e., homogeneous firms), and so this will be our focus before moving on to the general case of heterogeneous firms. The first key result is establishing the possibility of designing a simple voting rule that incentivizes firms to share information truthfully with the group and also ensures that the group recommendation will achieve effective communication if the number of firms is large, despite information loss through the aggregation process.

To state the result, let us define $\psi(N, k)$ to be the posterior probability the state is H if the DM observes exactly k signals out a total set of $2N$ signals having realization h.[8]

PROPOSITION 2. *Suppose the association adopts a q-rule defined by*

$$q^* = \min \{k : \psi(N, k) \geq \tau\}, \tag{1}$$

then for N sufficiently large, there exists an equilibrium in which all firms report truthfully to the association and the DM follows the association's recommendation.

Recall the first building block for effective group talk is to give firms incentive to communicate truthfully with each other.[9] In this model, incentive to communicate truthfully depends on the specification of the q-rule, as different vote thresholds lead to different pivotality events, and pivotality is the overriding strategic factor in a firm's decision. For example, a simple majority rule (i.e., $q = N + 1$) implies that the pivotal event is when exactly N other firms voted for the alternative policy. Meanwhile, a unanimity rule (i.e., $q = 2N$) implies that the pivotal event is when exactly $2N - 1$ other firms voted for the alternative policy. Assuming all other firms vote according to their signals (i.e., $m_j = 1$ if and only if $s_j = h$), then the two pivotal event above carry very different implications for firm i's belief updating. In particular, the circumstances in which firm i is pivotal under the unanimity rule implies overwhelmingly favorable evidence for the alternative policy. If a majority rule is imposed, then pivotality implies that the evidence from other firms is much more mixed, assuming that their reports are truthful. Unless the rule is calibrated properly, the firm has incentive to ignore its private information. The q-rule specified in Formula (1) is calibrated to induce the pivotal event that makes the firms just about indifferent between the default and alternative policy so that the firms have strict incentives to vote according to their signals. The need to align firms' incentives imposes a very strong constraint on the choice of threshold, as q^* is generically the only threshold that induces full sincere voting.

Assuming the firms find a way to share truthfully amongst themselves by selecting the right q-rule, the second piece to the puzzle of effective group talk is whether the association's recommendation can persuade the DM. Assuming firms vote truthfully, the DM can only infer from the association's recommendation that there is at least q^* firms with $s_i = h$

8. Formally,

$$\psi(N, k) = \frac{p^k (1-p)^{2N-k}}{p^k (1-p)^{2N-k} + (1-p)^k p^{2N-k}}.$$

9. When we reach the case of heterogeneous firms below, we will allow some dishonesty within the group, although as we shall see there should still be an "honest core" where the dynamics are similar to what we describe here

out of a total of $2N$ firms, which may or may not be strong enough information to convince the DM to choose the alternative policy. For example, knowing that out of twenty total firms, as few as three or as many as twenty received h signals gives the DM pretty limited evidence that the state is H. In this case, the firms' incentives pose a potentially problematic constraint in so far as the q^* that allows firms to trust the association will send the preferred message to the DM on their behalf is also a q^* that ensures the DM never trusts the signal it receives. In order to convince DM to choose the alternative, one would want to set a higher q that would prove more persuasive to the DM, as it would mean the case for the alternative is relatively stronger. Doing that, however, will violate the firm's incentive compatibility constraints, especially given the firms are already more favorable to the alternative than the DM.

Fortunately, if the number of firms is large enough, then there is a way out of this bind. A special feature of the q^* is that it takes the form of $N + \delta$ for an integer (possibly negative) δ that is independent of N. When updating its beliefs under the circumstance that it is pivotal, the firm cares only about the margin between yes and no votes from the other firms. Thus for large N, q^* closely resembles a simple majority rule. Moreover, the law of large numbers implies that knowing that at least half of the $2N$ signals yield h is arbitrarily informative about the true state being H.[10]

Recall from Proposition 1 that uncoordinated talk is ineffective if $\tau < \bar{\tau} - \epsilon$ (i.e., the DM is irresponsive to the firms) regardless of N. Proposition 2 shows that group talk can overcome the unraveling of communication if N sufficiently large in that the DM follows the recommendation by the association. It is easy to see, by a revealed preference argument, the improvement in communication due to group talk leads to greater welfare for both the firms and the DM.

COROLLARY 1. *If N is sufficiently large and $\tau < \bar{\tau} - \epsilon$, the firms and the DM are better off under group talk than uncoordinated talk.*

So far we have taken for granted firms' participation in the association. The fact that group talk improves firms' welfare means that there is a natural drive for the firms to voluntarily form an association and abide by its rules. This would be true even if the association requires a (small) due. Observe further that voting rule q^* implements the best outcome for the firms in that the DM implements the alternative policy if and only if the firms find it optimal given all the signals. This means that firms would have no incentive to go behind the group's back and lobby the DM through private channels. This contrasts with more traditional theories of collective action (e.g., collusion), which always features a present danger of individual firms deviating and undermining the collective.

How large does the association need to be? Recall from the numerical example for Proposition 1 that uncoordinated talk would be ineffective regardless of the number of firms when $\bar{\tau} = 0.7, p = 0.6, \tau = 0.5$. It can be shown that if there are at least 12 firms, then group talk would be effective under a simple majority rule. Specifically, the posterior probability that DM assigns to state H would be approximately 0.71 when the association provides a positive recommendation for the alternative policy. Numerical exercises show that for a variety of reasonable parameter specifications, the minimum number of firms required for group talk can be as low as single digits and at times in the

10. This observation also appears in Battaglini (2004) and Gradwohl and Feddersen (2018).

several dozens of firms (see Table 2 in appendix). Thus, while the group size necessary to theoretically guarantee the DM listens to a recommendation in all circumstances knows no limit. In practice the N can often be within the realm of group sizes that trade associations routinely organize around. In the discussion section below, we return to the group size issue and consider how the returns to scale in terms of communication relate to the more familiar challenges that come with size the literature describes. We shall be better positioned for this discussion after considering heterogeneity in firms.

Comparative statics and testable implications We now provide some comparative statics of key endogenous variables that can easily translate to testable hypotheses to guide future empirical studies. In particular, we focus on the threshold rule q^* necessary for effective group talk and $\tilde{N}$, the minimum group size that permits effective communication. Interest group scholars have long shown an enormous interest in group sizes and there are rich sources of data about these in both the US and comparative context. Lowery, Halpin and Gray's edited volume *The Organization Ecology of Interest Communities* (2015) is a good introduction. The inclinations of trade associations toward privacy makes identification of q^* more challenging. To the extent the literature engages the topic, it has often done so by repeating the anecdotal claims of Bauer, Pool, and Dexter (1963) that business associations typically proceed on the premise of unananimity or quasi-unanimity, which Bauer, Pool, and Dexter themselves indicate through numerous examples is far from universally true. That said, we think there are diverse empirical strategies that could engage more systematically with the issue of how much consensus business associations actually require, and the circumstances influencing them to require more or less. Recently, Delton (2020) and Mizruchi (2013) have leveraged archival methods to produce rich qualitative analyses of particular associations and their decision-making processes on particular issues over time. Strolovitch (2007) uses surveys to study the decisions about whether to support particular policies for a comparable class of advocacy organizations. Broockman (2012) and Swenson (2018) debate the use of public opinion polling and imputing interests with contemporary economic data. Egerod, Libgober, and Thieme (2024) collect a large sample of association bylaws by requesting from the IRS copies of these organization's applications for tax exempt status. Convinced that both group size and group consensus requirements are empirically ascertainable quantities, we turn to our predictions about what should influence them.

PROPOSITION 3. *The voting thresholds q^* that homogeneous associations optimally choose have the following properties*

1. *q^* is independent of the DM's minimum acceptable standard of evidence to adopt the alternative policy $\bar{\tau}$.*
2. *$\frac{q^*}{2N} \to \frac{1}{2}$ as $N \to \infty$.*
3. *q^* is increasing in τ. If $\tau > 1/2$ then $q^* \geq N$ (i.e., super-majority rule), and q^* is decreasing in p. If $\tau < 1/2$ then $q^* \leq N$ (i.e.,a sub-majority rule), and q^* is increasing in p.*

The first bullet states that the voting threshold is independent of the bias of the DM. This claim has important real world implications. In particular, one potential question is whether associations would have different voting thresh-

olds depending on the particularities of the strategic situation they confront. The US Senate, for example, has rules that provide different voting thresholds for budget reconciliation items (51 votes) and regular legislation (60 votes), presumably because the consequences of failing to pass a budget are more worrisome than failing to pass regular legislation. If the firms' evidentiary standard τ differs across issues, for example they are more desirous of change on the dimension of guns than on butter, then the model would permit different voting standards across issues. That said, we might also imagine that firms would strategically tailor their decision-rules (and hence their positions) to the DM they confront (Broockman 2012). But the model suggests that at least in the case of homogeneous organizations, they would not do this. Whether groups change their rules in response to shifts in political power due to elections is a natural question that could be investigated and falls directly from the model.

The second bullet shows that larger groups tend toward majoritarian procedures. This expectation differs from the (mostly anecdotal) evidence that the literature offers. In particular, the criticism of the US Chamber of Commerce and the National Association of Manufacturers in the middle part of the century was that they had difficulty taking any position or reflexively opposed all policy changes (Delton 2020), suggesting their threshold to support change was relatively high. That said, both groups (but especially the NAM) also faced widespread accusations of irrelevance in this period, and it is a reasonable question whether other more effective groups (or these groups in their more effective periods) would have figured out that majority rules work better, at least in this model of the lobbying problem. Furthermore, as we shall see when we allow for heterogeneity among firms, sometimes the voting threshold is high because some firms are potentially dishonest in their voting.

Finally, the third bullet examines the relationship between the tolerance of the group of firms for the policy and the decision to send a supportive signal. If the members are inherently skeptical of the policy alternative, then they will tend toward super-majoritarianism. If they are inherently credulous towards these kinds of alternatives, then they will prefer sub-majority rule. The admittedly perplexing governance decisions that Katz (2015) and Swenson (2018) describe the Chamber of Commerce of the 1990s adopting are potentially explicable through this proposition. In particular, these authors both argue that the Chamber now advocates for policy changes that few of its members support. Each describe various motivations. For Katz, this occurs because the Chamber President Tom Donahue is an extreme ideologue who has more-or-less captured the organization. Swenson on the other hand seems to regard this behavior as primarily a money-making scheme for the association. A serious question for both accounts is why strategically-minded business associations would foot the bill for organization membership if the group is so badly governed. Our model suggests a third possibility. In the face of an environment that business broadly perceives as increasingly hostile, the Chamber may have adopted governance rules allowing the organization to support deregulatory policies even when few members support it. Bad associational governance, or the kind of governance that the association needs to meet the moment? We do not resolve the puzzle, which we consider an empirical one, but at the very least our account does not raise the question of incentive compatibility that one might raise about other accounts.

The fact that the voting rule is sensitive to the firms' issue positions raises the question whether it is an appropriate description of associations which may lobby on a variety of issues. There are several responses to this. For some

associations, the voting thresholds may not be explicitly codified in the by-law but may be determined informally for each issue independently. Even if a voting threshold is explicitly stated in a by-law, the "real" votes may have occurred beforehand, through say a straw-poll,[11] Alternatively, the association may rely on other informal and more flexible processes to supplement a fixed voting rule in aligning firms incentives (see the section on vote-contingent payment below).

Having explored the empirical implications about group consensus, we turn to issue about membership size. In particular, how many members are necessary to render group talk effective.

PROPOSITION 4. *Let $\tilde{N}$ be the smallest N that induces group talk to be effective (i.e., DM follows the association's recommendation). $\tilde{N}$ is increasing in $\bar{\tau}$ and decreasing in τ.*

Recall that the conflict of interest as measured by the difference in bias $\bar{\tau} - \tau$ determines the viability of communication, which sufficiently large groups can overcome. No surprise then that as DM becomes more reluctant to support the policy, groups need to be bigger to have a chance of influence. The groups that are more aligned with the policymaker can afford to be smaller. The contrast between Mizruchi's portrait of the highly influential, and relatively small Committee on Economic Development in the 1950's and early 1960's and Delton's portrayal of the enormous, but ineffective, National Association of Manufacturers in the same period fits the expectations of the model. In particular, the fact that the liberal-minded members of the CED were more aligned with policymakers than the membership of the NAM, an organization whose leadership infamously circulated a 200-page letter insisting that Republican President Dwight Eisenhower was a communist,[12] no doubt contributed to the differential credibility of these organizations before policymakers of the time. More generally, we may speculate that business associations "bulk up" as their distance from relevant policymakers grows, since the possibility of uncoordinated talk succeeding diminishes in this case and the relative desirability of coordinated talk grows. Truman (1951) argues that groups organize when threatened with policy changes, although the mechanism by which their organization will produce compensating "pressure" is somewhat vague. Our model fills in some of the details here. Larger groups can credibly communicate to decision-makers in circumstances when, left to their own devices or organizing at insufficient scale, effective communication would prove impossible.

3.2 Heterogeneous firms

We now turn to the general case where firms' preferences may differ (i.e. $\tau_i \neq \tau_j$ for firms i and j). The insight that group talk can be effective carries through in this case, albeit with some additional wrinkles. First, we establish that group talk can be effective given there is a sufficient number of firms. There are many ways of modeling heterogeneity in the form of differing trigger-points τ_i, but perhaps the most transparent formulation is to do so in probabilistic

11. A straw-poll with the correct threshold essentially extract all information held by the firms and induce them to coordinate for a "show-vote" during the formal process.
12. https://newrepublic.com/article/164510/live-john-birch-societys-world-now-robert-welch-biography-review

terms.[13] Assume, for the purpose of Proposition 5, that τ_i are drawn independently from some particular distribution with positive density on $[0, \bar{\tau}]$. Then:

PROPOSITION 5. *The probability that there exists a q-rule that induces enough firms to vote sincerely and the DM to follow the association's recommendation is arbitrarily close to 1 as $N \to \infty$.*

The core logic of group talk demonstrated in the case of homogeneous firms provides the basis for Proposition 5. Consider a threshold rule q^* defined in Proposition 2 that aligns firms' incentives for truth-telling for some belief threshold τ. It is in fact the case that all firms with belief threshold in some vicinity of τ (i.e., the open interval in Expression (2) below) will have the incentive to vote truthfully as well. Thus, if we allow for a large enough population, then with high probability there will be enough firms in the vicinity of τ and so the group's recommendation would be persuasive based simply on those firms reports.

Note that while simple voting rule allows for effective information transmission with heterogeneous firms, it is not very efficient as generally it only induces truth telling for a subset of the firms. In particular, for any threshold $q < N$ (the case of $q > N$ is similar) then it will not be incentive compatible for firm i to vote sincerely if

$$\tau_i \notin \left(\frac{(1-p)^{\delta+1}}{(1-p)^{\delta+1} + p^{\delta+1}}, \frac{(1-p)^{\delta-1}}{(1-p)^{\delta-1} + p^{\delta-1}} \right), \tag{2}$$

where $\delta = N - q$. This observation reflects the sensitivity of the voting rule to firms' biases as discussed above. When firms have large disagreements among themselves, it is hard to have a one-size fits all voting rule that induces truth-telling from all firms. While some firms will act sincerely under a particular voting rule, others may find it overwhelms their own signals. In fact, the voting rule chosen means that the association makes recommendations based on the signals and preferences of the "core" set of firms whose τ_i are aligned to the q^*- rule of the association. All the other firms outside the core are predictable "no" or predictable "yes" votes.

One problem that the prior discussion raises is that such simple voting rules provide limited individual incentive for participation in the particular association. Admittedly, exiting the association and lobbying alone does not, in itself, produce policies closer to the firm's ideal, although it would economize on membership dues. If dues are small enough to be considered *de minimis*, however, then the firm may see little reason to leave. We shall explore further the possibility of tying contributions to votes in the next subsection. In particular, it certainly seems "fair" that those who derive the most benefit from the informational channel the association provides to shoulder the financial burden of maintaining that channel. However, as we shall see, the tying of contributions to votes may also widen the set of firms that have incentive to truthfully share information with the group.

Another possibility for what to do about the weakly represented firms is that firms which are consistent losers in the association may decide to form alternative organizations. Indeed, Bauer, Pool, and Dexter (1963) argue that associations hold multiple and overlapping memberships as a way of diffusing conflict between themselves. For now, we must leave for future work an extension with multiple associations. That said, one concern Bauer, Pool, and

13. Lemma 3 in the appendix presents a result that is most directly analogous to Proposition 2.

Dexter do not appear to address is that the presence of multiple lobbies tends to erode the informational rents that the lobbying sector holds over the DM (Sobel 2013). The firms whose votes never matter may do better with the single association that does not fully represent them than in a world where that association falls apart or where its members hold overlapping memberships in multiple groups that more accurately represent what they think to the DM, who would then use that information to better vindicate its own policy preferences.

A third possibility which we would identify for resolving the weak incentives of some firms to stay in the association is that there are often multiple voting thresholds consistent with Proposition 5. Put differently, the same group can talk effectively while sending different information. Firms that would be in the "core" under one voting rule would not be for another, and those that are excluded for some q^* would have their votes count if a different q^* were chosen. Because different voting rule can have different welfare consequences for different firms[14], the selection of voting rule when there is multiplicity is presumably the subject to internal lobbying and jostling between the firms. Although this process of choosing over voting rules is also beyond the scope of our modeling, one might speculate that if the costs to staying are low enough, some disadvantaged firms would consider remaining in the group in the hopes that the rules will change eventually. Indeed, depending on how modeled, the possibility of eventually being one of the holders of an informational monopoly may outweigh the benefits of living in a competitive informational environment for the foreseeable future.

Vote contingent payment We now venture beyond simple voting rules and allow the association to impose a fee on firms depending on how the firms voted. We show that an intuitive fee scheme can induce all firms to be truthful. To give explicit formula for the payment we will also need to specify explicitly the firm's state dependent utility u_i. In particular, we should do so in such a way that i has a belief threshold τ_i that triggers support or opposition to the alternative policy, A straightforward such utility u_i is the following:

$$u_i(\text{default}, L) = 1 - u_i(\text{alternative}, H) = \tau_i$$
$$u_i(\text{alternative}, L) = u_i(\text{default}, H) = 0.$$

We also assume also firms has quasilinear utility over money and thus for a given payment π, the firms' utility ex-post is $u_i(a, \omega) - \pi$.

Proposition 6 below presents a voting rule and a fee scheme that restores efficiency in terms of extracting information from the firms. For simplicity, we assume that $0 < \epsilon < \tau_1$ regardless of N (i.e., the firms belief threshold is bounded away from zero).

PROPOSITION 6. *For N sufficiently large, then there exists an equilibrium where all firms will vote truthfully and the DM follows the association's recommendation if the association adopts the threshold*

$$q^* = \min\{k : \psi(N, k) \geq \tau_{2N}\} \tag{3}$$

14. It can be shown that analogous to the case of homogeneous firms, the voting rule will implement the best outcome for firms that are induced to communicate truthfully.

and imposes a fee π_i on firms that casts a pivotal "yes" vote where,

$$\pi_i = (1 - \tau_i)(\psi(N, q^*) - \tau_i) \tag{4}$$

Recall that the failure of firms to vote truthfully is due to the fact their bias when conditioning on the pivotal event overwhelms their own signals. An intuitive way to correct this bias is for the association to impose a fee whenever the firm casts a pivotal vote. For example, when the firm is biased in favor of the alternative policy, which predisposes him to ignore its own signal and always vote in favor in the event that it is pivotal, then imposing a fee for the firm whenever he casts a pivotal ”yes" vote will dissuade him from casting the ”yes" vote blindly. Similarly, a fee conditional on a pivotal ”no" vote should be imposed in the case of bias against the alternative.

Given the preceding intuition, it should be no surprise that there is some degree of freedom in choosing the vote threshold and fee scheme. Indeed, the voting rule and the fee scheme proposed in Proposition 6 is just one possible combination that achieves full truth-telling. For example, for the threshold q^* proposed in the proposition, any fee payment π_i that satisfy

$$(\psi(N, q-1) - \tau_i)(1 - \tau_i) \leq \pi_i \leq (\psi(N, q) - \tau_i)(1 - \tau_i)$$

would induce all firms to vote truthfully. Also, note the voting rule specified Proposition 6 is one that induces all firms to be "over-enthusiastic" about the alternative policy conditioning on the pivotal event (and therefore specifies a fee only in the event of casting pivotal yes votes). Other vote thresholds would work too, provided the fee scheme is adjusted accordingly. For example, one may adopt a threshold that is less extreme that may require some firms to pay a fee contingent on casting a pivotal yes vote, while other firms pay a fee contingent on casting a pivotal no vote.

One may wonder whether it is worthwhile the firm to participate in an association in the first place given the prospect of paying contingent fees. This turns out to not be a major issue if N is large. In particular, payment in expectation will be small because the event of being pivotal is small. Specifically, this is the probability of the number of yes votes exactly equals to q, which goes to zero as N approaches infinity.[15]

Despite the indeterminacy of the voting rule/transfer scheme, one general observation that could serve as a potential hypothesis for empirical work is the fact that generally firms which get more representation pay more. In particular, Delton (2020) masterfully describes the marginalization of the arch-conservative John Birch Society affiliates from the National Association of Manufacturers in favor of larger, Fortune 500 corporate managers, who she notes became increasingly central to the organization’s finances. That said, as is typical for the mechanism design literature, the scheme that our formal model establishes as allowing for information revelation may pose practical difficulties. In particular, *ex ante* the scheme may look good to firms but if a pivotal event ever does happen and it does comes time to collect, the association may suddenly run into difficulties enforcing its contract. Restricting to a smaller subset, such as a Board, where the winners in a close vote are easily identified and can be coerced into contributing more to the group for the privilege of being the victor may prove a more functional mechanism. Our purpose in this section is not

15. In fact, the payment scheme can be "budget-balanced" if the fee paid by firm i is disbursed equally to the other $2N - 1$ firms.

to describe the optimal mechanism in practice, only to highlight that tying contributions to votes is a powerful way to induce more credible sharing of infromation between members, which ultimately enhances the value of the group's signal to the DM.

Revenue maximizing association So far, we have treated the association as nothing more than some rule its members agree upon to aggregate their messages. But as we have already mentioned, some informed observers regard associations as actors with their own ideological or profit seeking motivation. The more popular media often characterizes trade association managers and their representatives as yet another variety of beltway bandits, getting rich off influence peddling, which the social science literature hardly can discount, even as it raises important questions about the extent and circumstances of their influence over public policy (Hall and Deardorff 2006; Baumgartner et al. 2011). Even apart from the career concerns of the managers, real associations may do more than take policy positions and gather revenue to pursue those other goals. While a full exploration of these sorts of career or organizational concerns are beyond the scope of current paper, we briefly discuss a model variation in which the association is a third actor who wishes to maximize revenue generated from the type of contingent payment arrangement we examined in the previous section. That is, we only allow the association to choose a voting threshold and imposes a fee scheme that is contingent on how firms voted in the pivotal event.

First note that fixing some threshold q, there is some payment scheme that maximizes revenue. Take for example the fee scheme described in Equation (4). This particular scheme is the revenue maximizing fee given the q^* outlined in Equation (3). Note that because there are only finite possibilities for the voting threshold, it is assured that a revenue maximizing combination of threshold and fee scheme exists.

The discrete nature of the problem means it is difficult to characterize the revenue maximizing threshold in general, across all possible voting and fee schemes. However, just focusing on the class of fee sharing schemes we discuss above, it is clear that there is an important trade-off the association faces. The more extreme the threshold chosen, the lower the probability of the event that any firm casts a pivotal vote. However, conditional on being pivotal, a more extreme voting threshold will allow the association to extract larger fees from the firms since the fee is based on aligning the bias of the firms, and such bias is greater if the voting threshold is more extreme.

A related issue that arises when the association is revenue maximizing is whether it will welcome all firms to join or make it more exclusive. In considering the size of membership, the association faces a similar trade-off as discussed above. More firms on the one hand increases the revenue conditional on the vote count at exactly the threshold, but it will decreases the likelihood of this event. Indeed it turns out that the association sometimes would have an incentive to restrict its membership.

OBSERVATION 1. *The association's revenue is not necessarily increasing in N.*

A numerical example supporting the above claim can be found in the appendix. Besides the presumable downsides of cohesion and collective action on matters unrelated to position-taking, the above observation highlights another fairly

direct trade-off with size. The fee-for-representation implicit in the trade association does not always favor the biggest organizations.

4 Discussion

The above model illustrates how the internal rules governing the position-taking by an association can influence their ability to persuade. In particular, if designed properly, associations can provide channels for communication to political adversaries even in cheap talk settings where going it alone would fail. Bigger groups have potentially greater ability to cohere around effective majoritarian procedures than smaller ones, assuming they have sufficiently homogeneous preferences. That said, it will often prove impracticable for associations to achieve scale while preserving homogeneity. In heterogeneous groups, as long as the voting rules are tailored toward a "core" membership who have the ability to communicate honestly amongst themselves, then the group can also have powerful influence over the policymaker. Some groups may have preferences that permit multiple effective voting rules which empower different "core" memberships. Choosing between rules could prove a thorny political problem for the association. Alternatively, tying votes to contributions can increase the possibility of effective communication within a group, and hence before a policymaker. These illustrative findings raise a number of empirical question about the extent to which association practice conforms or differs from these expectations.

Having discussed the key contributions, we now raise and address several questions or concerns. The model we describe emphasizes the problem of credible information sharing and the problematic incentives of individuals to ignore their private information and herd toward a collectively expected outcome. Mechanically, such pathological group behavior relies on individuals conditioning behavior on a relatively unlikely (possibly very unlikely) case where they are pivotal. Although the kinds of actors we have in mind are presumably ruthless and rational (i.e. firms), even in relatively small groups the chances of becoming pivotal are quite small. Given these considerations, one (reasonable) concern is that the strategic and conflict-of-interest issues that we focus on through our formal theoretical modeling are not necessarily the most important issues confronting firms in entering a political association. Issues of free-riding and collective action, social choice, coordination, and still others, also likely loom large or perhaps larger for firms in organizing or in voting, as they do in other similar contexts, for example legislators who work together as a party in government (Aldrich 1995; Cox and McCubbins 2005). A natural question then is where the model sits given all the strategic issues and alternatives not considered, which might potentially be more important.

Our purpose through formal analysis is to show that the design of rules governing information shared between group members and policymakers can lead those firms to surmount their individual incentive problems and become persuasive collectively. Problems of trust and credibility are not small or infrequent ones for associations, even if they are not necessarily first order (although sometimes they may be). While real rules likely reflect an attempt to surmount more issues than the problematic herding that is the principal focus of the formal model we present, the broader lesson the model provides remains valid and, in our view, important. Put differently, if norms of aggregation can work to

persuade policymakers in formal theory, it provides evidence that they can do so in reality. Indeed, we do think that such dynamics at least partially explain the beguiling credibility that some groups appear to have before policymakers, which otherwise one would be tempted to attribute to policymaker bias or the role of money in politics (which is often implied to be barely legal or even downright illegal). If the issue of communication and credibility is not first order for a group, then we expect other concerns will likely dominate their design of procedures. The no-free lunch principle implies that there are likely to be trade-offs between addressing the needs of credible communication and other goals such as providing collective goods, preventing preference cycles, and so forth. We presume actual rules of decision sometimes reflect other needs more strongly. That said, if there are other drivers and consequences of association rules than the ones we focus on, and other strategic concerns at play, we do not think they refute the key lessons that the model offers. The rules describing how information will be shared with policymakers influences what firms choose to share and the credibility of the association that shares said information.

Another potential line of inquiry about the model relates to the fact that the advantage larger groups have in this model is that the collective signal they provide is more informative. It is easy to doubt that larger groups actually do have access to more or better information than smaller groups, at least beyond some scale, and one could argue that the number of signals is substitute for precision of signals. Indeed, communication is sustainable for lower N with higher p. Even so, we think it is important to recognize that it is not obvious that bigger groups will be more persuasive just because they collectively possess more information. Even for large N, firms that are uncoordinated may not solve the credible transmission problem because of incentives to lie. Even when this is overcome in the group talk setting, the DM must contend with the fact that the group's recommendation is an imprecise aggregation of realized signals. Fortunately, a sort of "wisdom of the crowd" logic applies and the group's recommendation is sufficiently persuasive when the group is large.

Models addressing the conditions under which policy is enacted typically have welfare implications, and we consider it prudent to clarify what our model says (and doesn't say) about welfare. In particular, our model assumes a world that consists only of a policymaker and a set of firms. Between these agents alone, effective communication is an unalloyed welfare improvement, and the more information actors can effectively transmit the better. That said, policymaking is always a gamble and when communication is effective it always results in the DM taking risks more in a fashion that the firms would prefer. In this sense, the existence of a communication channel that the association provides biases policymaking in the firms' favor. If one imagines a world in which there are *citizens* whose welfare is impacted by the decision of the DM, and whose preferences are more like the DM's than the firms', then the welfare consequences start to become more ominous. Particularly if the citizens also have information about what policy is best, but are for whatever reason unable to organize an association that shares their own information consistent with preferences. For tractability reasons, we have not considered the case where there are multiple, competing lobbies, but we speculate that competition between associations would likely erode the informational rents that a single association might claim. Work such as Schlozman, Verba, and Brady 2012 clearly raises concerns that resource endowments influence the for-

mation of groups in the first place, and the model we propose shows how and why that question of whether represented by an association would matter.

Besides the issue of how multiple and potentially overlapping association memberships would nuance the above findings, there are several other potential areas to explore in future work. Our model has examined a relatively sharp policy environment, where only two policies are considerable and only one policy is appropriate given the state of the world. Future work could consider the consequences of a more ambiguous and continuous policy world, in particular where the main question is not whether but how much the firms as a group can persuade the DM. Also, we assume so far that the firms possess equally informative signals. In reality the firms may be differentially informed in addition to having diverse preferences. Heterogeneity of information will bring new complications, for example, it may entail voting rules that are not anonymous (i.e., specify decisive coalitions rather than merely a voting threshold), but we suspect the qualitative insights will remain largely unchanged.

Finally, there are profound connections between the sort of model we develop and the broader literature in economics on mechanism design, which explores the design of incentives in the presence of asymmetric information. The voting rule is an example of an mechanism. However, the standard results in mechanism design do not directy apply to our setting because unlike a canonical mechanism design problem, we do not prescribe commitment power to the "principle" (i.e., the DM).[16] It is known that imperfect commitment nullifies the revelation principle that is the cornerstone of standard mechanism design and therefore complicates the problem significantly (see Bester and Strausz 2000, 2001). The general problem designing group communication protocol in our setting is an intriguing avenue for future research.[17]

5 Conclusion

This paper has addressed the problem of how communication happens between political adversaries in cheap talk environments. Through a formal model, we have demonstrated the role that "norms of aggregation" play in shaping the communications between firms and policymakers. In particular, we have argued and shown that political association is a technology capable of endowing credibility in cheap talk, and influence policy relative to the world in which firms lobby in an uncoordinated fashion or with sub-optimal rules of engagement. We have related these findings to the literature on interest groups and suggested new directions for empirical and theoretical inquiry, and also discussed the likely welfare implications. The structural power of business is attributed by the literature to many sources. Our work encourages more and deeper thought about the institutions and structures businesses build for channeling their preferences to policymakers.

16. The DM is not bound to follow the recommendation by the association, the DM must find it in his best interest to do so ex-post.

17. The design of organized communication protocol where the DM has commitment power is explored in Wolinsky (2002) and a new work-in-progress by Deniz Kattwinkel and Alexander Winter.

References

Aldrich, John H. 1995. *Why parties?: The origin and transformation of political parties in America.* University of Chicago Press.

Ansolabehere, Stephen, John M. de Figueiredo, and James M. Snyder. 2003. "Why Is There So Little Money in U.S. Politics?" *Journal of Economic Perspectives* 17 (1): 105–130.

Austen-Smith, David, and Jeffrey S. Banks. 1996. "Information Aggregation, Rationality, and the Condorcet Jury Theorem" [in en]. *American Political Science Review* 90, no. 1 (March): 34–45. Accessed August 26, 2022. https://www.cambridge.org/core/product/identifier/S0003055400205315/type/journal_article.

Battaglini, Marco. 2004. "Policy Advice with Imperfectly Informed Experts" [in en]. *The B.E. Journal of Theoretical Economics* 4, no. 1 (April): 00001022021534596311 00. Accessed August 26, 2022. https://www.degruyter.com/document/doi/10.2202/1534-5963.1100/html.

———. 2017. "Public protests and policy making." *The Quarterly Journal of Economics* 132 (1): 485–549.

Bauer, Raymand A., Ithiel de Sola Pool, and Lewis Anthony Dexter. 1963. *American Business and Public Policy.* New York: Atherton Press.

Baumgartner, Frank R., Jeffrey M. Berry, Marie Hojnacki, David C. Kimball, and Beth L. Leech. 2011. *Lobbying and Policy Change: Who Wins, Who Loses, and Why.* University of Chicago Press.

Bester, Helmut, and Roland Strausz. 2000. "Imperfect commitment and the revelation principle: the multi-agent case." *Economics Letters* 69 (2): 165–171. https://www.sciencedirect.com/science/article/pii/S0165176500003013.

———. 2001. "Contracting with Imperfect Commitment and the Revelation Principle: The Single Agent Case." *Econometrica* 69 (4): 1077–1098. https://onlinelibrary.wiley.com/doi/abs/10.1111/1468-0262.00231.

Broockman, David E. 2012. "The "Problem of Preferences": Medicare and Business Support for the Welfare State." *Studies in American Political Development* 26 (October 2012): 83–106.

Chakraborty, Archishman, and Rick Harbaugh. 2010. "Persuasion by Cheap Talk" [in en]. *American Economic Review* 100, no. 5 (December): 2361–2382.

Cox, Gary W., and Mathew D. McCubbins. 2005. "Procedural Cartel Theory." In *Setting the Agenda: Responsible Party Government in the U.S. House of Representatives,* 17–34. Cambridge University Press.

Crawford, Vincent P, and Joel Sobel. 1982. "Strategic information transmission." *Econometrica: Journal of the Econometric Society,* 1431–1451.

Delton, Jennifer A. 2020. *The Industrialists: How the National Association of Manufacturers Shaped American Capitalism.* Princeton University Press.

Egerod, Benjamin, Brian Libgober, and Sebastian Thieme. 2024. "Who Governs the Association." Working Paper. https://wwww.brianlibgober.com/Who-Governs-Association.pdf.

Feddersen, Timothy, and Wolfgang Pesendorfer. 1998. "Convicting the Innocent: The Inferiority of Unanimous Jury Verdicts under Strategic Voting" [in en]. *American Political Science Review* 92, no. 1 (March): 23–35. Accessed August 26, 2022. https://www.cambridge.org/core/product/identifier/S000305540020909X/type/journal_article.

Gradwohl, Ronen, and Timothy Feddersen. 2018. "Persuasion and Transparency" [in en]. *The Journal of Politics* 80, no. 3 (July): 903–915. Accessed August 26, 2022. https://www.journals.uchicago.edu/doi/10.1086/697250.

Hall, Richard L., and Alan V. Deardorff. 2006. "Lobbying as Legislative Subsidy." *American Political Science Review* 100 (1): 69–84. http://journals.cambridge.org/abstract_S0003055406062010.

Katz, Alyssa. 2015. *The Influence Machine: The U.S. Chamber of Commerce and the Corporate Capture of American Life* [in en]. Google-Books-ID: R_mLDQAAQBAJ. Random House Publishing Group, June.

Kollman, Ken. 1998. *Outside Lobbying: Public Opinion and Interest Group Strategies* [in en]. Google-Books-ID: _kP_DwAAQBAJ. Princeton University Press.

Lindblom, Charles E. 1977. *Politics and Markets: The World's Political-Economic Systems.* Basic Books.

Lowery, David, and Virginia Gray. 2015. "An Introduction to the Population Ecology Approach." In *The Organization Ecology of Interest Communities,* 1–15. London: Palgrave Macmillan UK. Accessed December 27, 2016. http://link.springer.com/10.1057/9781137514318_1.

Mizruchi, Mark S. 2013. *The Fracturing of the American Corporate Elite.* Harvard University Press, May. Accessed November 11, 2022. https://www.degruyter.com/document/doi/10.4159/harvard.9780674075368/html.

Nossiter, Bernard D. 1962. "Chamber Nips Trade Bill Revolt." ProQuest Historical Newspapers: The Washington Post, *The Washington Post* (May 3, 1962): A1.

Schlozman, Kay Lehman, Sidney Verba, and Henry E. Brady. 2012. *The Unheavenly Chorus: Unequal Political Voice and the Broken Promise of American Democracy.* Princeton, New Jersey: Princeton University Press. http://web.b.ebscohost.com.ezp-prod1.hul.harvard.edu/ehost/ebookviewer/ebook/bmxlYmtfXzQ0NDEyNF9fQU41?sid=4214d309-2486-41d1-a373-d63ebeb32550@sessionmgr1&vid=0&format=EB&rid=1.

Schnietz, Karen. 1998. "Democrats' 1916 Tariff Commission: Responding to Dumping Fears and Illustrating the Consumer Costs of Protectionism" [in en]. *Business History Review* 72 (1): 1–45. Accessed August 25, 2022. https://www.cambridge.org/core/product/identifier/S000768050007272X/type/journal_article.

Skocpol, Theda, and Alexander Hertel-Fernandez. 2016. "The Koch Network and Republican Party Extremism" [in en]. *Perspectives on Politics* 14, no. 3 (September): 681–699. Accessed August 25, 2022. https://www.cambridge.org/core/product/identifier/S1537592716001122/type/journal_article.

Sobel, Joel. 2013. "Giving and Receiving Advice" [in en]. In *Advances in Economics and Econometrics,* 1st ed., edited by Daron Acemoglu, Manuel Arellano, and Eddie Dekel, 305–341. Cambridge University Press, May. Accessed August 25, 2022. https://www.cambridge.org/core/product/identifier/CBO9781139060011A022/type/book_part.

Strolovitch, Dara Z. 2007. *Affirmative advocacy: race, class, and gender in interest group politics* [in en]. Chicago: University of Chicago Press.

Swenson, Peter A. 2018. "Misrepresented Interests: Business, Medicare, and the Making of the American Health Care State" [in en]. *Studies in American Political Development* 32, no. 1 (April): 1–23. Accessed March 7, 2024. https://www.cambridge.org/core/product/identifier/S0898588X18000019/type/journal_article.

Truman, David B. 1951. *The Governmental Process: Political Interests and Public Opinion.* Knopf.

Wilson, James Q. 1973. *Political Organizations* [in en]. Google-Books-ID: GreRswEACAAJ. Princeton University Press.

Wolinsky, Asher. 2002. "Eliciting information from multiple experts" [in en]. *Games and Economic Behavior* 41, no. 1 (October): 141–160. Accessed August 26, 2022. https://linkinghub.elsevier.com/retrieve/pii/S0899825602000039.

A Online Supporting Information

A.1 Proof for Proposition 1

The proof largely follows the proof for Lemma 1 in Gradwohl and Feddersen 2018. We will prove the result for the general case of N firms (rather than $2N$ firms). A strategy profile of the firms is persuasive if the DM chooses the alternative probability with some positive probability. We will show that there exists an $i \in \{1, \ldots, N\}$ such that $\tau_i \geq \bar{\tau} - \epsilon$. Let $m \equiv \{m_1, \ldots, m_N\}$ be a vote profile and $M = \{0,1\}^N$ be the space of all vote profiles. Also let $m_{-i} \in \{0,1\}^{N-1}$ and $m_i \in \{0,1\}$ be the vote profile of all firms other than i and the vote of i, respectively, and that (m_i, m_{-i}) is the vote profile comprised of m_i and m_{-i}. Also, define

$$piv_i = \{m_{-i} \in \{0,1\}^{N-1} : \text{ s.t. } r(1, m_{-i}) \neq r(0, m_{-i})\}$$

to be the set of pivotal vote profiles for firm i. Note that we can take without loss of generality the fact that $\sigma(\cdot)$ has full support over M. Otherwise, some firm always plays the same action and can thus be disregarded.

Let $Pos[\cdot]$ denote the posterior probability of the high state conditional on some event. And let l_i or h_i stand for the event that i received a l or h signal respectively. First we will prove the following lemma.

LEMMA 1. *If σ is a persuasive strategy profile, then there exists a firm i and a $m_{-i} \in piv_i$ satisfying $Pos[m_{-i} \cap l_i] \leq \tau_i$.*

Proof. This is a proof by contradiction. Suppose that there is no such i and m_{-i} as desired (i.e., whenever i is pivotal, $Pos[m_{-i} \cap s_i] > \tau_i$ regardless of s_i.) In other words, whenever the firm is pivotal, it will prefer the alternative policy.

Given that by assumption σ has full support over M, it must be that i is indifferent between voting for or against the alternative i.e., probability of the DM choosing the alternative policy is the same for $m_i = 0$ and for $m_i = 1$ given that i is pivotal:

$$Pr[r(1, m_{-i}) = 1] = Pr[r(0, m_{-i}) = 1], \tag{5}$$

where the probability is derived from the distribution of $m_{-i} \in piv_i$.

Now, in equilibrium it must be either $Pos[(1, m_{-i})] \geq Pos[(0, m_{-i})]$ for all $m_{-i} \in piv_i$ or the reverse inequality holds for all $m_{-i} \in piv_i$. Suppose without loss of generality that the former holds. Then $r(1, m_{-i}) = 1$ implies that $r(0, m_{-i}) = 1$. But by equation 5 this would imply that $r(1, m_{-i}) = r(0, m_{-i})$ for all m_{-i}, and so i is never pivotal. Since this holds for every firm i, no firm is ever pivotal. This contradicts the assumption that the strategy profile is persuasive.

□

Now, note that for any firm i and $m_{-i} \in \{0,1\}^{N-1}$, if

$$Pos[m_{-i} \cap l_i] \leq \tau_i$$

then

$$Pos[m_{-i} \cap h_i] \leq \frac{\tau_i p^2}{\tau_i p^2 + (1-\tau_i)(1-p)^2}.$$

Now we complete the proof by arguing that for a persuasive strategy profile, there exists an $i \in \{1, \ldots, N\}$ such that $\tau_i \geq \bar{\tau} - \epsilon$. By lemma 1, there exists a firm i and $m_{-i} \in piv_i$ such that $Pos[m_{-i} \cap l_i] \leq \tau_i$, and moreover:

$$Pos[m_{-i} \cap h_i] \leq \frac{\tau_i p^2}{\tau_i p^2 + (1-\tau_i)(1-p)^2}.$$

Now, the DM's threshold $\bar{\tau}$ can be no greater $\frac{\tau_i p^2}{\tau_i p^2 + (1-\tau_i)(1-p)^2}$ because otherwise firm i will not be pivotal given m_{-i} (this follows from the fact that $Pos[(m_i, m_{-i})] \leq Pos[m_{-i} \cap h_i]$). By definition of $\bar{\tau} - \epsilon$ and the fact that the signals are symmetric (i.e., a positive signal exactly cancels out a negative signal), we have $\bar{\tau} - \epsilon \leq \tau_i$. □

A.2 A Converse to Proposition 1

Define

$$\kappa = \min \left\{ k : \frac{p^k}{p^k + (1-p)^k} \geq \bar{\tau} \right\} \tag{6}$$

In other words, κ is the minimum number of high signals that would move the posterior above $\bar{\tau}$ given prior prob of $\frac{1}{2}$ and the precision of signal is p. Also recall that $\bar{\tau} - \epsilon = \frac{\bar{\tau}(1-p)^2}{\bar{\tau}(1-p)^2 + (1-\bar{\tau})p^2}$ Proposition 7 below states that if there are enough firms with belief thresholds sufficiently close to that of DM's, then one can always construct an equilibrium in which these firms report truthfully to the DM, and others babble, and the DM implements the alternative policy if it has receives enough support.

PROPOSITION 7. *If there are at least κ firms with $\tau_i > \bar{\tau} - \epsilon$, then there exists an equilibrium in which all such firms report truthfully and the other firms babbles, and the DM chooses to implement the alternative policy iff there is at least κ yes votes from firms with $\tau_i > \bar{\tau} - \epsilon$.*

Proof. We will verify that the proposed strategies of the firms and DM constitute an equilibrium. Now define the set $\mathcal{M} \equiv \{i : \tau_i > \bar{\tau} - \epsilon\}$. Note first that in order to persuade the DM to choose the alternative, there must be at least κ sincere votes in favor of the alternative policy. This follows directly from the definition of κ.

We now show that so long as the cardinality of $\mathcal{M}$ is greater than κ then we can construct the equilibrium as described in the proposition. Suppose the cardinality of $\mathcal{M}$ is greater than κ. Take any firm $i \in \mathcal{M}$ and suppose it is pivotal with respect to the proposed strategy of the DM i.e., $\kappa - 1$ firms from the set $\mathcal{M}$ report signal h to the DM (i.e., $m_i = 1, \forall i \in \mathcal{M}$) and all other firms in $\mathcal{M}$ sincerely report signal l. If $s_i = h$, then firm i will choose $m_i = 1$ which

persuades the DM to choose the alternative. This is optimal for firm i since the DM's posterior probability of state H will be at least $\bar{\tau}$ and firm i's posterior probability of state H will exceed τ_i since $\tau_i < \bar{\tau}$. Similarly, if $s_i = l$, then firm i will prefer to send $m_i = 0$. Doing so persuades the DM to choose the default and furthermore this is aligned with the firm's interest because the firm's posterior probability of state H will be less than τ_i as well given that $\tau_i > \bar{\tau} - \epsilon$. In sum, it is incentive compatible for firm i to follow the prescribed strategy and be truthful, which in turn justifies the DM's strategy. Finally, for firms not belonging to $\mathcal{M}$, the DM does not consider their reports since they babble, which in turn makes their babbling incentive compatible. □

A.3 Proof for Proposition 2

Suppose for now that the DM follows the association's recommendation based on the voting rule q^* (we will verify later when this is IC for the DM), we argue first that the firm i will vote sincerely if other firms do. Note that q^* is defined such that whenever i is pivotal (i.e., there are $q^* - 1$ of yes votes from other firms), receiving signal h (l) implies that i's posterior belief will above (below) τ, and therefore it is rational for i to vote according to his signal.

We now consider when it is incentive compatible for the DM to follow the association's recommendation (assuming the firms vote sincerely). If the association recommend B, it means there are at least q^* votes. Now, for sufficiently large N, $\frac{q^*}{N}$ will be close to $\frac{1}{2}$ (because it will be the case that $q^* - (N - q^*)$ will be independent of N). Given that the precision of signal is $p > 1/2$, the law of large number applies and that for sufficiently large N, the posterior belief of high state conditional on the proportion of high signals being at least $\frac{q^*}{N} \approx \frac{1}{2}$ will be greater than $\bar{\tau}$. Therefore observing the association recommending B, the DM will find it optimal to follow the recommendation, and similarly if the association recommends A instead. □

A.4 Proof for Proposition 3

Note that given $p > \frac{1}{2}$, $\psi(N, k)$ is decreasing in N and increasing in k. It follows that q^* is increasing in N and τ. Also note that given the symmetry of signals, $q^* - N$ is a fixed integer that is independent of N. Therefore, $\frac{q^*}{2N} \to \frac{1}{2}$ as $N \to \infty$. If $\tau > 1/2$, then given the nature of the signals q^* would have to be at least N. Note also that ψ is increasing in p whenever $k > N$ and is decreasing in p whenever $k < N$. Thus q^* would be decreasing in p if $\tau > 1/2$ and increasing in p if $\tau < 1/2$. □

A.5 Proof for Proposition 4

Recall that $q^* = N + \delta$ where δ may be a positive or negative integer. Let $F_{2N,p}$ be the CDF of the binomial distribution with $2N$ trials and probability of success of p, and let

$$Pos(N, \delta) = \frac{1 - F_{2N,p}(N + \delta)}{2 - F_{2N,p}(N + \delta) - F_{2N,1-p}(N + \delta)}$$

be the posterior probability the DM places on the high state when she observes a "yes" vote from the group assuming all firms vote sincerely. Observe that

$$\tilde{N} = \min\{N : Pos(N, \delta) \geq \bar{\tau}\}.$$

That is, $\tilde{N}$ is the smallest N such that the observing a "yes" recommendation from the group convinces the DM to choose the alternative policy. Note that $Pos(N, \delta)$ is pinned down by the relative likelihood:

$$\frac{1 - F_{2N,p}(N + \delta)}{1 - F_{2N,1-p}(N + \delta)} = \frac{1 - F_{2N,p}(N + \delta)}{F_{2N,p}(N - \delta)}$$

We will first prove the following lemma.

LEMMA 2. *$\frac{1-F_{2N,p}(N+\delta)}{F_{2N,p}(N-\delta)}$ is increasing in N, fixing δ, and it is increasing in δ, fixing N.*

Suppose for simplicity that $\delta \geq 0$ (argument for the case where $\delta < 0$ proceeds in the same manner). Observe that

$$\frac{1 - F_{2N,p}(N + \delta)}{F_{2N,p}(N - \delta)} = \frac{\sum_{\delta=0}^{N} \binom{2N}{N+\delta} p^{N+\delta}(1-p)^{N-\delta}}{\sum_{\delta=0}^{N} \binom{2N}{N+\delta}(1-p)^{N+\delta}p^{N-\delta}} \tag{7}$$

We can write the ratio when $N + 1$ as follows:

$$\frac{1 - F_{2N+2,p}(N + \delta + 1)}{F_{2N+2,p}(N - \delta + 1)} = \frac{\sum_{\delta=0}^{N} \binom{2N+2}{N+\delta+1} p^{N+\delta+1}(1-p)^{N-\delta+1} + p^{2N+2}}{\sum_{\delta=0}^{N} \binom{2N+2}{N+\delta+1}(1-p)^{N+\delta+1}p^{N-\delta+1} + (1-p)^{2N+2}} \tag{8}$$

We now wish to show that $\frac{1-F_{2N,p}(N+\delta)}{F_{2N,p}(N-\delta)} < \frac{1-F_{2N+2,p}(N+\delta+1)}{F_{2N+2,p}(N-\delta+1)}$. First we make three important observations, which can all be proven with simple algebra:

1. $[p^{N+\delta}(1-p)^{N-\delta}]/[(1-p)^{N+\delta}p^{N-\delta}] = p^{2k}/(1-p)^{2k}$ is increasing in δ.
2. $\binom{2N+2}{N+\delta+1}/\binom{2N}{N+\delta}$ is increasing in δ.
3. Suppose a, b, c, d, θ are all positive reals and $\frac{c}{d} > \frac{a}{b}$, then $\frac{a}{b} < \frac{a+\theta c}{b+\theta d} < \frac{c}{d}$ and $\frac{a+\theta c}{b+\theta d}$ is increasing in θ.

Armed with these three observations, and after some algebra, we have the following:

$$\begin{aligned} &\frac{\sum_{\delta=0}^{N} \binom{2N}{N+\delta} p^{N+\delta}(1-p)^{N-\delta}}{\sum_{\delta=0}^{N} \binom{2N}{N+\delta}(1-p)^{N+\delta}p^{N-\delta}} = \frac{\sum_{\delta=0}^{N} \binom{2N}{N+\delta} p^{N+\delta+1}(1-p)^{N-\delta+1}}{\sum_{\delta=0}^{N} \binom{2N}{N+\delta}(1-p)^{N+\delta+1}p^{N-\delta+1}} \\ &< \frac{\sum_{\delta=0}^{N} \binom{2N+2}{N+\delta+1} p^{N+\delta+1}(1-p)^{N-\delta+1}}{\sum_{\delta=0}^{N} \binom{2N+2}{N+\delta+1}(1-p)^{N+\delta+1}p^{N-\delta+1}} < \frac{\sum_{\delta=0}^{N} \binom{2N+2}{N+\delta+1} p^{N+\delta+1}(1-p)^{N-\delta+1} + p^{2N+2}}{\sum_{\delta=0}^{N} \binom{2N+2}{N+\delta+1}(1-p)^{N+\delta+1}p^{N-\delta+1} + (1-p)^{2N+2}} \end{aligned} \tag{9}$$

The first inequality follows from the second observation, and the second inequality follows from the first and third observation. Thus we have shown $\frac{1-F_{2N,p}(N+\delta)}{F_{2N,p}(N-\delta)} < \frac{1-F_{2N+2,p}(N+\delta+1)}{F_{2N+2,p}(N-\delta+1)}$ which immediately implies that $\frac{1-F_{2N,p}(N+\delta)}{F_{2N,p}(N-\delta)}$ is increasing in N, fixing δ. Note that the first and third observation also allow one to establish $\frac{1-F_{2N,p}(N+\delta)}{F_{2N,p}(N-\delta)}$ is increasing in δ.

The proposition is a straightforward consequence of the above lemma given that 1) $Pos(N, \delta)$ is independent of $\bar{\tau}$ and 2) δ is increasing in τ which means that $Pos(N, \delta)$ is increasing in τ.

□

A.6 Proof for Proposition 5

The proposition follows directly from the following lemma. First define $\tilde{N}(x)$ be the threshold defined in Proposition 4 when $\tau = x$.

LEMMA 3. *If there exists $x^+ \equiv \frac{p^k}{p^k+(1-p)^k} < \bar{\tau}$ (or $x^- \equiv \frac{(1-p)^k}{p^k+(1-p)^k}$) for some positive integer k such that there is more than $2\tilde{N}(x^+)$ (or respectively $2\tilde{N}(x^-)$) firms with*

$$\tau_i \in A_k^+ \left(\frac{p^{k-1}}{p^{k-1}+(1-p)^{k-1}}, \frac{p^{k+1}}{p^{k+1}+(1-p)^{k+1}} \right)$$

(or respectively, $\tau_i \in A_k^- \left(\frac{(1-p)^{k+1}}{p^{k+1}+(1-p)^{k+1}}, \frac{(1-p)^{k-1}}{p^{k-1}+(1-p)^{k-1}} \right)$). Then there exists an equilibrium in which all the firms with τ_i in those intervals vote sincerely, all the firms outside of the interval babble, and the group sends collective recommendation using the voting rule as given in Proposition 2 in the case where $\tau = x^+$ or ($\tau = x^-$) and only counting votes from the truthful firms. The DM follows the recommendation of the association.

The steps of proof for the lemma is a straightforward generalization of Proposition 2. Suppose there are enough firms in the interval $\left(\frac{p^{k-1}}{p^{k-1}+(1-p)^{k-1}}, \frac{p^{k+1}}{p^{k+1}+(1-p)^{k+1}} \right)$ (the other case is similar). We will verify the proposed equilibrium is indeed incentive compatible. If the firms follow the prescribed strategy and the group the prescribed voting rule then the DM will indeed the association's recommendation by a similar logic as laid out in the proof of Proposition 2. Also it is easy to verify that the firm j belonging in the interval will vote sincerely if other firms in the interval do so (and those outside the set babbles) given the proposed voting rule. Having established the lemma, the proposition follow by noting that as N becomes large, so is the probability of the event that for there is enough firms within A_k^+ or A_k^- for some k that enables the equilibrium described above.

□

A.7 Proof for Proposition 6

We will show that given the voting threshold of q^* specified in the statement of the proposition, the transfer scheme induces all firms to vote sincerely. Some of the details are omitted as they are the same as in the proof for Proposition 2. Note first that if firms were to vote sincerely, then DM will follow the association's recommendation given that that N is large and the assumption that τ_i is bounded away from zero.

Now the expected utility of firm i conditional on 1) all other firms are voting sincerely, 2) it is pivotal and 3) no payment is

$$\begin{cases} \psi(N, q^* - 1)(1 - \tau_i), & \text{if vote yes and } s_i = l \\ \psi(N, q^*)(1 - \tau_i), & \text{if vote yes and } s_i = h \end{cases}$$

Furthermore, firm i's expected utility when it is indifferent between voting yes and no is $\tau_i(1 - \tau_i)$. Thus, any fee π_i satisfying

$$\psi(N, q^* - 1)(1 - \tau_i) - \pi_i \leq \tau_i(1 - \tau_i) \leq \psi(N, q^*)(1 - \tau_i) - \pi_i,$$

will induce i to vote truthfully i.e., vote yes when $s_i = h$ and no otherwise. In particular, setting $\pi_i = (1 - \tau_i)(\psi(N, q^*) - \tau_i)$ will do the job.

□

A.8 Example for Observation 1

Suppose N is sufficiently large and define $\tau_i = \frac{i}{2N\bar{\tau}}$ i.e., $\{\tau_i\}_{i=1}^{2N}$ partitions the interval $[0, \bar{\tau}]$ into $2N$ equal intervals. Let q^* be the revenue maximizing threshold, now suppose the association excludes the two firms with τ_i closest to $\psi(N, q^*)$. Note that the loss of expected revenue from excluding two such firms is minuscule given N is large. However, the probability of the pivotal event given $q^* - 1$ vs. q^* grows by a factor of approximately $1/4p(1-p)$, which is bounded away from 1. If N is large then the revenue gains from the firms that are left will more than offset the revenue losses from the two firms that are excluded.

A.9 Numerical example for the minimum number of firms to sustain effective group talk

$\bar{\tau}$	p	τ	$2\tilde{N}$
$3/5$	$3/5$	$1/4$	10
		$1/2$	4
	$2/3$	$1/4$	6
		$1/2$	2
$2/3$	$3/5$	$1/4$	18
		$1/2$	8
	$2/3$	$1/4$	10
		$1/2$	4
$3/4$	$3/5$	$1/4$	28
		$1/2$	16
	$2/3$	$1/4$	14
		$1/2$	8

Table 2: **Numerical examples**. $\bar{\tau}$ is the belief threshold of policymaker necessary to support policy adoption, p is the accuracy of each firm's signal, τ is the firm's posterior belief threshold, and $2\tilde{N}$ is the minimum number of firms that ensures the effectiveness of group talk.