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Competing for Attention

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COMPETING FOR ATTENTION

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ABSTRACT. We develop a model of lobbying in which a time and resource constrained policymaker first chooses which policy proposals to learn about, before choosing which to implement. The policymaker reviews the proposals of the interest groups who provide the highest contributions. We study how policy outcomes and contributions depend on policymaker constraints and the design of the "Contest for Attention." Among other results, awarding attention to the highest contributors generally guarantees the first best policy outcome. It can also lead to the highest possible contributions, suggesting that a policymaker may not need to sacrifice policy in order to maximize contributions.

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> "About all you get [in exchange for a contribution] is a chance to talk to them . . . If you have a good case you can win them over. But you have to be able to talk to them."
>
> – Interest group representative interviewed in Herndon (1982, p1000)

> "Access to the president should never be for sale."
>
> – Bob Edgar, president of Common Cause, February 26, 2013[1]

1. Introduction

Popular opinion is that political contributions corrupt policymaking. The vast majority of Americans believe that "money buys results in congress," and that money biases legislation away from the needs of average constituents and in favor of deep-pocketed special interests (Lessig 2011, p88). Theoretical models of politics largely support these popular views, with classic models depicting lobbying as little more than a quid pro quo exchange of political contributions for policy (e.g., Tullock 1980, Grossman and Helpman 1994). Insider accounts of policymaking, however, describe overtly corrupt behavior as the rare exception, with most policymakers trying to do the right thing, while facing severe constraints on their time and limits to their expertise (e.g., Bauer et al. 1963, Hansen 1991, Schram 1995, Baumgartner et al. 2009). We present a model of the political process consistent with the insider accounts of policymaking. Ours is a model of informational lobbying, where political contributions help special interest groups capture the attention of a time constrained policymaker, and are *not* provided in the direct exchange for policy favors. We show how political contributions lead the policymaker to focus his efforts on the most-beneficial policies. By allocating his limited attention based on political contributions, the policymaker can guarantee better policy outcomes than in the absence of contributions.

We develop a model of lobbying which approximates the political process described in a number of insider accounts which emphasize how severely constrained policymakers are in their ability to learn about and implement policy proposals (e.g., Bauer et al. 1963, Hansen 1991). In our model, a policymaker faces a number of policy proposals and must choose which to implement. The proposals may involve earmark funding for projects within the policymaker's home district.

[1]Common Cause is perhaps the most-recognized national organization focused on promoting campaign finance reform. Edgar issued this statement in response to a New York Times article suggesting that Organizing for America, a non profit organization that developed from the Obama for America campaign organization following the 2012 presidential elections, was selling access to the president.

Due to budget constraints, the policymaker may not be able to fund all of the projects he believes are beneficial.[2] Alternatively, the proposals may involve introducing legislation reforming policy on alternative issues. Drafting, introducing, and promoting legislation is time consuming, preventing the policymaker from introducing legislation in all areas that may benefit his constituents. Although the proposals may not by nature be mutually exclusive alternatives,[3] resource and time constraints necessitate that the policymaker prioritize proposals and choose only some on which to focus his efforts.

Before choosing which proposals to implement, the policymaker can assess the costs and benefits of alternative options by meeting with interest groups and experts, reading government reports or independent research, holding legislative hearings, or asking staff or government agencies to research the political feasibility and constituent benefits of different options.[4] If the policymaker carefully assesses all alternatives, then he can be certain to implement the most-beneficial options. But, this is generally not feasible. Time and resource constraints prevent the policymaker from carefully assessing all proposals, just as they limit the number of proposals he can implement. Faced with binding time and resource constraints, the policymaker must prioritize proposals, first choosing which to review and then choosing which to implement.

The policymaker is constrained and can neither review nor implement all proposals. The main contribution of this paper is to analyze in detail one method the policymaker may use to choose which proposals to review: a *Contest for Attention*. In a contest for attention, interest groups representing each policy proposal pay political contributions in competition for the policymaker's limited attention, with the policymaker reviewing the proposals whose interest groups paid the highest contributions. The policymaker sells political access to the highest bidders. This is the type of exchange between policymakers and interest groups that the general public and campaign finance reform advocates view as corrupt and detrimental for the average citizen.

Our main result stands in contrast to the popular idea that selling access is necessarily detrimental for policy outcomes. We show that a policymaker who sells his limited

[2]Frisch and Kelly (2010, 2011) present evidence that during the 2006 budget cycle the Chairman of the U.S. House Appropriations Subcommittee for Labor-Health and Human Services allowed each rank-and-file member of the U.S. House to request up to $400,000 in earmark funding from his subcommittee. The allotted amount increased systematically for subcommittee members, principals in at-risk districts and those in leadership positions. If a legislator requested a larger amount of funding from the subcommittee, the funding was rejected or cut down to the allotted amount. This process means that legislators must carefully decide for which earmark proposals to request funding, and the legislators may rely on political contributions to help narrow down the set of candidates.

[3]The policymaker could, if budgets permitted, fund many projects, and could, if time permitted, draft, introduce and pass legislation reforming many issues.

[4]See for example Baumgartner et al. (2009, p7) who observes "In the case of Congress and administrative agencies, policymakers must choose to allocate their time among the myriad of different issues they are called upon to address."

attention to the highest bidder will become fully informed about the quality of *all* proposals even though he can directly review only *some* of them. Allocating attention to the highest contributors is not detrimental for policy, but rather leads to a fully informed policymaker and the first best policy.[5]

The reason for this is as follows. Each interest group's equilibrium contribution is strictly increasing in the quality of its proposal. Interest groups involved with high quality proposals are willing to pay more to capture the policymaker's attention (leading him to review their proposals) than interest groups with lower quality proposals. This means the policymaker directly observes the proposal quality of those who win attention (the highest contributors), and indirectly infers the proposal quality of others from their contributions. As a result, the policymaker is fully informed about the quality of all proposals, and implements policy as if he directly observed each proposal's quality. Although in equilibrium the interest groups who submit the highest payments see their proposals implemented, this is not *because* they submitted the highest payments. Rather, it is because the groups with the highest quality proposals submit the highest payments, and in equilibrium the policymaker implements the highest quality proposals. We show that this insight is robust to a number of alternative assumptions and generalizations, which we discuss in the paper and explore in detail in an online appendix.

The analysis also considers equilibrium contributions, an important consideration as the policymaker may benefit from both collecting contributions and implementing good policy. We show that giving attention to the highest contributors not only leads to the first best policy, it can also result in the first best level of contributions.[6] This means that a policymaker may not need to sacrifice policy in order to maximize contributions. The result stands in contrast to other models of lobbying in which the tradeoff between implementing good policy and collecting campaign contributions plays a central roll (e.g., Prat 2002, Coate 2004, Cotton 2009). This is the case in our model when interest groups share the same valuation for having their proposals implemented, when the policymaker reviews no more proposals than he is able to implement, and when attention is allocated through an all-pay contest for attention. Here, a policymaker who cares about both policy and contributions can be no better off than when he allocates attention through a contest for attention before implementing the proposals he (correctly) believes are best. There exists no other mechanism by which the policymaker can choose which proposals to implement that will result in higher payoffs. In other settings, the contest for attention still leads to the first best policy, but does not necessarily maximize contributions compared to the selling policy directly. Then, using a contest for attention is preferable

[5]First best from the perspective of the policymaker. It is also first best from the perspective of constituents if we believe that policymaker prefers the policy that maximizes constituent welfare.

[6]First best from the perspective of the policymaker.

to any other method of implementing policy when the policymaker cares enough about policy relative to payments.

The environment with asymmetric interest groups gives insight into the effects of special interest wealth on policy outcomes. In that setting, contributions are maximized when the policymaker allocates attention through a handicapped contest for attention. Such a contest is biased against wealthy interest groups, requiring them to pay higher contributions for the same contest "score" as a lower-paying, less-wealthy group. In the payment-maximizing full-information equilibrium, rich interest groups tend to contribute more than poor interest groups, but they are no more likely to have their proposals implemented. Despite higher payments from rich interest groups, the contest for attention still leads to a fully informed policymaker who implements the first best policy.

Although the analysis is motivated by lobbying and policymaking, the underlying framework and the implications of competing for attention are applicable to a number of settings beyond politics. Consider the following examples. An employer wants to hire the highest-ability applicants. An employer grants interviews to the most-persistent applicants, those who have undertaken the greatest costs to gain the employers attention.[7] Similarly, a venture capitalist may listen to pitches from the entrepreneurs who have done the most to gain their attention. A bachelorette may accept a date from the suitor who is most persistent in his come-ons or makes the biggest fool out of himself in order to capture her attention (both all-pay contests), or she may accept a date from the suitor who offers to take her out to the most-expensive restaurant (a winner-pay contest). In each of these situations, a decision maker must allocate a limited number of "prizes" among agents, and prefers to award the prizes to the highest-quality agents (where quality is orthogonal to an agent's willingness to pay for a prize). The decision maker may review some (but not all) agents to learn their quality before choosing how to allocate prizes.[8] Agents make payments or undertake costly actions (or submit bids) observable to the decision maker, who reviews the agents who submit the highest payments. The model suggests that by awarding attention to the highest bidder, the decision maker (e.g., employer, venture capitalist, bachelorette) may be better able to identify and award the prizes to the most-qualified agents (e.g., applicants, funding seekers, suitors).

2. Relationship with the Literature

The only other paper to consider a contest for attention is Cotton (2009), which brings a highly stylized version of the contest for attention into a more traditional model of

[7]In the movie Wall Street, for example, Bud Fox wins his first meeting with investor Gordon Gekko by being more persistent (and giving Gekko a nicer box of cigars) than others vying for Gekko's attention.

[8]Typically, an employer does not interview all applicants, investors do not meet with all entreprenures looking for funding, and bachelorettes do not date all interested suitors.

lobbying, and uses the model to study campaign finance reform policies. A policymaker chooses whether to sell policy or sell political access (which allowed disclosure of private evidence) through an all pay auction. When the policymaker sells policy, the game is similar to a traditional all pay auction for policy (e.g., Hillman and Riley 1989). When the policymaker sells access, the game becomes a highly stylized version of the divisible resource framework that we consider in Section 5 and the Online Appendix. Both Cotton (2009) and the current paper make the point that a policymaker who sells attention (i.e., political access) can become informed about a policy by observing payments made by interest groups as they vie for attention. Cotton (2009) makes this point with a very simple version of the contest for attention in the process of deriving results about contribution limits and taxes. Its focus is on campaign finance reform, not the contest for attention itself. The current paper, on the other hand, considers contests for attention in detail. We generalize the contest for attention, show that the main insight extends to a variety of environments, and derive a number of important new results that were not possible in the stylized version of the contest for attention considered previously.[9]

A handful of other papers have also modeled the connection between political contributions and access to policymakers (i.e., attention). In Austen-Smith (1998) and Cotton (2012), interest groups must pay a price set by a policymaker in order to engage in informational lobbying. Both consider how a policymaker may offer more access to wealthy interest groups, who are willing to pay more.[10] These papers focus on how a policymaker restricts access in order to extract rent from the political process. In contrast, we focus on whether a time-constrained policymaker can sell attention in such a way (e.g., through an all-pay auction) that he is able to learn about and implement the best policy, despite not having the capacity to review all policy options.[11] Groll and Ellis (2014) model a market for political access where commercial lobbying firms connect citizens to politicians. In the political access models of Austen-Smith (1995) and Lohmann (1995), contributions lend credibility to unverifiable information presented by interest groups (i.e., burning money). In our framework, as well as the other political access papers

[9]For example, Cotton (2009) finds that selling attention maximizes policy utility but results in lower payments than selling policy. The current paper illustrates that this earlier finding is a consequence of the policy framework; in other settings, selling attention may lead to the first best outcome in terms of both policy and payments.

[10]Cotton (2012) shows that a policymaker may exclude less-wealthy interest groups from the policymaking process because doing so allows him to attract higher payments from the more-wealthy interest groups, and extract more rent from the policymaking process. Interestingly, Cotton (2012) shows how less-wealthy interest groups may be better off when they are excluded from the policymaking process. This is because it may be better to be ignored by the policymaker than to be targetted by his rent-seeking efforts.

[11]Notice that the policymaker will not become fully informed if he sets a fixed price for attention, as he does in Austen-Smith (1998) and Cotton (2012).

discussed above, information is verifiable and may be learned with certainty by a policymaker who devotes attention to an issue. In Levy and Razin (2013), interest groups compete in an all pay auction, and the winner has its proposal considered by policymakers. What is meant by consideration differs greatly between their framework and ours. In their framework, there is no uncertainty about proposals, and consideration means being put up for a vote in the legislature, facing off against the status quo policy. In our framework, consideration means a policymaker learns about the costs and benefits of a proposal, before deciding whether to move forward with it. Their work focuses on how a status quo policy evolves over time. Ours focuses on how competing for attention improves the policymakers ability to *learn about* the best policy.

The majority of the literature models lobbying as a system of quasi bribery, where contributions are given in exchange for policy outcomes (e.g., Tullock 1980, Grossman and Helpman 1994), or as a system of information provision in the absence of political contributions (e.g., Austen-Smith and Wright 1992, Cotton and Dellis 2012). Bennedsen and Feldmann (2006) and Dahm and Porteiro (2008) consider both information provision and the exchange of money for policy.[12] Although the theoretical literature focuses on the use of political contributions to buy policy, this role of contributions is supported by neither insider accounts of the lobbying process nor empirical evidence.[13] Rather, empirical accounts of lobbying suggest that contributions help interest groups capture the attention of policymakers, assuring that their policies receive full consideration. For example, Langbein (1986), Ansolabehere et al. (2002) and Hall and Wayman (1990) present evidence that interest groups provide political contributions in order to secure access to policymakers. See also the excellent descriptions of the policymaking process in Bauer et al. (1963), Hansen (1991) and Baumgartner et al. (2009), and the surveys by Herndon (1982), Schram (1995) and Makinson (2003).

There is a substantial literature on the efficient allocation of resources. Esteban and Ray (2006) show that both high wealth and economic desirability increase lobbying by special interests, and show that this can lead to greater misallocation when these factors are not observable. Cotton (2013) and Fullerton and McAfee (1999) consider environments in which a decision maker wants to allocate a limited resource based on some characteristic orthogonal to applicant value. Cotton (2013) considers a journal that wants to maximize the quality of accepted papers, but can review only so many papers before choosing which to publish. It shows how the journal can maintain an acceptable

[12]In these papers, interest groups can produce information, which influences the policymaker's beliefs about the benefits of alternative proposals, and therefore changes the price of buying policy favors. In these models, political contributions continue to buy policy.

[13]Note that a correlation between political contributions and policy outcomes is consistent with both a money-for-policy story and a money-for-access story, where those with more-convincing arguments pay more for access.

refereeing burden and maximize journal quality by imposing submission costs (e.g., a combination of fees and delays) on authors. The costs discourage submissions from the authors who believe their papers have low probability of acceptance, and allow the editors to focus on more promising papers. Unlike in our paper, there is no contest in this environment, just fixed submission costs set by an editor (more closely comparable to lobbying models in which a policymaker sets the price of access, e.g., Austen-Smith 1998, Cotton 2012). More related to our current paper is Fullerton and McAfee (1999), where a contest designer must select a subset of agents to participate in a research tournament. They show that using a contest to allocate entry into the research tournament ensures that only the most promising researchers enter the tournament. In our setting and in Fullerton and McAfee, higher quality agents (e.g., those advocating on behalf of higher quality policies) are willing to pay more to "participate" in the next stage of the game, whether the next stage is our paper's review process or Fullerton and McAfee's research tournament.

All-pay auctions are typically used to directly allocate prizes (e.g., Baye et al. 1993, Hillman and Riley 1989). In our framework the all-pay auction is used to allocate the policymaker's attention. When we allow for observable agent asymmetries, the policymaker's preferred method for choosing which proposals to review involves a handicapped all-pay auction. Such an auction fully adjusts interest group payments to account for known heterogeneity. There exists a growing literature on handicapping contests. Siegel (2014) develops a general all-pay contest framework with handicaps in an environment with complete information. Kirkegaard (2010) considers the use of handicaps in a model with private information about valuations. Eso and Szentes (2007) show that a version of a handicap auction can maximize revenue in a game in which the *auctioneer* chooses how much information to reveal to the bidders about the value of the good. The present paper assumes that bidders reveal information to the auctioneer (not the other way around), and the auctioneer's goal is to collect as much information as possible (rather than revenue maximization). We show how a handicapped auction can be used to maximize the revelation of information, not only to maximize revenue. None of these other models use a contest to elicit information about bidder types.

3. Model with symmetric interest groups

We begin with a relatively simple version of the model. There are n symmetric policy proposals that differ only in quality. The policymaker reviews one of the proposals before choosing one proposal to implement. This symmetric game with one review slot and one implementation slot provides a simple setting in which to develop intuition for our main results. After presenting the results for the game with one review slot and one implementation slot, we show that the results continue to hold when the policymaker reviews and implements multiple proposals. In later sections, we allow for observable asymmetries between the proposals (specifically, between preference intensity of the interest groups advocating in favor of the proposals).

3.1. **Setting.** A policymaker is faced with a set of policy proposals $\mathcal{N} = \{1, ..., n\}$, and must choose which of these n proposals to implement. The proposals may represent different earmark funding requests for projects within the policymaker's district, or reform proposals on different issues. Let q_i denote the quality of proposal $i \in \mathcal{N}$ and $q = \{q_1, ..., q_n\}$ the underlying state of the world. Each q_i is the independent realization of a random variable distributed on $\mathcal{Q} = (0, q_{max}]$ according to continuously differentiable distribution F with density f.[14] Distribution F is common knowledge. The policymaker is ex ante uncertain about the realized quality of each proposal.

The policymaker has the resources to implement one of the proposals. Let $p_i = 1$ ($p_i = 0$) indicate that the policymaker implements (does not implement) proposal i, where $p = \{p_1, ..., p_n\}$ denotes the full policy outcome.

Before implementing a proposal, the policymaker may review one of the proposals to directly observe its quality. Let $r_i = 1$ ($r_i = 0$) indicate that the policymaker reviews (does not review) proposal i, where $r = \{r_1, ..., r_n\}$. A review may involve meeting with IGs or lobbyists to gain a better understanding of the proposal, asking staff or government agencies to conduct research, or holding legislative hearings. When the policymaker reviews proposal i, he perfectly observes q_i. Let $\sigma = \{\sigma_1, ..., \sigma_n\}$ represented the information directly observed by the policymaker by reviewing a proposal, where $\sigma_i = q_i$ when he reviews i and $\sigma_i = \emptyset$ when he does not review i.

Each proposal $i \in \mathcal{N}$ is supported by an independent interest group (IG), an advocate on behalf of its proposal. IG_i refers to the IG associated with issue i. Each IG, an expert on its respective project or policy area, privately observes q_i at the beginning of the game. Before the policymaker decides which proposal to review, the IGs may independently provide payments to the policymaker in an effort to capture his attention. Such payments may be a monetary political contributions or in-kind transfers. Let $c_i \geq 0$ denote any "contribution" made by IG_i, where $c = \{c_1, ..., c_n\}$.

We adapt an all-pay auction to model the allocation of the "review slot" based on payments.[15] The IGs provide payments, and the policymaker reviews the proposal associated with the IG that provided the highest payment. In the "contest for attention" for a single review slot, $r_i = 1$ if $c_i > c_j$ for all $j \neq i$, and ties are broken randomly.

[14]The qualitative nature of the results continue to hold if we alternatively assume that each proposal's quality is a realization of a different random variable, as long as all distributions are common knowledge.

[15]Hillman and Riley (1989) apply an all-pay auction to model the sale of policy favors, and Cotton (2009) argues that the all-pay auction may also be used to model the sale of political access.

The policymaker's payoff is made up of contribution utility u_c and policy utility u_p:

$$U_{PM} = (1-\lambda)u_c(c) + \lambda u_p(p;q). \tag{1}$$

Contribution utility u_c is strictly increasing in individual contributions c_i (and total payments $\sum c_i$). Policy utility is strictly increasing in the quality of the implemented proposal, $\sum p_i q_i$. All else equal, the policymaker prefers to implement the highest quality proposal. Therefore, quality may represent net benefit to the policymaker's constituents or effects on the policymaker's chances of reelection. Parameter $\lambda \in (0,1]$ represents how much the policymaker cares about policy relative to contributions.

An IG's payoff depends on whether its proposal is implemented and its payment. For each $i \in \mathcal{N}$,

$$U_i(p_i, c_i) = vp_i - c_i. \tag{2}$$

Parameter v represents the relative value IGs put on policy outcomes relative to payments; in later sections we allow this parameter to differ across IGs. An IG is an advocate in that its willingness to pay to have it implemented is independent of proposal quality.[16]

The game takes place as follows. First, each IG_i privately observes its own proposal's quality q_i, and then chooses contribution c_i. Second, the policymaker reviews the proposal associated with the highest payment, directly learning that proposal's quality. He updates his beliefs about the quality of the other proposals accounting for the payments made by the IGs. Third, the policymaker chooses one proposal to implement.

3.2. **Preliminaries.** The analysis solves for the Perfect Bayesian Equilibria of the game. A complete description of equilibrium must define:

- Equilibrium contribution strategy C_i^* for each IG, where $C_i^*(q_i)$ describes the equilibrium value of c_i when IG_i observes that its proposal is quality q_i.
- Equilibrium implementation strategy, P^*, used by the policymaker to determine which proposal to implement given c and σ.
- The policymaker's posterior beliefs, given c and σ. We denote these beliefs by μ.

These components constitute an equilibrium if (i) no IG has an incentive to deviate from $c_i = C_i^*(q_i)$ given the payment strategies of the other IGs and the implementation strategy of the policymaker, (ii) the policymaker's implementation strategy P^* is sequentially rational given his beliefs μ, and (iii) the policymaker's posterior beliefs μ are consistent with $C_1^*, ..., C_n^*$ and σ. Function μ denotes the policymaker's updated beliefs about q,

[16]This is in contrast to most auction models which assume valuations are unknown. We make the alternative assumption that v is known, but that agents have private information about their qualifications, a characteristic orthogonal to their value. This is consistent with situations in which a policymaker knows how well financed interest groups are, but does not know how different policies will benefit his constituents or reelection chances.

where $\mu(\tilde{q}|c,\omega)$ is the probability the policymaker puts on state $\tilde{q} \in \mathcal{Q}$ given contribution profile c and review outcome ω. Similarly, $\mu_i(\tilde{q}_i|c,\omega)$ is the posterior probability proposal i is quality $\tilde{q}_i$.

We impose an assumption on the behavior of IGs when indifferent between multiple contributions.

A1 An IG that is indifferent between multiple contributions chooses the contribution that maximizes the expected probability that its proposal is implemented, given the equilibrium strategies of the other IGs and the policymaker.

This assumption plays a roll in the analysis only in cases where IGs are indifferent between contributing according to equilibrium function C_i^* and contributing other amounts. Any equilibrium found under A1 will also be a Perfect Bayesian Equilibrium in the absence of the assumption. In the Online Appendix, we consider implications of both this assumption and the alternative assumption that an indifferent IG minimizes payments.

Full-information equilibria. The primary insight of our paper shows how the policymaker becomes fully informed about the quality of all proposals when he sells attention (i.e., the one review slot) to the highest bidder. We say that the contest for attention leads to the policymaker being "fully-informed" if there exists an equilibrium of the contest for attention in which his equilibrium beliefs, μ, put probability 1 on the true state of the world: $\mu(q|c,\omega) = 1$. We begin by providing a sufficient condition on the IGs' equilibrium payment strategies to guarantee that the policymaker is fully informed.

Lemma 1. *If $C_i^{*\prime}(q_i) > 0$ for each $i \in \mathcal{N}$ and all possible $q_i \in \mathcal{Q}$, then the policymaker is fully informed in equilibrium.*

When the policymaker reviews a proposal, he perfectly observes q_i, and therefore has correct beliefs about its quality. Lemma 1 shows that in equilibrium the policymaker will also have correct beliefs about the quality of the $n-1$ proposals he does not review. Strictly monotonic payment functions mean there is a one-to-one mapping between the quality of each proposal and the payment made by its IG. In equilibrium, when the policymaker observes payment c_i, he expects the payment was generated by the IG's equilibrium contribution function C_i^*. Because C_i^* is strictly increasing, it is invertible; we define $Q_i^* \equiv C_i^{*-1}$. The policymaker therefore updates his beliefs about q_i upon observing c_i, expecting that $q_i = Q_i^*(c_i)$. In equilibrium, these beliefs are correct.

We refer to any Perfect Bayesian Equilibrium for which the condition in Lemma 1 is satisfied as a **full-information equilibrium**. The analysis limits attention to such equilibria.

Before proceeding with the analysis, it is helpful to determine the policymaker's sequentially rational policy choice in any full-information equilibrium. In the final stage of the game, the policymaker implements the proposal with the highest expected quality given his beliefs μ.[17] Denote the policymaker's posterior beliefs about q_i by $E_\mu q_i$.

Lemma 2. *If the policymaker is fully informed, then in equilibrium he implements the highest quality proposal with probability* 1.

Payment-maximizing full-information equilibrium. Lemma 2 shows that in any full-information equilibrium, the policymaker implements the highest quality proposal. This means that an IG with proposal quality q_i expects equilibrium benefit $B(q_i)$, where

$$B(q_i) = vF(q_i)^{n-1}. \tag{3}$$

Parameter v is the value to an IG of having its proposal implemented, and $F(q_i)^{n-1}$ is the probability that proposal i is the highest quality proposal. Expression (3) gives the expected benefit to an IG when the policymaker *certainly* implements the highest quality proposal. It implies an individual rationality constraint for each IG_i:

$$c_i \leq B(q_i). \tag{4}$$

No IG will ever pay more than its expected benefit from lobbying, and in any full-information equilibrium, its expected benefit equals $B(q_i)$.

Lemma 3. *There does not exist a full-information equilibrium in which $C_i^*(q_i) > B(q_i)$ for any $i \in \mathcal{N}$ and $q_i \in \mathcal{Q}$.*

The maximum feasible payment from IG_i equals $B(q_i)$. We define a **payment-maximizing full-information equilibrium** as a full-information equilibrium in which all IGs pay their maximum feasible amounts: $C_i^* = B$ for each $i \in \mathcal{N}$ and $q_i \in \mathcal{Q}$.

3.3. **Solving the Contest for Attention.** The preliminary analysis determined that in any full-information equilibrium, the policymaker's posterior beliefs are always correct, and he implements the first best policy. Here, we begin with a full characterization of the set of symmetric full-information equilibria of the contest for attention game. In a symmetric full-information equilibrium, all IGs play the same strategy $\bar{C}^*$, where $\bar{C}^{*\prime}(q_i) > 0$ for all possible q_i.

To derive the equilibrium payment function, we consider IG_i's best response when all other IGs contribute according to $\bar{C}^*$. Because the other $n-1$ IGs contribute according to the equilibrium payment function, the policymaker has correct beliefs about their proposal qualities, regardless of whether they win attention. If they do win attention, the policymaker observes q_j directly. If they do not win attention, the policymaker (correctly) believes $E_\mu q_i = \bar{Q}^*(c_i)$, where $\bar{Q}^* \equiv \bar{C}^{*-1}$. We derive equilibrium payment

[17] We assume that he breaks ties randomly. In equilibrium, ties do not occur.

functions $\bar{C}^*$ such that IG_i has no incentive to deviate from contributing according to the strategy when it expects other IGs to do the same.

No incentive to over-contribute — We first explain why IG_i prefers $c_i = \bar{C}^*(q_i)$ to any higher contribution. If IG_i provides the equilibrium contribution, it submits the highest contribution, wins attention and has its proposal implemented if and only if it has the highest quality proposal.[18] Contributing $c_i > \bar{C}^*(q_i)$ introduces the possibility that IG_i wins attention even when it does not have the highest quality proposal. This does not increase the probability that proposal i is implemented, however, as winning attention guarantees that the policymaker reviews and directly learns q_i. Since the policymaker's beliefs about the quality of the other $(n-1)$ proposals are accurate, the policymaker continues to implement proposal i if and only if it is the highest quality proposal. Therefore, overbidding requires a larger payment without providing an expected benefit to the IG.

No incentive to under-contribute — The equilibrium contribution function must also be such that no IG wants to under-contribute compared to the equilibrium payment. If IG_i deviates downward, its costs decrease (a benefit). But, it also decreases the probability that IG_i submits the highest payment and has its policy implemented (a cost). To rule out such deviations, a decrease in contribution must lead to a sufficiently large decrease in the probability of winning attention. This will be the case when the slope of the equilibrium contribution function is sufficiently low.[19]

We will derive a condition on the equilibrium contribution function $\bar{C}^*$ such that each IG_i prefers $c_i = \bar{C}^*(q_i)$ to any lower amount when the other IGs contribute according to the equilibrium function. Notice that for any contribution $c_i \leq \bar{C}^*(q_i)$, IG_i wins attention and has its proposal implemented if and only if it provides the highest contribution. If another IG provides a higher contribution, then IG_i will not win attention. The policymaker will have expectations that $E_\mu q_i = \bar{Q}^*(c_i)$, which will be less than the observed quality of the IG that contributes according to the equilibrium function and wins attention. The policymaker does not observe the true quality of q_i, and will therefore implement the other proposal regardless of whether that proposal was actually higher quality than i. If, on the other hand, IG_i provides the highest contribution, then IG_i wins attention. Even before the policymaker reviews proposal i, he expects that it is highest quality proposal based on the contributions. After he reviews the proposal, he

[18]Ties happen with probability zero in equilibrium.

[19]When contributions are increasing in quality at a low rate, the distribution of equilibrium contributions is more dense than when contributions are increasing in quality at a higher rate. This means that a given decrease in IG_i's contribution is more likely to change the rank ordering of contributions in the low slope case than in the high slope case.

learns that i is even higher quality than he expected, and will implement it over the other options.

The expected payoff to IG_i from any $c_i \leq \bar{C}^*(q_i)$ is

$$EU_i = F(\bar{Q}^*(c_i))^{n-1}v - c_i. \tag{5}$$

Given the definition of B from (3), the expected payoff can be rewritten

$$EU_i = B(\bar{Q}^*(c_i)) - c_i. \tag{6}$$

For $\bar{C}^*$ to constitute an equilibrium, IG_i must prefer contributing $c_i = \bar{C}^*(q_i)$ to any lower value. Contributing the equilibrium amount results in expected payoff $EU_i = B(q_i) - \bar{C}^*(q_i)$, which must be larger than (6) for all $c_i < \bar{C}^*(q_i)$. This will be true for all possible q_i when

$$\bar{C}^{*\prime}(q_i) \leq B'(q_i) \quad \text{for all } q_i \in \mathcal{Q}. \tag{7}$$

Individual rationality further requires that $\bar{C}^*(0) = 0$.

Summary of equilibrium requirements — These conditions and the requirement that a full-information equilibrium requires $\bar{C}^{*\prime}(q_i) > 0$ for all $q_i \in \mathcal{Q}$ are the foundation of the first proposition.

Proposition 1. *For any function $\bar{C}$ such that $0 < \bar{C}'(q_i) \leq B'(q_i)$ for all $q_i \in \mathcal{Q}$ and $\bar{C}(0) = 0$, there exists a full-information equilibrium in which $C_i^* = \bar{C}$ for each $i = \mathcal{N}$. No other symmetric full-information equilibria exist.*

Notice the implications of this result. First, it establishes that the policymaker may become fully informed about the quality of all proposals, even if he only reviews one of them. In equilibrium, the fully-informed policymaker is guaranteed to implement the highest-quality proposal. Selling attention to the highest contributor improves policy outcomes. Second, it shows that there are in fact many full-information equilibria.

Payment-maximizing equilibrium — Next, we describe the full-information equilibrium that maximizes contributions from all IGs, and the payments received by the policymaker. Such an equilibrium corresponds with the highest level of competition between the IGs, an equilibrium characteristic that may serve as a focal point and lead to coordination on such an equilibrium.

Corollary 1. *There exists an equilibrium in which $C_i^* = B$ for each $i = \mathcal{N}$. This is the payment-maximizing full-information equilibrium.*

In the payment-maximizing full-information equilibrium, each IG contributes $c_i = B(q_i) = F(q_i)^{n-1}v$. The policymaker extracts all rent from the policymaking process. From an ex ante perspective, the expected individual contribution is $\int f(q_i)B(q_i)dq_i$, and the sum of total expected contributions equals

$$n \int f(q_i)B(q_i)dq_i = v \int nf(q_i)F(q_i)^{n-1}dq_i = v.$$

The finding that total IG payments equal v is remarkable. Even if the policymaker explicitly sold proposal implementation (rather than attention) to the highest bidder or by making a take-it-or-leave-it price to one of the IGs, he would not be able to collect more than v in expected payments from the IGs. There does not exist a method for deciding which proposal to implement that results in higher payments than the payment-maximizing equilibrium of the contest for attention. And unlike directly selling proposal implementation to the IGs, the contest for attention has the added benefit of guaranteeing the first-best policy.

Proposition 2. *The payment-maximizing full-information equilibrium results in the first best policy and the first best level contributions for the policymaker. There exists no other method for implementing policy that leads to higher expected payoffs for the policymaker.*

This results implies that a policymaker who cares about both the quality of the implemented proposal and collecting payments can do no better than first allocating attention through a contest and then implementing the proposal he believes best. Such an allocation method guarantees both the first best policy outcome and the maximum expected payments.

This means there does not necessarily exist a tradeoff between implementing the best policy and maximizing political contributions. This result is in contrast to other papers on lobbying, where the driving force between the results is a trade off between implementing policy that is good for constituents, and implementing policy that encourages contributions from special interests (e.g., Prat 2002, Coate 2004, Bennedsen and Feldmann 2006, Cotton 2009).

This result, however, is not as strong in Section 4 where we consider IG asymmetries. There, we show that the contest for attention continues to guarantee the first best proposal implementation even if IGs differ in their valuations. However, the contest for attention will no longer guarantee the highest possible total payments from IGs compared to any other method of choosing which policy to implement. Although it will maximize payments compared to any other method that guarantees the first best policy.

3.4. **Implementing multiple proposals.** The above results extend to a setting where the policymaker reviews the k proposals associated with the highest IG payments, and then implements the m proposals he believes are highest quality, where $1 \leq k \leq m < n$. Here, we focus on the case where the number of review slots is no greater than the number of proposals the policymaker can emphasize, including the extreme case where the policymaker reviews only a single proposal before implementing multiple proposals.[20] By allocating as few as one review slot through a contest for attention, the policymaker becomes fully informed about the quality of all proposals and is able to implement the m highest-quality alternatives.

There are a number of differences between the analysis in the case where $k = m = 1$ that we consider above, and the analysis in this section. First, the ex ante expected benefit to IG_i when the policymaker certainly implements the m highest-quality proposals is now

$$B(q_i; m) = v \sum_{y=0}^{m-1} \frac{(n-1)!}{(n-1-y)!y!} (1 - F(q_i))^y F(q_i)^{n-1-y}, \tag{8}$$

the value of having its proposal implemented times the probability that fewer than m other proposals are higher quality.

Second, when $k < m$ there is the possibility that in equilibrium the policymaker implements a proposal without first reviewing it. This is consistent with the idea that a legislator may vote on issues he has not had time to study in detail.[21] This means the policymaker will implement some proposals without first reviewing them, thereby altering the incentives IGs have to over-contribute and signal higher quality proposals than they actually have. If it is sufficiently low-cost to inflate the policymaker's beliefs about q_i, then the IG will prefer to over-contribute compared to equilibrium. This means that $\bar{C}^{*\prime}(q_i)$ must not be too low; it must be sufficiently costly to signal a marginally higher quality. Otherwise, IGs would have the incentive to at least marginally inflate their payments in an effort to provide the impression (when they are not reviewed) that their proposals are higher quality than they truly are.

The incentives IGs have to under-contribute compared to equilibrium are similar to the previous section. The equilibrium requires that $\bar{C}^{*\prime}(q_i) \leq B'(q_i; m)$ for all $q_i \in \mathcal{Q}$, which is the multiple-proposal equivalent to (7) from the previous section. Proposition 3 establishes that the constraint that $\bar{C}^*$ be increasing at a sufficiently hight rate never contradicts the constraint that it must be increasing at no greater rate than B.

[20]In the Online Appendix, we consider the case where $k > m$, and show that the policymaker can still become fully informed by selling access through an all pay auction. However, when $k > m$, there does not exist a payment-maximizing full-information equilibrium. Because of this, it is reasonable to expect that policymaker would never allocate more than m access slots.

[21]House Judiciary Chairman John Conyers (D-Michigan) explained in July 2009, "I love these Members of Congress, they get up say 'Read the bill.' What good is reading the bill if it's a thousand pages and you don't have two days and two lawyers to find out what it means after you read the bill?" See video of the event at http://www.cnsnews.com/node/51610. Former U.S. Representative Thomas Downey (D-New York) explains further: "It is difficult to see Members of Congress. Not because they hide themselves from you, but because they are very busy, between committee work, and traveling back and forth from their districts, maintaining their office appointments, and seeing their constituents" (Schram 1995).

Proposition 3. *In the contest for attention game where* $1 \leq k \leq m < n$*, there exists a function* $\tilde{C}$ *such that*

i. $0 \leq \tilde{C}'(q_i) < B'(q_i; m)$ *for all* $q_i \in \mathcal{Q}$*, and*
ii. *for all functions* $\bar{C}$ *such that* $\tilde{C}'(q_i) < \bar{C}'(q_i) \leq B'(q_i; m)$ *for all* $q_i \in \mathcal{Q}$ *and* $\bar{C}(0) = 0$*, there exists a full information equilibrium in which* $C_i^* = \bar{C}$ *for each* $i = \mathcal{N}$*.*

The equilibrium in which $C_i^* = B(\cdot; m)$ *is the unique payment-maximizing full-information equilibrium.*

In the payment-maximizing equilibrium, total expected payments equal mv, implying that once again the policymaker is able to fully-extract all of the rent from the policymaking process. Again, a policymaker who cares about both the quality of the implemented proposal and collecting IG payments will never expect higher utility than when he allocates attention to the highest bidder before implementing the proposals he believes best.

Proposition 4. *Consider the contest for attention game with k review slots and m implemented proposals, where* $1 \leq k \leq m < n$*. The payment-maximizing full-information equilibrium results in the first best policy and the first best level contributions for the policymaker. There exists no other method for implementing policy that leads to higher expected payoffs for the policymaker.*

3.5. **Importance of reviewing at least one proposal.** In equilibrium, each IG contributes according to a payment function that is strictly increasing in its proposal's quality, and the policymaker correctly infers the quality of each proposal from the IG payments. This means that ex post, after the IGs provide their contributions, reviewing a proposal never improves the accuracy of the policymaker's (already fully-accurate) beliefs. Despite the ex post redundancy of the review process, it remains an essential part of the policymaker's allocation method, essential for the policymaker to become fully informed.

Proposition 5. *If the policymaker reviews no proposals, then there does not exist a full-information equilibrium.*

The intuition behind this result is straightforward. Some probability of being reviewed is needed to maintain the separating equilibrium in which an IG's payment is strictly increasing in the quality of its proposal. If the policymaker reviews no proposal but continues to expect that IGs contribute according to strictly increasing payment functions, then the IGs each have an incentive to increase their payments, effectively inflating the policymaker's beliefs about the quality of their proposals. In this case, each IG deviates to pay $c_i = \bar{C}^*(q^{max})$, resulting in the maximum policymaker beliefs about the quality of its proposal. Without any review, the policymaker is unable to infer anything about a proposal from its IG's payment, and in equilibrium $c_i = 0$ for all i.[22]

Under the assumptions of the model, the policymaker never has an incentive to review more than one proposal, as he becomes fully informed about the quality of all proposals in equilibrium, even when $k = 1$. In Section 5, we discuss cases of noisy IG quality signals, and unobservable IG asymmetries; cases where reviewing additional proposals may be beneficial.

4. Model with Asymmetric Interest Groups

In reality, IGs differ in their benefit from having their proposal implemented, or opportunity costs of providing political contributions. In this section, we allow for such observable asymmetries between the IGs. Except for the following changes, the underlying setting remains identical to the previous sections.

The IGs' payoffs depend on whether their proposal is implemented and their payment: $u_i(p_i, c_i) = v_i p_i - c_i$. Parameter v_i represents the relative value IG_i puts on policy outcomes relative to payments. A higher v_i may be interpreted as either IG_i having more at stake from their proposal being implemented, or as i being more wealthy or having lower costs of funds.[23] Without loss of generality, we rank order IGs according to their value, such that $v_1 > v_2 > ... > v_n$.[24]

The policymaker reviews k and then implements m proposals, where $1 \leq k \leq m < n$. The expected benefit to IG_i if the policymaker always implements the m highest-quality proposals can be defined as $B_i(q_i; m)$, which differs from $B(q_i; m)$ as defined in (8) only in that v is replaced by v_i in its argument. Where clear, we refer to $B_i(\cdot; m)$ by B_i. Given that $v_1 \geq ... \geq v_n$, it follows that $B_n(q_i) \leq B_i(q_i)$ for all i and $q_i > 0$; the benefit to

[22]Proposition 5 relies on A1. If we eliminate A1 and impose no restriction on the behavior of indifferent IGs, there will exist an equilibrium in which all IGs are indifferent between any contribution, and each contribute according to B. When all other IGs contribute according to B, any $c_i \in [0, B(q_{max})]$ is a best responses for IG_i, each giving an expected payoff of zero. Therefore, each IG is willing to contribute $c_i = B(q_{max})$, but we see no reason why it would do so. Unlike in the earlier sections, here such a contribution does not stand out from the other contributions over which an IG is indifferent. Because of this, we impose A1, putting some structure on the choice of contribution by an indifferent IG, and therefore ruling out any full-information equilibrium when there are no reviews.

[23]To see this, suppose that IG i receives payoffs $\hat{u}_i = \hat{v}_i - \hat{\tau}_i b_i$ when its policy is implemented and $\hat{u}_i = -\hat{\tau}_i b_i$ when it is not implemented. Here, $\hat{v}_i$ is the weight on policy and $\hat{\tau}_i$ is the weight on payments. Any positive affine transformation of $\hat{u}_i$ maintains preferences. We therefore define $v_i \equiv \hat{v}_i / \hat{\tau}_i$ and $u_i \equiv \hat{u}_i / \hat{\tau}$, and rewrite agent i's preferences as we defined them in the body of the paper. An increase in $\hat{v}_i$ and a decrease in $\hat{\tau}_i$ are indistinguishable in the model.

[24]The analysis considers IG differences in v_i. Additionally, we could incorporate differences in quality distribution, F_i, allowing IGs to, for example, differ in the expected quality of their proposals. Allowing such differences complicates the analysis, particularly the functions for B_i, without providing additional insight. The main results continue to hold.

IG_n from participating in a full-information equilibrium is lower than the benefit to any other IG.

In the previous section, the contest for attention was symmetric, giving the same weight to all IGs' payments, and awarding attention to the k IGs that provided the highest payments. If the policymaker uses such a symmetric contest to allocate attention when IGs are asymmetric, he will still become fully informed and implement the first best policy in equilibrium, as long as the differences between the IGs are not too large. While a symmetric contest for attention results in the first best policy, it is optimal for a policymaker who also cares about contributions.[25] For the remainder of this section, we allow for a more general asymmetric (i.e. "handicapped") contest for attention, which requires greater payments from some IGs than from others for the same equilibrium probability of winning attention. We show how such a contest is optimal for the policymaker compared to any other method that guarantees the first best policy.

We generalize the contest for attention, modeling it as an asymmetric all-pay contest defined as a set of score functions $\theta = \{\theta_1, ..., \theta_n\}$, one for each IG. When IG_i provides payment c_i, its "score" is given by $\theta_i(c_i)$, where $\theta_i(0) = 0$ and $\theta_i'(c_i) > 0$ for all $c_i > 0$. The proposals associated with the highest scores in the contests receive attention. That is, the policymaker reviews proposal i if fewer than k other proposals have $\theta_j(c_j) > \theta_i(c_i)$.

A policymaker may require higher payments from IGs with higher v_i than from IGs with lower v_i, in exchange for the same equilibrium probability of winning attention. The revenue maximizing contest for attention involves score functions that fully adjust for observable IG asymmetries. Such a contest involves $\theta_i = B_i^{-1}$ for all $i \in N$. In equilibrium, each IG provides a payment $C_i(v_i) = B_i(v_i)$, and an IG wins attention and is and has its policy implemented if and only if it has one of the k highest q_i. In equilibrium, the policymaker implements the first best policy, and collects the maximum possible revenue compared to any other mechanism that guarantees the first best policy. We provide a detailed analysis in the Online Appendix. Proposition 9 summarizes this result.

Proposition 6. *Consider the game with asymmetric IGs and a handicapped contest for attention in which $\theta_i = B_i^{-1}$ for all i, and where $1 \leq k \leq m < n$. There exists a full-information equilibrium in which $C_i^* = B_i$ for all $i = 1, ..., n$. This is the unique payment-maximizing full-information equilibrium.*

In equilibrium, IGs with higher v_i tend to pay more than IGs with lower v_i, implying higher contributions from more-wealthy groups or groups with more to gain from having their proposal implemented. This does not, however, translate into either the

[25] A detailed analysis game with asymmetric IGs is included in the Online Appendix. It includes the case of a symmetric contest for attention.

attention or implementation decisions being biased in favor of more-wealthy IGs. In equilibrium, more-wealthy groups pay more, but the contest accounts for observable differences between IGs, and in equilibrium only the highest quality IGs (regardless of wealth) gain attention and have their proposals implemented.

Corollary 2. *Consider the game with asymmetric IGs and a handicapped contest for attention in which $\theta_i = B_i^{-1}$ for all i, and where $1 \leq k \leq m < n$. In equilibrium, wealthy IGs tend to contribute more than less wealthy IGs, but they are no more likely to have their proposals implemented and are no better off than less wealthy IGs.*

When IGs differ only in proposal quality, a policymaker who cares about both collecting payments and proposal quality can be no better off than when he sells attention to the highest bidders before implementing the proposals he believes best. This procedure for implementing policy results in the first best total payment (equal to mv in expectation) and the first best policy outcome. It no longer guarantees the first best total payment in the environment with asymmetric IGs. In this section, the payment-maximizing full-information equilibrium guarantees the first best policy outcome, and guarantees the highest possible payments compared to any other full-information equilibrium. But, it no longer guarantees the highest payments compared to certain methods of selling policy.[26] The payment-maximizing full-information equilibrium describes the most-profitable outcome associated with any mechanism that guarantees the first best policy outcome. A contest for attention that results in this outcome is preferred to any other method of awarding policy, as long as the policymaker cares enough about policy relative to payments (i.e. as long as λ in his payoff function is not too small).

5. Other Considerations

We summarize a number of extensions, which illustrate the generality of our results. Detailed consideration of these extensions is provided in the Online Appendix.

Awarding attention through a winner-pay auction–We have thus far modeled the contest for attention as an all-pay auction. The policymaker may still be fully informed and guaranteed to implement the first best policy if he uses a winner-pay auction to award attention. However, with a winner pay contest, no payment-maximizing full-information equilibrium exists. This means that potential revenue is higher when the contest for attention takes the form of an all-pay contest rather than a winner-pay contest.

[26]For example, the policymaker could make a take it or leave it offer to the m highest value IGs, committing to implement IG_i's proposal if and only if $c_i = v_i$ for $i = 1, ..., m$. It is an equilibrium under such an alternative mechanism for the m highest value IGs to contribute $c_i = v_i$, and such a mechanism results in the maximum feasible expected sum of payments. It does not, however, guarantee the first best policy outcome.

Other methods for allocating attention–The Online Appendix discusses alternative ways that the policymaker may sell access or choose policy. We also consider an alternative version of the game in which IGs can send cheap talk messages instead of payments prior to the allocation of attention.

Noisy quality signals–The model assumes that IGs perfectly observe the quality of their own proposals. It is possible, however, that IGs only observe an imperfect signal of their proposal's quality and are not perfectly aware of how the policymaker will perceive their proposal's quality following a review. In this case, the policymaker learns about the private signal of all IGs from their contributions, but he only becomes fully informed about the true quality of the proposals he actually reviews.

Allocating a divisible resource–We consider an alternative setting in which the policymaker chooses how to allocate a divisible resource when a project's optimal allocation is increasing in its own quality and decreasing in the quality of the other proposals. It is a generalized version of the competition for attention that appeared in Cotton (2009). We show in this alternative setting, a contest for attention leads the policymaker to become fully informed about the optimal allocation.

We reserve the detailed consideration of other extensions for future research. These include:

IG budget constraints–Assuming that IGs face binding budget constraints changes the equilibrium outcomes. When all IGs face the same budget constraint, the constraint may represent the implementation of campaign contribution limits as in Cotton (2009). An asymmetric constraint may represent cash or borrowing constraints which may differ across IGs. With budget constraints, an IG's equilibrium payment strategy is no longer strictly increasing in proposal quality, but rather strictly increasing in quality up to a point, before jumping to the maximum budget. This implies that the policymaker will fail to become fully informed about the quality of all proposals when more than k IGs have high enough realizations of quality that they contribute their entire budget.

Unobservable IG asymmetries–When IG differences in v are unobservable, a policymaker will be uncertain whether high contributions are due to IGs having high v or high proposal quality. He will only learn the true quality of proposals he reviews, and will remain less informed about the quality of the other proposals. This adds noise to the policymaking process which we anticipate is similar to the extension with noisy IG quality signals.

IG have opposing positions on the same policy space–The model requires IGs to have some uncertainty about the proposal quality of the other IGs. The model would apply in a situation where the policymaker is deciding whether to eliminate steel tariffs, where the steel industry knows how many jobs the tariffs save in the steel industry, and manufacturers know how many manufacturing jobs the tariffs costs, but the opposing interests have uncertainty about the effect of the tariffs on jobs in the other industry. Such a situation is consistent with our framework. However, our framework is not consistent with a situation where the opposing interests are fully informed about the policymaker's optimal policy on their issue. That is a different model that may be explored in future research.

6. Conclusion

The paper shows how a policymaker who sells political access to interest groups based on contributions may become fully informed about the quality of all policy proposals, and be guaranteed to implement the best policy. This is the case when the policymaker allocates his limited attention through a "contest for attention" before implementing the proposals he believes are best. This result stands in contrast to popular intuition that assumes the exchange of political contributions for access must be detrimental for policy. We find exactly the opposite. Selling political access to the highest bidders can guarantee the first best policy.

We establish that this main insight holds across a variety of assumptions and extensions to the model. The result holds regardless of how constrained the policymaker is, whether interest groups are symmetric or asymmetric, whether the contest for attention involves an all-pay or winner-pay contest, and whether the policy proposals involve the allocation of a non-divisible or divisible resource. Our analysis suggests that a contest for attention can result in a fully informed policymaker and the first best policy in a wide variety of settings.

The paper goes on to establish that in some settings, a contest for attention may result in both the first best policy and the first best level of total contributions. When this is the case, a policymaker does not need to sacrifice political contributions in order to implement the best policy. This result is in contrast to numerous models of lobbying in which a policymaker can bias policy in favor of interest groups in order to increase political contributions. With a contest for attention, it is possible for a policymaker to maximize both contribution and policy utility. When this is the case, it is impossible for a policymaker to be better off in terms of either contributions or policy than when he allocates attention to the highest bidder before implementing the proposals he believes best.

Additional insights are gained when the analysis allows interest groups to differ in terms of wealth or policy valuation, as well as proposal quality. In this setting, the payment-maximizing contest for attention is handicapped to fully account for interest group asymmetries. A rich interest group must pay more than an otherwise similar poor group for the same equilibrium probability of access (e.g., big oil must pay more than a local community non profit). The result gives insight into the popular intuition that the rich have better access to politicians, and that policy must therefore be biased in favor of the rich. This is not true in our analysis. Although we find that rich interest groups tend to contribute more than poor interest groups, this does not imply that the rich have a higher probability of winning attention or having their proposals implemented. In equilibrium, the policymaker devotes attention to and implements the highest quality proposals. Under our assumptions about policymaker behavior, policy is independent of interest group wealth.

Finally, the competition for attention framework may provide insight into other settings beyond political lobbying. A contest for attention may improve allocation decisions in other environments in which the primary goal is to choose the highest-quality or most-qualified options, including the selection of candidates for jobs, scholarships, admissions or marriage, and the selection of investment opportunities. We leave further consideration of these and other applications to future research.

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Appendix A. Proofs

Throughout the proofs, we use "PM" in place of "policymaker."

Lemma 1: The strict monotonicity of $\bar{C}_i^*$ means there exists a one-to-one mapping between proposal i's quality, q_i, and the payment made by IG_i, c_i. If the PM reviews proposal i, then he observes q_i directly. If the PM does not review proposal i, then he infers q_i from his observation of c_i anticipating the IGs' equilibrium contribution strategy. That is, he believes that $q_i = \bar{C}_i^{*-1}(c_i)$, and given the one-to-one relationship between c_i and q_i these beliefs are accurate in equilibrium. □

Lemma 2: The PM's policy choice must be sequentially rational given his beliefs about q, which means he must choose the policy with the highest posterior expected quality. When the PM is fully informed, his beliefs are correct, and he implements the highest quality proposal with probability one. □

Lemma 3: Follows from the analysis in the body of the paper. □

Proposition 1: The analysis here complements the analysis in the body of the paper. In the body, we show that $EU_i = B(\bar{Q}^*(c_i)) - c_i$ for any $c_i \leq \bar{C}^*(q_i)$. In equilibrium, IG_i must (weakly) prefer $c_i = \bar{C}^*(q_i)$ to any lower contribution, including a marginal decrease in c_i. The IG has no incentive to marginally decrease c_i from its equilibrium payment if $\partial EU_i / \partial c_i \geq 0$ when evaluated at $c_i = \bar{C}^*(q_i)$, meaning that IG_i prefers to increase his contribution to $\bar{C}^*(q_i)$ from any value lower than but close enough to this amount. This is the case when

$$\left.\frac{\partial EU_i}{\partial c_i}\right|_{c_i=\bar{C}^*(q_i)} = B'\left(\bar{Q}^*(\bar{C}^*(q_i))\right)\bar{Q}^{*\prime}(\bar{C}^*(q_i)) - 1 \geq 0. \tag{9}$$

Note that $\bar{Q}^*(\bar{C}^*(q_i)) = q_i$ and that $1/\bar{Q}^{*\prime}(\bar{C}^*(q_i)) = \bar{C}^{*\prime}(q_i)$ is implied by $\bar{Q}^*$ being the inverse function of $\bar{C}^*$. Therefore, (9) may be rewritten

$$\bar{C}^{*\prime}(q_i) \leq B'\left(q_i\right). \tag{10}$$

In equilibrium, (10) must hold for each possible realization of $q_i \in \mathcal{Q}$. The requirement that (10) holds for all q_i implies that $1 \leq B'(\bar{Q}^*(c_i))\bar{Q}^{*\prime}(c_i)$ for all $c_i \in (0, \bar{C}^*(q_{max})]$, which guarantees that $\partial EU_i / \partial c_i \geq 0$ for all relevant c_i. Therefore, (10) for all $q_i \in \mathcal{Q}$ is both a necessary and sufficient condition for an IG not to have an incentive to deviate downward from its equilibrium contribution.

The rest of the existence argument follows from the analysis in the body of the paper. The claim that no other symmetric full-information equilibria exist follows because the analysis fully characterizes the set of strictly increasing contribution functions that correspond to symmetric Perfect Bayesian Equilibria of the game. Because a full-information equilibrium is defined as one in which all contribution functions are strictly increasing, our characterization includes *all* symmetric full-information equilibria. □

Proposition 2: Follows from Prop. 1 and the definition of a payment-maximizing full-information equilibrium as one in which all IGs contribute according to $C_i^* = B$. □

Corollary 2: Suppose $c^* = \{c_1^*, ..., c_n^*\}$ constitutes the equilibrium contribution profile under any arbitrary mechanism for the PM choosing which policy to implement. Each IG's equilibrium contribution c_i^* must satisfy an individual rationality constraint, $c_i^* \leq \pi_i(c^*)v$, where $\pi_i(c^*)$ is the probability the PM chooses policy i conditional on equilibrium contribution profile c^*. The set of individual rationality constraints implies that

$$\sum_{i=1}^{n} c_i^* \leq \sum_{i=1}^{n} \pi_i(c^*)v. \tag{11}$$

If the policymaker always chooses a policy (as he will in our game), then $\sum_{i=1}^{n} \pi_i(c^*) = 1$. Therefore, (11) simplifies to

$$\sum_{i=1}^{n} c_i^* \leq v. \tag{12}$$

With the contest for attention, ex ante expected aggregate contributions equal v. As (12) shows, no mechanism for choosing which policy to implement can result in higher aggregate payments.

In a full-information equilibrium, the PM also implements the proposal that maximizes his policy payoff. Therefore, the equilibrium involves both the highest possible payments and the best possible policy outcome, and the PM expects the maximum theoretically feasible payoff. □

Proposition 3: The analysis in the body of the paper establishes that no IG has an incentive to under contribute (i.e., pay $c_i < \bar{C}^*(q_i)$) when $\bar{C}^{*\prime}(q_i) \leq B'(q_i; m)$ for all $q_i > 0$. It also argues that no IG has an incentive to over contribute (i.e., pay $c_i > \bar{C}^*(q_i)$) when $\bar{C}^{*\prime}(q_i)$ is sufficiently large, and that $C^* = B$ is always consistent with this requirement. Here, we formally establish these components of the result. The body of the paper establishes that no IG has an incentive to over contribute when $k = m$; we therefore focus on the case where $k < m$.

Consider the decision of IG_i when all other IGs contribute according to strictly increasing function $\bar{C}^*$, and where $k < m$. IG_i's expected payoff from contribution $c_i \geq \bar{C}^*(q_i)$ is

$$\begin{aligned} &v \sum_{y=0}^{m-1} \tfrac{(n-1)!}{(n-1-y)!y!} F(q_i)^{n-1-y}(1 - F(q_i))^y \\ &+ v \sum_{y=m}^{n-1} \tfrac{(n-1)!}{(n-1-y)!y!} \sum_{x=k}^{m-1} \tfrac{y!}{(y-x)!x!} F(q_i)^{n-1-y}(F(Q^*(c_i)) - F(q_i))^{y-x}(1 - F(Q^*(c_i)))^x \\ &- c_i. \end{aligned} \tag{13}$$

The first line of (13) is v times the probability that fewer than m other proposals are higher quality than proposal i. When proposal i is one of the m highest quality proposals and $c_i \geq C^*(q_i)$, the PM will implement proposal i regardless of whether IG_i wins attention. If IG_i wins attention, the PM observes q_i and expects it to be one of the m highest values. If i has one of the m highest quality proposals but does not win attention, the group will still have submitted one of the m highest payments and will still have its policy implemented. The second line of (13) is v times the probability that IG_i does not have one of the m highest quality proposals, but still has its policy implemented (i.e., submits one of the m highest payments but does not receive attention).

Notice that the first line of (13) equals $B(q_i; m)$ as given by (8).

We can approach the analysis from the perspective of mechanism design. Under a contest mechanism, IGs choose contributions conditional on the quality of their proposals. The Revelation Principle implies that we can model this choice as IGs announcing their quality (possibly dishonestly), and being assigned a contribution amount given their announcement according to their equilibrium payment function C^*. We denote agent i's announcement of its type by $\hat{q}_i$, which is equivalent to i choosing a contribution c_i and $\hat{q}_i \equiv C_i^{*-1}(c_i)$. Equilibrium payment functions must be such that each IG prefers to truthfully announce their quality, with $\hat{q}_i = q_i$. This means that we can rewrite (13) in terms of $\hat{q}_i$ rather than c_i.

$$\begin{aligned}&B(q_i; m)\\&+ v\sum_{y=m}^{n-1} \tfrac{(n-1)!}{(n-1-y)!y!} \sum_{x=k}^{m-1} \tfrac{y!}{(y-x)!x!} F(q_i)^{n-1-y}(F(\hat{q}_i) - F(q_i))^{y-x}(1-F(\hat{q}_i))^x\\&- C^*(\hat{q}_i).\end{aligned} \tag{14}$$

Notice that when IG_i truthfully announces $\hat{q}_i$ (i.e., does not over contribute), the second line of (14) equals zero, and its expected payoff is

$$B(q_i; m) - C^*(q_i). \tag{15}$$

For IG_i to prefer his equilibrium contribution to any higher contribution, (15) must be at least as great as (14) for all $\hat{q}_i > q_i$. And this must hold generally for all $q_i > 0$ in order for i never to have an incentive to deviate. (15) is at least as great as (14) if

$$\begin{aligned}v\sum_{y=m}^{n-1} \tfrac{(n-1)!}{(n-1-y)!y!} \sum_{x=k}^{m-1} \tfrac{y!}{(y-x)!x!} F(q_i)^{n-1-y}(F(\hat{q}_i) - F(q_i))^{y-x}(1-F(\hat{q}_i))^x\\ \leq C^*(\hat{q}_i) - C^*(q_i).\end{aligned} \tag{16}$$

This expression is satisfied for all $\hat{q}_i > q_i$ and every $q_i > 0$ when $C^*(\hat{q}_i) - C^*(q_i)$ is sufficiently large. Given that we focus on full-information equilibria where by definition $C^{*\prime}(q_i) > 0$, this condition requires that $C^{*\prime}(q_i)$ is sufficiently large for all q_i. If (16) does not hold, then IG_i prefers to deviate to announce a value $\hat{q}_i > q_i$ (i.e., to contribute more than $C^*(q_i)$), violating the equilibrium strategy.

The above analysis verifies the claim that $C^{*\prime}(q_i)$ must be sufficiently large. Next, we show that $C^* = B$ always satisfies this required equilibrium condition; $C^{*\prime}(q_i) = B'(q_i)$ is always sufficiently large. Expression (15), the expected utility to IG_i of playing the equilibrium strategy $\hat{q}_i = q_i$, simplifies to $B(q_i; m) - B(q_i; m) = 0$. To establish that IG_i prefers $\hat{q}_i = q_i$ to any higher value, we must show that (16) always holds when $C^* = B$. First, we rewrite an expression for $B(q_i; m)$ in terms of both i's true quality q_i and some arbitrary alternative $\tilde{q}_i < q_i$.

$$\begin{aligned}B(q_i; m) = \;& v\sum_{y=0}^{m-1} \tfrac{(n-1)!}{(n-1-y)!y!} F(\tilde{q}_i)^{n-1-y}(1-F(\tilde{q}_i))^y\\&+ v\sum_{y=m}^{n-1} \tfrac{(n-1)!}{(n-1-y)!y!} \sum_{x=0}^{m-1} \tfrac{y!}{(y-x)!x!} F(\tilde{q}_i)^{n-1-y}(F(q_i) - F(\tilde{q}_i))^{y-x}(1-F(q_i))^x\end{aligned}$$

When IG_i exaggerates the quality of its proposal, it represents a quality $\hat{q}_i$ greater than q_i. We may therefore write

$$\begin{aligned} B(\hat{q}_i;m) = \;& v\sum_{y=0}^{m-1} \tfrac{(n-1)!}{(n-1-y)!y!} F(q_i)^{n-1-y}(1-F(q_i))^y \\ & + v\sum_{y=m}^{n-1} \tfrac{(n-1)!}{(n-1-y)!y!} \sum_{x=0}^{m-1} \tfrac{y!}{(y-x)!x!} F(q_i)^{n-1-y}(F(\hat{q}_i)-F(q_i))^{y-x}(1-F(\hat{q}_i))^x \end{aligned} \tag{17}$$

Notice that the first line of this expression simply equals $B(q_i;m)$ from (8). Next, we plug (17) and (8) into (16) for $C^*(\hat{q}_i) = B(\hat{q}_i;m)$ and $C^*(q_i) = B(q_i;m)$ respectively. Simplifying the resulting expression allows us to rewrite (16):

$$\begin{aligned} & v\sum_{y=m}^{n-1} \tfrac{(n-1)!}{(n-1-y)!y!} \sum_{x=k}^{m-1} \tfrac{y!}{(y-x)!x!} F(q_i)^{n-1-y}(F(\hat{q}_i)-F(q_i))^{y-x}(1-F(\hat{q}_i))^x \\ \leq\; & v\sum_{y=m}^{n-1} \tfrac{(n-1)!}{(n-1-y)!y!} \sum_{x=0}^{m-1} \tfrac{y!}{(y-x)!x!} F(q_i)^{n-1-y}(F(\hat{q}_i)-F(q_i))^{y-x}(1-F(\hat{q}_i))^x. \end{aligned} \tag{18}$$

Inequality (18) strictly holds for all $\hat{q}_i > q_i$, establishing that IG_i prefers to announce $\hat{q}_i = q_i$ any higher value. This equivalently means that IG_i prefers $c_i = C^*(q_i)$ to any higher contribution. □

Proposition 4: It is straightforward to adapt the proof of Corollary 2 for the multiple policy environment. □

Proposition 5: By definition, a full information equilibrium is one in which $C^{*\prime}(q_i) > 0$ for all $q_i > 0$. As we previously determined, in equilibrium the PM will implement the proposals he believes are highest quality. His beliefs when he does not review proposal i put probability 1 on $q_i = C^{*-1}(c_i) \equiv Q^*(c_i)$ for any c_i on the domain of C^*.

Consider IG_i's optimization problem when the other $n-1$ IGs contribute according to equilibrium function C^*, and the PM reviews no proposals (relying only on observed contributions when updating his beliefs). IG_i's expected payoff from contributing c_i is

$$v\sum_{y=0}^{m-1} \tfrac{(n-1)!}{(n-1-y)!y!} F(Q^*(c_i))^{n-1-y}(1-F(Q^*(c_i)))^y - c_i.$$

That is, when the PM reviews no proposals, the PM implements proposal i when contribution c_i signals one of the m highest qualities. Given that the other $n-1$ IGs contribute according to the equilibrium function, proposal i is implemented when fewer than m other $j \neq i$ give $c_j > c_i$, which happens whenever fewer than m others have $q_j > Q^*(c_i)$. Given the continuous distribution of qualities, ties happen with zero probability. (8) means that this payoff is equivalent to

$$B(Q^*(c_i);m) - c_i. \tag{19}$$

The derivative of (19) with respect to c_i is positive if

$$B'(Q^*(c_i);m)Q^{*\prime}(c_i) \geq 1.$$

Given the definition of $Q^* \equiv C^{*-1}$, we know $1/Q^{*\prime}(c_i) = C^*(q_i)$. Therefore we may rewrite the previous inequality as

$$C^{*\prime}(q_i) \leq B'(q_i; m) \tag{20}$$

The analysis in support of Proposition 1 established that $C^{*\prime}(q_i)$ can be no greater than $B'(q_i)$ for C^* to be an equilibrium, guaranteeing that (20) is satisfied. Therefore, no full information equilibrium exists in which $C^{*\prime}(q_i) < B'(q_i; m)$ for any $q_i \in \mathcal{Q}$.

We must also show that there does not exist an equilibrium in which $C_i^* = B(\cdot; m)$. When this is the case, IG_i is indifferent between all $c_i \in [0, B(q_{max}; m)]$; any contribution gives IG_i an expected payoff of zero. A1 requires that an indifferent IG maximize the probability of having its policy implemented. This probability is maximized at a value of 1 when IG_i submits the maximum feasible contribution, $c_i = B(q_{max}; m)$. For all $q_i < q_{max}$, A1 means that IG_i over contributes since $B(q_i; m) = C_i^*(q_i) < c_i = B(q_{max}; m)$. □

Other proofs and analysis of the extensions can be found in the Online Appendix.

Appendix B. Online Appendix for "Competing for Attention" by Christopher Cotton

This document works through the extensions found in my article, "Competing for Attention." It includes the following sections:

B.1. Reviewing additional proposals – Extends Section 3 of the paper to allow the policymaker to review more proposals than he can implement.
B.2. Asymmetric IGs in a symmetric contest – Incorporates IG asymmetries into the analysis, and then considers a symmetric contest for attention, where those who make the highest payment receive attention.
B.3. Asymmetric contests for attention – Considers asymmetric contests for attention, which can adjust payments to account for agent asymmetries.
B.4. Winner-pay contests – Assumes that only those who win attention pay their bids.
B.5. Other methods for allocating attention – A discussion of alternative access allocation mechanisms.
B.6. Alternative assumptions on indifferent contributors – Considers alternatives to assumption A1.
B.7. Noisy quality signals – Discusses the case in which IGs only observe noise signals of how the policymaker will interpret the evidence.
B.8. Allocating a divisible resource – Assumes that the policymaker chooses how to split a divisible resource rather than allocate a finite set of non-divisible prizes.

B.1. **Reviewing additional proposals.** The results in Section 3.4 apply to the case where the policymaker reviews no more proposals than he can implement. In that section when the other players choose equilibrium strategies, an IG needs to submit one of the m highest payments to have a chance of its policy being implemented. This is a necessary condition, and if an IG did not do so, the policymaker would not review the group's proposal, and would not expect that the proposal was worth implementing.

In this section, we consider the alternative possibility that the policymaker reviews more proposals than he implements, i.e., $1 \leq m < k < n$. Here, an IG no longer needs to submit one of the m highest contributions for the possibility of having its policy implemented. The IG only needs to submit one of the $k > m$ highest payments; although it must still have one of the m highest qualities, as the quality of the k highest-payment proposals will be revealed during the review process. This increases the incentive IGs have to decrease their contributions. Although full-information equilibria continue to exist, they require that $C^{*\prime}(q_i)$ is not too high. This incentive undermines the existence of the payment-maximizing full-information equilibrium, and when $k > m$, no such equilibrium exists.

The main result—that the policymaker can guarantee the first best policy by selling attention to the highest bidder—continues to hold when the policymaker reviews more proposals than he can implement. However, reviewing additional proposals eliminates the existence of the payment-maximizing equilibrium, and can thus undermine the policymaker's rent seeking efforts. When the policymaker reviews more proposals than he can implement, there does not exist a full-information equilibrium that fully extracts IG rent; no payment-maximizing full-information equilibrium exists.

Proposition 7. *In the contest for attention where* $1 \leq m < k < n$*, there exists a function* $\tilde{C}$ *such that*

i. $0 < \tilde{C}'(q_i)$ *for all* $q_i \in \mathcal{Q}$*, and*
ii. *for all functions* $\bar{C}$ *such that* $0 < \bar{C}'(q_i) < \tilde{C}'(q_i)$ *for all* $q_i \in \mathcal{Q}$ *and* $\bar{C}(0) = 0$*, there exists a full-information equilibrium in which* $C_i^* = \bar{C}$ *for each* $i = \mathcal{N}$*.*

There does not exist a payment-maximizing full-information equilibrium.

Proof. Consider the decision of IG_i when all other IGs contribute according to strictly increasing function $\bar{C}^*$, and where $m < k$. IG_i's expected payoff from contribution $c_i \leq \bar{C}^*(q_i)$ is

$$\begin{aligned} &v \textstyle\sum_{y=0}^{m-1} \frac{(n-1)!}{(n-1-y)!y!} F(Q^*(c_i))^{n-1-y}(1 - F(Q^*(c_i)))^y \\ &+ v \textstyle\sum_{y=m}^{k-1} \frac{(n-1)!}{(n-1-y)!y!} \sum_{x=0}^{m-1} \frac{y!}{(y-x)!x!} F(Q^*(c_i))^{n-1-y}(F(q_i) - F(Q^*(c_i)))^{y-x}(1 - F(q_i))^x \\ &- c_i. \end{aligned} \tag{21}$$

The first line of (21) is v times the probability that fewer than m other proposals submit higher payments than c_i. This means that fewer than m other IGs have $q_j > Q^*(c_i)$, and by extension have $q_j < q_i$ since $Q^*(c_i) \leq q_i$ given our focus on the case of under contributing where $c_i \leq \bar{C}^*(q_i)$. The first line is equivalent to $B(\hat{q}_i; m)$. The second line of (21) is v times the probability that IG_i has does not submit one of the m highest payments but is still reviewed (i.e., still submits one of the k highest payments) and is revealed to have one of the m highest quality proposals.

As in the proof to Prof. 3 in the body of the paper, we can approach the analysis from the perspective of mechanism design, where the Revelation Principal implies that we can model this choice as IGs announcing their quality (allowing for possible dishonesty), and being assigned a contribution amount given their announcement according to their equilibrium payment function C^*. We denote agent i's announcement of its type by $\hat{q}_i$, which is equivalent to i choosing a contribution c_i and $\hat{q}_i \equiv C_i^{*-1}(c_i)$. Equilibrium payment functions must be such that each IG prefers to truthfully announce its quality, with $\hat{q}_i = q_i$. This means that we can rewrite (21) in terms of $\hat{q}_i$ rather than c_i.

$$B(\hat{q}_i; m) + \ v \sum_{y=m}^{k-1} \frac{(n-1)!}{(n-1-y)!y!} \sum_{x=0}^{m-1} \frac{y!}{(y-x)!x!} F(\hat{q}_i)^{n-1-y} (F(q_i) - F(\hat{q}_i))^{y-x} (1 - F(q_i))^x \\ - \bar{C}^*(\hat{q}_i). \tag{22}$$

If IG_i announces $\hat{q}_i = q_i$, this simplifies to

$$B(q_i; m) - \bar{C}^*(q_i). \tag{23}$$

Equation B in terms of true quality q_i may be expanded:

$$B(q_i; m) = \ B(\hat{q}_i; m) + \\ v \sum_{y=m}^{n-1} \frac{(n-1)!}{(n-1-y)!y!} \sum_{x=0}^{m-1} \frac{y!}{(y-x)!x!} F(\hat{q}_i)^{n-1-y} (F(q_i) - F(\hat{q}_i))^{y-x} (1 - F(q_i))^x. \tag{24}$$

Therefore, (23) is greater than (22) if

$$v \sum_{y=m}^{k-1} \frac{(n-1)!}{(n-1-y)!y!} \sum_{x=0}^{m-1} \frac{y!}{(y-x)!x!} F(\hat{q}_i)^{n-1-y} (F(q_i) - F(\hat{q}_i))^{y-x} (1 - F(q_i))^x - \bar{C}^*(\hat{q}_i) \\ \leq \ v \sum_{y=m}^{n-1} \frac{(n-1)!}{(n-1-y)!y!} \sum_{x=0}^{m-1} \frac{y!}{(y-x)!x!} F(\hat{q}_i)^{n-1-y} (F(q_i) - F(\hat{q}_i))^{y-x} (1 - F(q_i))^x - \bar{C}^*(q_i). \tag{25}$$

Or, equivalently

$$\bar{C}^*(q_i) - \bar{C}^*(\hat{q}_i) \\ \leq \ v \sum_{y=k}^{n-1} \frac{(n-1)!}{(n-1-y)!y!} \sum_{x=0}^{m-1} \frac{y!}{(y-x)!x!} F(\hat{q}_i)^{n-1-y} (F(q_i) - F(\hat{q}_i))^{y-x} (1 - F(q_i))^x. \tag{26}$$

The probability the PM implements proposal i is increasing in all $\hat{q}_i < q_i$. Condition (25) holds as long as the increased payment associated with truthfully announcing quality is lower than the increase in expected policy payoff from doing so. This will be the case as long as $\bar{C}^{*\prime}(q_i)$ is sufficiently low for all q_i.

Suppose $\bar{C}^*$ is such that $\bar{C}^*(0) = 0$ and $\bar{C}^{*\prime}(q_i)$ is positive but approaching zero for all q_i. Then (26) is certainly satisfied. This guarantees that such an equilibrium contribution function exists. Therefore, there exists a function $\tilde{C}$ such that $\tilde{C}'(q_i) > 0$ for all q_i, and for each $\bar{C}$ such that $0 < \bar{C}'(q_i) < \tilde{C}'(q_i)$ for each q_i and $\bar{C}(0) = 0$ there exists a full revelation equilibrium in which $C_i^* = \bar{C}$ for each i.

Next, we show that there does not exist a payment-maximizing full-information equilibrium. Such an equilibrium requires $C_i^* = B$ for all i. This implies (21) simplifies to

$$v \sum_{y=m}^{k-1} \frac{(n-1)!}{(n-1-y)!y!} \sum_{x=0}^{m-1} \frac{y!}{(y-x)!x!} F(\hat{q}_i)^{n-1-y} (F(q_i) - F(\hat{q}_i))^{y-x} (1 - F(q_i))^x \tag{27}$$

and (23) simplifies to 0. For $\hat{q}_i < q_i$, (27) is positive, meaning that IG_i receives a higher expected payoff from $\hat{q}_i < q_i$ than it does from $\hat{q}_i = q_i$, a contradiction. Therefore, no equilibrium exists in which $C_i^* = B$ for all i. □

B.2. **Symmetric contest for attention with asymmetric IGs.** The main results for asymmetric IGs will come in the next section where we consider a handicapped contest. In this section, we show that when differences between IGs are not too large, a policymaker may still become fully informed if he sells attention to the highest bidder.

Proposition 8. *Consider the game with asymmetric IGs and a symmetric contest for attention, and where $1 \leq k \leq m < n$. If the IGs are sufficiently similar, then there exists a full-information equilibrium in which $C_i^* = B_n$ for all $i = 1, ..., n$. There does not exist a symmetric payment-maximizing full-information equilibrium.*

Following the same argument as in the previous sections, one can show that no IG_i has an incentive to under-contribute compared to the symmetric full-information equilibrium strategy when $\bar{C}^{*\prime}(q_i) \leq B_i'(q_i)$ for all $q_i \in \mathcal{Q}$. The symmetric equilibrium strategy $\bar{C}^*$ must satisfy this constraint for all $i \in \mathcal{N}$. Because the constraint is most restrictive for IG_n (one can show that for any q_i, $B_i'(q_i) > B_j'(q_i)$ when $i < j$), it must be that $\bar{C}^{*\prime}(q_i) \leq B_n'(q_i)$ for all $q_i \in \mathcal{Q}$. This means there cannot exist a symmetric full-information equilibrium that offers higher expected contributions than one in which $\bar{C}^* = B_n$.

When $k = m$ no IG_i ever has an incentive to over-contribute, and when $k < m$ no IG_i has an incentive to over-contribute as long as $\bar{C}^{*\prime}(q_i)$ is sufficiently steep. For any individual IG_i, these constraints are guaranteed to be satisfied as long as $\bar{C}^{*\prime}(q_i)$ is sufficiently close to $B_i'(q_i)$ for all $q_i \in \mathcal{Q}$. The steepest feasible symmetric contribution function (such that no IG has an incentive to under-contribute), $\bar{C}^* = B_n$, satisfies this constraint for all $i \in \mathcal{N}$ as long as B_n is sufficiently similar to B_i (i.e., when v_i is sufficiently close to v_n).

In the game where IGs differ in v_i, and where the policymaker reviews the proposals with the highest c_i, there does not exist an equilibrium in which $C_i^* = B_i$ for all i. In the game with asymmetric IGs, the policymaker cannot maximize payments by awarding attention to the highest bidders.

Proof to Proposition 8: As in the proofs to Prop. 3 and 5, we continue to rely on the revelation principle in solving the problem. This approach means that each IG announces its quality $\hat{q}_i$, and the equilibrium payment functions C_i^* must be each IG prefers to announce quality truthfully, $\hat{q}_i = q_i$. The proof to Prop. 3 establishes that (16) must hold for each $\hat{q}_i \geq q_i$ and all $q_i \in \mathcal{Q}$. When IGs differ in terms of their v_i, this condition becomes

$$v_i \sum_{y=m}^{n-1} \frac{(n-1)!}{(n-1-y)!y!} \sum_{x=k}^{m-1} \frac{y!}{(y-x)!x!} F(q_i)^{n-1-y} (F(\hat{q}_i) - F(q_i))^{y-x} (1 - F(\hat{q}_i))^x \leq C^*(\hat{q}_i) - C^*(q_i), \tag{28}$$

where C^* is the equilibrium contribution function shared by all IGs. Following the proof to Prop. 3, one can also show that the left hand side of this expression is strictly less than $B_i(q_i;m)$. For the same reason as in the earlier proofs, this implies that there exists a function $\tilde{C}_i$ where $0 \leq \tilde{C}_i'(q_i) < B_i'(q_i;m)$ for all $q_i \in \mathcal{Q}$, and such that for each $\bar{C}$ such that $\tilde{C}_i'(q_i) < \bar{C}'(q_i) \leq B_i'(q_i;m)$ and $\bar{C}(0) = 0$ it is a best response for IG_i to contribute according to $\bar{C}$ whenever the $n-1$ other IGs also contribute according to $\bar{C}$.

For there to exist a full-information equilibrium in which $C_i^* = B_n$ for each i, it must be that

$$\begin{aligned} &v_i \sum_{y=m}^{n-1} \tfrac{(n-1)!}{(n-1-y)!y!} \sum_{x=k}^{m-1} \tfrac{y!}{(y-x)!x!} F(q_i)^{n-1-y}(F(\hat{q}_i) - F(q_i))^{y-x}(1-F(\hat{q}_i))^x \\ \leq\ &v_n \sum_{y=m}^{n-1} \tfrac{(n-1)!}{(n-1-y)!y!} \sum_{x=0}^{m-1} \tfrac{y!}{(y-x)!x!} F(q_i)^{n-1-y}(F(\hat{q}_i) - F(q_i))^{y-x}(1-F(\hat{q}_i))^x. \end{aligned} \tag{29}$$

The right hand side of this expression comes from substituting in for $C^*(q_i) = B_n(q_i;m)$ and $C^*(\hat{q}_i) = B_n(\hat{q}_i;m)$ while recognizing that when $\hat{q}_i > q_i$, $B_n(\hat{q}_i;m)$ may be written as:

$$\begin{aligned} B_n(\hat{q}_i;m) = \ & B_n(q_i;m) + \\ & v_n \sum_{y=m}^{n-1} \tfrac{(n-1)!}{(n-1-y)!y!} \sum_{x=0}^{m-1} \tfrac{y!}{(y-x)!x!} F(q_i)^{n-1-y}(F(\hat{q}_i) - F(q_i))^{y-x}(1-F(\hat{q}_i))^x. \end{aligned} \tag{30}$$

Remember that $v_1 > v_2 > ... < v_n$. Therefore, if (29) holds for IG_1, it will also hold for all other IGs. The probability represented by the summation on the left hand side of (29) is strictly less than the probability represented by the summation on the right hand side of the same inequality. Therefore, (29) holds for all IGs as long as v_1 is sufficiently close to v_n. When v_1 is sufficiently close to v_n that (29) is satisfied, there exists an equilibrium in which all IGs contribute according to $C_i^* = B_n$.

Next, we rule out the existence of a payment-maximizing, full-information equilibrium, which by definition requires $C_i^* = B_i$ for all i. Notice that for any $q_i \in \mathcal{Q}$, $B_i(q_i;m) > B_j(q_i;m)$ if and only if $i < j$ (i.e., iff $v_i > v_j$), and therefore $B_1(q_{max};m) > B_i(q_{max};m)$ for all $i \neq 1$. Consider the contribution decision of IG_1 given that the other $n-1$ IGs contribute according to $C_i^* = B_i$. This means that if IG_1 submits any payment $c_1 \geq B_{k+1}(q_{max};m)$, then with probability one c_1 is one of the k highest payments and the PM reviews and directly observes q_1. Thus, submitting any $c_1 \geq B_{k+1}(q_{max};m)$ guarantees that the PM implements policy 1 if and only if it is one of the m highest quality proposals. Increasing a payment greater than $B_{k+1}(q_{max}, m)$ imposes greater costs on the IG, but does not change the probability the PM implements the IG's proposal. Therefore, IG_1 expected payoff is strictly decreasing in its contributions when $c_1 > B_{k+1}(q_{max};m)$, and IG_1 strictly prefers to contribute $c_i = B_{k+1}(q_{max};m)$ to any higher value.

Define $\bar{q}$ as the IG_1 quality realization that solves $B_1(\bar{q};m) = B_{k+1}(q_{max};m)$. A payment-maximizing full-information equilibrium requires that $C_1^*(q_1) = B_1(q_1;m)$. We know $B_1(q_1;m) > B_{k+1}(q_{max};m)$ for all $q_1 \in (\bar{q}, q_{max}]$, contradicting the finding in the previous paragraph that the maximum feasible contribution by IG_1 cannot exceed $c_1 =$

$B_{k+1}(q_{max}; m)$. Therefore, no payment-maximizing full-information equilibrium exists when the PM reviews the proposals associated with the highest payments. □

B.3. **Model with Asymmetric Interest Groups.** In Section 3, we consider a version of the game in which IGs differ only in the realized quality of their proposals. In reality, IGs differ in their benefit from having their proposal implemented, or opportunity costs of providing political contributions. In this section, we allow for such observable asymmetries between the IGs.[27] Except for the following changes, the underlying setting remains identical to the previous sections.

The IGs' payoffs depend on whether their proposal is implemented and their payment: $u_i(p_i, c_i) = v_i p_i - c_i$. Parameter v_i represents the relative value IG_i puts on policy outcomes relative to payments. A higher v_i may be interpreted as either IG_i having more at stake from their proposal being implemented, or as i being more wealthy or having lower costs of funds.[28] Without loss of generality, we rank order IGs according to their value, such that $v_1 > v_2 > ... > v_n$.[29]

The policymaker reviews k and then implements m proposals, where $1 \leq k \leq m < n$. The expected benefit to IG_i if the policymaker always implements the m highest-quality proposals is thus

$$B_i(q_i; m) = v_i \sum_{y=0}^{m-1} \frac{(n-1)!}{(n-1-y)!y!}(1 - F(q_i))^y F(q_i)^{n-1-y}. \tag{31}$$

Here, $B_i(\cdot; m)$ differs from $B(\cdot; m)$ in (8) only in the IG specific value v_i. Where clear, we refer to $B_i(\cdot; m)$ by B_i. Given that $v_1 \geq ... \geq v_n$, it follows that $B_n(q_i) \leq B_i(q_i)$ for all i and $q_i > 0$; the benefit to IG_n from participating in a full-information equilibrium is lower than the benefit to any other IG.

The Online Appendix provides an analysis of a symmetric contest for attention in this environment. In such a contest, an IG wins attention when it provides one of the k highest payments. In that environment, as long as IGs are not too different, the policymaker becomes fully informed and implements the first best policy in equilibrium. However,

[27] Throughout the paper, we continue to assume that the quality of all proposals is drawn from the same distribution F. It is straightforward to extend the model to assume a different distribution for each IG. However, doing so is extremely tedious, notationally, without providing any additional insight.

[28] To see this, suppose that IG i receives payoffs $\hat{u}_i = \hat{v}_i - \tau_i b_i$ when its policy is implemented and $\hat{u}_i = -\hat{\tau}_i b_i$ when it is not implemented. Here, $\hat{v}_i$ is the weight on policy and $\hat{\tau}_i$ is the weight on payments. Any positive affine transformation of $\hat{u}_i$ maintains preferences. We therefore define $v_i \equiv \hat{v}_i / \hat{\tau}_i$ and $u_i \equiv \hat{u}_i / \hat{\tau}$, and rewrite agent i's preferences as we defined them in the body of the paper. An increase in $\hat{v}_i$ and a decrease in $\hat{\tau}_i$ are indistinguishable in the model.

[29] The analysis considers IG differences in v_i. Additionally, we could incorporate differences in quality distribution, F_i, allowing IGs to, for example, differ in the expected quality of their proposals. Allowing such differences complicates the analysis, particularly the functions for B_i, without providing additional insight. The main results continue to hold.

we can show that such a contest is not optimal for a policymaker who also cares about contributions. In the following analysis, we allow for more general asymmetric (i.e., "handicapped") contest for attention, which requires greater payments from some IGs than from others for the same equilibrium probability of winning attention. We show how such a contest is optimal for the policymaker compared to any other method that guarantees the first best policy.

We generalize the concept of "contests for attention" to allow for an asymmetric contest. A contest for attention is modeled as an asymmetric all-pay contest defined as a set of score functions $\theta = \{\theta_1, ..., \theta_n\}$, one for each IG. When IG_i provides payment c_i, its "score" is given by $\theta_i(c_i)$, where $\theta_i(0) = 0$ and $\theta_i'(c_i) > 0$ for all $c_i > 0$. The proposals associated with the highest scores in the contests receive attention. That is, the policymaker reviews proposal i if fewer than k other proposals have $\theta_j(c_j) > \theta_i(c_i)$.

Up until now, the analysis has considered a symmetric contest for attention in which the policymaker reviews the proposals of the IGs that provide the highest payments. This situation is captured by the generalized contest structure when $\theta_i = \theta_j$ for $i, j = 1, ..., n$. A general function θ_i allows the contest for attention to take into account individual IG characteristics, including differences in v_i. In this way, the score functions allow for the handicapping of the contest, requiring different payments from different IGs for the same expected probability of winning attention.

In this section, we consider a specific version of the handicapped contest for attention, where in equilibrium the score functions fully adjust for the observable IG asymmetries. Specifically, the analysis focuses on a contest in which

$$\theta_i(c_i) = B_i^{-1}(c_i) \quad \text{for all} \quad c_i > 0.$$

IG_i's score function equals the inverse of its potential-benefit function, B_i.[30] These score functions mean that IG_i wins attention when fewer than k other IGs make payments such that $B_j^{-1}(c_j) > B_i^{-1}(c_i)$.

We show that the payment-maximizing full-information equilibrium (e.g., where $C_i^* = B_i$ for all $i = 1, .., n$) exists in this environment. Following the notation established in the earlier sections, we define $Q_i^* \equiv C_i^{*-1}$, where $Q_i^*(c_i)$ is the quality of proposal i that results in *equilibrium* contribution c_i. Therefore when $C_i^* = B_i$, it follows that $Q_i^*(c_i) = B_i^{-1}(c_i)$.

For the payment-maximizing full-information equilibrium to be an equilibrium of the game, contributing according to $C_i^* = B_i$ must be a best response for each IG_i given that the other IGs contribute according to the equilibrium strategies. Given the equilibrium strategies of the other IGs, IG$_i$ wins attention if its contest score $B_i^{-1}(c_i)$ is one of the k

[30]Notice that function B is strictly increasing in q_i and is therefore invertible.

highest. The contest scores of the other $n-1$ IGs playing according to $C_i^* = B_i$ are given by $B_j^{-1}(C_j^*(q_j)) = B_j^{-1}(B_j(q_j)) = q_j$. Therefore, IG_i wins attention whenever fewer than k other IGs have $q_j > Q_i^*(c_i)$. Recognizing this greatly simplifies the analysis. It means that the incentives that IG$_i$ has to deviate from the equilibrium payment function and submit either a higher or lower payment are similar to its incentives in the symmetric game in Section 3.4.

First, consider IG$_i$'s incentive to overpay, submitting a contribution $c_i > C_i^*(q_i)$. If $k = m$, then overpaying is never beneficial, as there is no possibility for IG$_i$ to have its proposal implemented without review (which is necessary for the group to benefit from using its payment to signal a higher quality proposal than it actually has). If $k < m$, then there is the possibility that in equilibrium the policymaker implements a proposal without first reviewing it, and the IG may benefit from overpaying, inflating the policymaker's beliefs about its proposal's quality in the absence of review. As was also true in Section 3.4, it must be sufficiently costly to signal a marginally higher quality; $C_i^{*\prime}(q_i)$ must not be too low. This requirement is always satisfied when $C_i^* = B_i$.

Next, consider IG$_i$'s incentive to underpay, submitting a contribution $c_i < C_i^*(q_i)$. Similar to previous sections, for IG_i not to underpay, we require $C_i^{*\prime}(q_i) \leq B_i'(q_i)$ for all $q_i > 0$. If this is not the case, then for at least some realizations of q_i, IG$_i$ benefits from contributing less than the equilibrium payment; the costs associated with a lower probability of having its proposal implemented are dominated by the cost savings associated with a lower payment.

The equilibrium payment function $C_i^* = B_i^*$ satisfies these constraints and is therefore a best response for IG$_i$. In equilibrium, the IG strictly prefers to contribute according to the equilibrium function rather than overpay, and weakly prefers to contribute according to the equilibrium function rather than underpay. The indifference between contributing to the equilibrium payment function and paying less is a consequence of the payment-maximizing full-information equilibrium, in which the policymaker extracts all rent from the policymaking process.

Proposition 9. *Consider the game with asymmetric IGs and a handicapped contest for attention in which $\theta_i = B_i^{-1}$ for all i, and where $1 \leq k \leq m < n$. There exists a full-information equilibrium in which $C_i^* = B_i$ for all $i = 1, ..., n$. This is the unique payment-maximizing full-information equilibrium.*

Proof: We consider the existence of a payment-maximizing full-information equilibrium when the contest for attention handicaps bidders using contest score functions in which $\theta_i = B_i^{-1}$ for each i. In such an equilibrium, IG_i contributes $c_i = C_i^*(q_i) = B_i(q_i; m)$, and the contest assigns it a score $\theta_i(c_i) = B_i^{-1}(c_i)$. Substituting $c_i = B_i(q_i; m)$ into the score function gives $\theta_i(c_i) = B_i^{-1}(B_i(q_i; m)) = q_i$. This means that in equilibrium, the PM reviews the k highest quality proposals. Once this is established, the rest of the proof follows from the earlier analysis.

Consider IG_i's contribution decision when the other $n-1$ IGs contribute according to their equilibrium payment functions. The PM reviews proposal i if and only if its contribution c_i is sufficiently high that fewer than k other IGs have $q_j > Q_i^*(c_i)$. This means that IG_i's optimization problem is identical to the optimization problem considered in the Prop. 3 analysis with one exception: v, B and Q^* must be replaced with IG specific v_i, B_i and Q_i^* in the equations. Otherwise the analysis is unchanged. We can therefore conclude C^* constitutes an equilibrium if for each i and $q_i \in \mathcal{Q}$, C_i^* is such that $C_i^{*\prime}(q_i)$ is not too small and $C_i^{*\prime} \leq B_i^{*\prime}(q_i)$. Just as in the earlier section, $C_i^* = B_i$ always satisfies the requirement that $C_i^{*\prime}(q_i)$ not be too small. Therefore, there exists an equilibrium in which $C_i^* = B_i$ for each i. By definition, this is the unique payment-maximizing full-information equilibrium. □

In equilibrium, the contest for attention's score functions fully adjust for IG asymmetries, and in equilibrium the contest awards attention to the k highest-quality proposals. IGs with higher v_i tend to pay more than IGs with lower v_i, implying higher contributions from more-wealthy groups or groups with more to gain from having their proposal implemented. This does not, however, translate into either the attention or implementation decisions being biased in favor of more-wealthy IGs. In equilibrium, more-wealthy groups pay more, but the contest accounts for observable differences between IGs, and in equilibrium only the highest quality IGs (regardless of wealth) gain attention and have their proposals implemented.

Corollary 3. *Consider the game with asymmetric IGs and a handicapped contest for attention in which $\theta_i = B_i^{-1}$ for all i, and where $1 \leq k \leq m < n$. In equilibrium, wealthy IGs tend to contribute more than less wealthy IGs, but they are no more likely to have their proposals implemented and are no better off than less wealthy IGs.*

When IGs differ only in proposal quality, a policymaker who cares about both collecting payments and proposal quality can be no better off than when he sells attention to the highest bidders before implementing the proposals he believes best. This procedure for implementing policy results in the first best total payment (equal to mv in expectation) and the first best policy outcome. It no longer guarantees the first best total payment in the environment with asymmetric IGs. In this section, the payment-maximizing full-information equilibrium guarantees the first best policy outcome, and guarantees the highest possible payments compared to any other full-information equilibrium. But, it no longer guarantees the highest payments compared to certain methods of selling policy. For example, the policymaker could make a take it or leave it offer to the m highest value IGs, committing to implement IG_i's proposal if and only if $c_i = v_i$ for $i = 1, ..., m$. It is an equilibrium under such an alternative mechanism for the m highest value IGs to contribute $c_i = v_i$, and such a mechanism results in the maximum feasible expected sum of payments. It does not, however, guarantee the first best policy outcome. The payment-maximizing full-information equilibrium describes the most-profitable outcome associated with any mechanism that guarantees the first best policy outcome. A contest for attention that results in this outcome is preferred to any other method of awarding policy, as long as the policymaker cares enough about policy relative to payments (as long as λ in his payoff function is not too small).

B.4. **Awarding attention through a winner-pay auction.** We model the contest for attention as an all-pay auction, where all IGs pay their contributions regardless of whether they win attention. In this section, we show that the policymaker may still be fully informed and guaranteed to implement the first best policy if he uses a winner-pay auction to award attention. However, we also establish that no payment-maximizing full-information equilibrium exists. This means that potential revenue is higher when the contest for attention takes the form of an all pay contest rather than a winner pay contest.

In this section, we return to the initial setting we considered in Section 3, where IGs differ only in their proposal quality (e.g., $v_i = v$) and where the policymaker reviews and implements one proposal (i.e., $k = m = 1$). Rather than the all-pay contest in Section 3, here each IG submits a bid, c_i, but only the IG that wins attention (i.e., the high bidder) pays its bid. We consider the existence of a full-information equilibrium in which all IGs bid according to a strictly increasing bid function $\bar{C}^*$. If each IG_i bids $c_i = \bar{C}^*(q_i)$, then the policymaker will have correct beliefs about the quality of all proposals, and the IG with the highest quality proposal will win attention, pay its bid, and have its proposal implemented. As before, define $\bar{Q}^*(c_i) = \bar{C}^{*-1}(c_i)$, the quality implied by bid c_i in equilibrium.

For similar reasons as in the earlier section, an IG has no incentive to overbid compared to its equilibrium bid. By overbidding, IG_i increases the probability that it wins attention (i.e., is reviewed and has to pay its bid), but does not increase the probability that its proposal is eventually implemented. Regardless of whether IG_i bids $c_i = \bar{C}^*(q_i)$ or some higher amount, it's policy is eventually implemented with probability $F(q_i)^{n-1}$. Therefore, given that $k = m = 1$, all IGs prefer $c_i = \bar{C}^*(q_i)$ to any higher bid.

IGs also must have no incentive to underbid compared to equilibrium. If IG_i underbids, it expects payoff is

$$EU_i = F(\bar{Q}^*(c_i))^{n-1}(v - c_i), \tag{32}$$

which differs from (5) in Section 3 in that the IG pays its bid only if it wins attention. For any realization q_i, IG$_i$ must prefer to bid $c_i = \bar{C}^*(q_i)$ rather than a lower amount. This is true when (32) is increasing in c_i for all potential c_i:

$$\frac{\partial EU_i}{\partial c_i} = (n-1)F(\bar{Q}^*(c_i))^{n-2}f(\bar{Q}^*(c_i))\bar{Q}^{*\prime}(c_i)\big(v - c_i\big) - F(\bar{Q}^*(c_i))^{n-1} \geq 0. \tag{33}$$

The expression is easier to interpret if we rewrite it in terms of the equilibrium bid function $\bar{C}^*$, noting that strict monotonicity of the bid function implies that $\bar{C}^*(q_i) = 1/\bar{Q}^*(c_i)$. Inequality (33) holds for all $c_i < \bar{C}^*(q_i)$ and all possible q_i if the following expression holds for all $q_i \in \mathcal{Q}$:

$$(n-1)F(q_i)^{n-2}f(q_i)\big(v - \bar{C}^*(q_i)\big) - F(q_i)^{n-1}\bar{C}^{*\prime}(q_i) \geq 0. \tag{34}$$

Notice that the strategy associated with the payment-maximizing equilibrium from the all-pay contest, $\bar{C}^*(q_i) = B(q_i)$, does not satisfy (34), and therefore cannot be an equilibrium. Consider instead the alternative strategy

$$\bar{C}^*(q_i) = \frac{v}{2}F(q_i)^{n-1}. \tag{35}$$

When this is the equilibrium strategy, (34) simplifies to $F(q_i)^{n-1} \leq 1$, implying that the equilibrium condition is satisfied, and the payment function given by (35) constitutes a full-information equilibrium of the winner pay contest for attention game. The following proposition states the result more generally.

Proposition 10. *Consider the winner pay contest for attention. For any function $\bar{C}$ that satisfies (34), $\bar{C}(0) = 0$, and $0 < \bar{C}'(q_i)$ for all $q_i \in \mathcal{Q}$, there exists a full-information equilibrium in which $C_i^* = \bar{C}$ for each $i = 1, ..., n$. No other symmetric full-information equilibrium exists.*

Proof. Existence follows from the analysis in the body of the paper. The claim that no other symmetric full-information equilibria exist follows because the analysis fully characterizes the set of strictly increasing contribution functions that correspond to symmetric Perfect Bayesian Equilibria of the game. Because a full-information equilibrium is defined as one in which all contribution functions are strictly increasing, our characterization includes *all* symmetric full-information equilibria. □

Notice that the maximum possible payment in a full-information equilibrium of the winner-pay contest is necessarily lower than the total expected payment in the payment-maximizing full-information equilibrium of the all-pay contest for attention. The sum of expected payments in the all-pay contest equal v. In order to achieve total payments equal to v in the winner-pay contest, the high bidder would always need to bid v. This is not possible in a full-information equilibrium, in which payment functions must be strictly increasing in proposal quality.

B.5. **Other methods for allocating attention.** In this section, we discuss a number of alternative methods for allocating the review slots. Consider first the possibility that the policymaker allocate attention randomly, independent of any payment, before implementing the proposals he believes best. In this case, IGs have no incentive to contribute, and in equilibrium the policymaker will become fully informed about the quality of the k proposals he chooses to review, but will remain fully uninformed about the quality of the other proposals. This will also be the case if the policymaker allocates the review slot based on some other observable characteristic. In equilibrium, he will collect no payments and will not be certain of implementing the best proposals.

Alternatively, the policymaker could sell access but through a different method than an auction or contest. For example, the policymaker could announce a fixed price, and review up to k proposals with IG payments equal to their access price. In equilibrium of this alternative environment, there exists a cut value $\bar{q}_i$ for each IG, with IG$_i$ willing to pay the access price only if $q_i \geq \bar{q}_i$. When this is the case, the policymaker remains only partially informed about the proposals he does not review, inferring only whether q_i was greater than or less than $\bar{q}_i$. He is not guaranteed to implement the highest-quality proposals.[31]

In our framework, the only interaction between the IGs and policymaker prior to the policymaker choosing which proposals to review involves political contributions. Alternatively, IGs may be able to send cheap talk messages to the policymaker prior to the policymaker awarding attention. Here, we consider whether cheap talk, in the absence of payments, can guarantee the first best policy allocation. When $k < m$, it is not possible to eliminate payments and maintain a full-information equilibrium. However, when $k \geq m$, there exists a full-information equilibrium of a game in which each IG announces its type $\hat{q}_i$, and the policymaker reviews the $k \geq m$ proposals associated with the highest announced quality. Because an IG will always have its proposal reviewed (and its quality verified) before it is implemented, no IG has an incentive to deviate from announcing $\hat{q}_i = q_i$. The groups are indifferent between announcing $\hat{q}_i$ truthfully or exaggerating their quality. Although the full-information equilibrium exists, it is not robust to a number of refinements. Trembling-hand perfection, for example, eliminates the full-information equilibrium and results in a unique equilibrium in which all IGs announce the highest possible $\hat{q}_i = q^{max}$. This is because an IG strictly prefers to exaggerate its quality when there is even a very small probability that other IGs exaggerate theirs. Under such equilibrium refinements, no full-information equilibrium exists in a game with cheap talk rather than payments.

[31]Cotton (2012) considers access prices in a model with two IGs and a binary quality structure. Cotton (2013) models submission fees in academic publishing, which play a similar role as access prices would play in our lobbying framework.

B.6. **Alternative assumption on indifferent contributors.** Here, we consider an alternative to A1 in the game with symmetric IGs. We assume that indifferent IGs choose the strategies that minimize payments, rather than one that maximizes the expected value of the policy outcome.

A2 An IG that is indifferent between alternative strategies limits attention to the strategy associated with the minimum contribution.

Under this alternative assumption, we find that nearly the entire range of full-information equilibria identified in Proposition 3 continue to exist. The one exception is the payment-maximizing full-information equilibrium in which $C_i^* = B$ for all $i \in \mathcal{N}$. However, there does exist a full-information equilibrium in which the outcome is nearly identical to the payment-maximizing full-information equilibrium, and we show that this equilibrium results in just at least as high of policymaker payoffs compared to any alternative method of implementing policy.

The assumption restricts the behavior of an IG only when it is indifferent between its equilibrium contribution and other contributions. For equilibria in which $C_i^{*\prime}(q_i) < B'(q_i)$ for all i and $q_i \in \mathcal{Q}$, choosing $c_i = C_i^*(q_i)$ is the unique best response for each i when the other IGs also contribute according to C^*. In this case, A1 and A2 play no roll. For equilibria in which $C_i^* = B$, however, IG_i is indifferent between $c_i = C_i^*(q_i)$ and any lower contribution. Here, A1 requires that IG_i choose $c_i = C_i^*(q_i)$, the maximum payment over which i is indifferent. Such behavior is perfectly consistent with equilibrium. Contrast this with A2, which in this case requires IG_i to choose $c_i = 0$, the minimum payment over which i is indifferent. Therefore, A2 requires IG behavior that is not consistent with an equilibrium in which $C_i^*(q_i) = B(q_i) > 0$. Under A2, no payment-maximizing full-information equilibrium exists. We restate Proposition 3 given A2.

Proposition 11. *Assume A2 and consider the contest for attention game with k review slots and m implemented proposals, where $1 \leq k \leq m < n$. There exists a function $\tilde{C}$ such that*

i. $0 \leq \tilde{C}'(q_i) < B'(q_i; m)$ *for all* $q_i \in \mathcal{Q}$, *and*
ii. *for all functions $\bar{C}$ such that $\tilde{C}'(q_i) < \bar{C}'(q_i) < B'(q_i; m)$ for all $q_i \in \mathcal{Q}$ and $\bar{C}(0) = 0$, there exists a full information equilibrium in which $C_i^* = \bar{C}$ for each $i = 1, ..., n$.*

There does not exist a payment-maximizing full-information equilibrium.

Proof: Follows from the proof to Prop. 3 and recognizing that A2 requires that $c_i = 0$ when $C^* = B$.

The key difference between this result and the earlier result is that under A2, there does not exist an equilibrium in which $C_i^* = B$ for all i. This means that no payment-maximizing full-information equilibrium exists. However, there does exist a full-information equilibrium in which the outcome is nearly identical to the payment-maximizing full-information equilibrium. This is the case when the equilibrium strategies C_i^* are nearly equal to B; that is, when $C_i^{*\prime}(q_i)$ is less than, but nearly equal to $B'(q_i; m)$ for all i and $q_i \in \mathcal{Q}$. No other method for choosing which proposals to implement will result in higher payoffs for the policymaker than he earns in this equilibrium of the contest for attention. The following proposition adapts Proposition 4 to account for A2.

Proposition 12. *Assume A2 and consider the contest for attention game with k review slots and m implemented proposals, where $1 \leq k \leq m < n$. There exists a full-information equilibrium that results in at least as high of expected policymaker payoffs as any alternative method for choosing which proposals to implement.*

Proof. Under A2, there does not exist an equilibrium in which $C_i^* = B$ for all i. This means that no payment-maximizing full-information equilibrium exists. However, there does exist a full-information equilibrium in which the outcome is nearly identical to the payment-maximizing full-information equilibrium. This is the case C_i^* is such that $C_i^{*\prime}(q_i)$ is less than, but nearly equal to $B'(q_i; m)$ for all i and $q_i \in \mathcal{Q}$. This is a full information equilibrium, meaning that the PM is guaranteed to implement the first best policy outcome.

This means no other method for choosing which policies to implement results in higher policy utility. Next, we establish that no other method results in higher payments. The highest payment equilibrium of the contest for attention under A2 results in expected total contributions only marginally less than mv. This means that only a method for implementing policy under which total payments at least equal to mv leads to higher contributions than the contest for attention. It is straightforward to adapt the proof of Corollary 2 to show that without any restriction on the behavior of indifferent IGs (or under assumption A1), the maximum payment is mv. Under A2, however, no such mechanism in which total payments are mv is feasible. This is because total expected payments of mv require that payments fully transfer any rent from IGs to the PM, leaving the IGs with payoff of zero. A2 requires that any IG contributes the lowest payment over which it is indifferent, which in this case is a payment of $c_i = 0$, which also guarantees a payoff of zero. Therefore, total expected payments of mv is not feasible under A2, and the maximum possible expected total payments are marginally less than mv. Therefore, the contest for attention leads to the highest feasible payments of any method the PM may use to choose which proposals to implement. □

In addition to these results, Propositions 5 and 7 both continue to hold under A2.

B.7. **Noisy quality signals.** The model assumes that IGs perfectly observe the quality of their own proposals. It is possible, however, that IGs are not perfectly aware of how the policymaker will perceive their proposal's quality following a review. For example, an IG may know everything about its own proposal without knowing the policymaker's priorities. We may think of such a situation as each IG observing a noisy signal s_i about its true proposal quality q_i. Higher s_i tend to correspond to higher q_i. In this setting, the policymaker may still award attention through a contest, in which case IGs with higher signals submit higher payments as they compete for attention. In equilibrium, the policymaker directly observes the quality of any proposal he reviews, and can infer the signals associated with the proposals he does not review. The policymaker is less informed than in the case when IGs perfectly observe their quality. However, he is still more informed than if he awarded the same number of review slots through a less informative mechanism.

In this alternative setting, the policymaker benefits from reviewing additional proposals as long as $k \leq m$. However, it is not clear that the policymaker is better off reviewing $k > m$ proposals compared to $k = m$. Reviewing more proposals leads the policymaker to be better informed about additional proposals, but reviewing more than m proposals undermines the full-information equilibrium and prevents the policymaker from becoming informed about the proposals he does not review.

B.8. **Allocating a divisible resource.**

B.9. **Allocating a divisible resource.** Throughout the paper, the policymaker can either fully implement or not implement each proposal. Our framework best represents an environment where the policy choice is discrete: a legislator chooses whether or not to introduce legislation or to vote for each reform proposal, and whether or not to request earmark funding from the appropriations committee for each proposed district project. In some settings, however, a policymaker not only must decide whether to support each proposal, he must also decide "how much" support to give. For example, after the U.S. Congress allocates a budget to the Department of Transportation (DOT), the DOT must choose how to divide highway funding between the 50 states. Each state will receive some funding, but the DOT prefers to allocate more funding to states with greater need. The states, their representatives, and regional contractors lobby the DOT to attract greater funding for their own projects.

In this section, we discuss an environment where the policymaker's policy choice $p = (p_1, ..., p_n)$ represents a vector of allocations, where p_i is the allocation provided to IG_i. Here, p_i is not constrained to be either zero or one, but is allowed to take on other values. The policymaker's optimal choice of p_i is strictly increasing in q_i and strictly decreasing in q_j for all $j \neq i$. That is, the policymaker wants to give a larger share of the budget to the higher quality IGs.[32] We refer to this alternative policymaking environment as a game with divisible resources.

Cotton (2009) considers a contest for attention in a very simple version of this policymaking environment, assuming only two interest groups and that the optimal allocation to IG_i equals $q_i - q_{-i}$. The paper shows that in such a simple version of the divisible resource game, the policymaker can become fully informed about the quality of both IGs if he sells attention to one of the groups using an all pay auction. The result suggests that the most important result from the non-divisible allocation game—that by giving attention to the highest contributors, a policymaker can become fully informed and implement the first best policy—may carry over to the game with divisible resources. We show that this is generally true in the online appendix of the current paper, which considers a greatly generalized divisible resource game.

There are noteworthy differences between the non-divisible allocation model considered throughout the majority of this paper and the divisible resource model considered here. First, one can show that there is a unique symmetric full-information equilibrium in the game with divisible resources. This means that the issues involving the multiplicity of relevant equilibria is not present in the divisible resource environment. Second, in the unique equilibrium of the divisible resource game, each IG expects a positive payoff. This is in contrast to the payment-maximizing equilibrium of the non divisible allocation game, where the policymaker captured all rent. In the divisible resource game, no payment maximizing equilibrium exists. Despite these differences, the main result remains the same in both environments. By selling attention to the highest bidder, the PM can become fully informed about the quality of all IGs, even those he does not review directly. This allows him to implement his first best allocation, as if he was fully informed. Selling attention to the highest bidder can improve policy outcomes.

In the body of the paper, we consider settings in which the policymaker (PM) has a limited number of non divisible "prizes" which he must split among the IGs. There are fewer prizes than IGs, and each IG can receive at most one prize. This means that an IG either received a full prize, which it valued at v, or received nothing. In this online section, we allow for divisible prizes. Here, the PM must divide a limited resource across the n IGs. This alternative framework may represent the division of a budget across different resources.

As before, there are n IGs, indexed by $i = 1, ..., n$. Each IG_i privately observes its own quality q_i. Its quality is the independent realization of continuous, twice differentiable

[32]One may envision a setting in which the policymaker divides a fixed budget between the n projects, and $p_i > 0$ for each IG. But, neither the fixed budget nor the restriction to strictly positive transfers are necessary for the analysis. It only matters that the optimal choice of p_i is increasing in q_i and decreasing in the quality of others.

distribution F on which there are no mass points. The distribution has pdf f, and support $\mathcal{Q} = (0, q_{max}]$. Let $q = \{q_1, .., q_n\}$ and $q_{-i} = \{q_1, ..., q_{i-1}, q_{i+1}, ..., q_n\}$.

The PM chooses an allocation amount a_i to provide each IG_i. Function $A(q_i, q_{-i})$ gives the PM's optimal choice of allocation, a_i, for an IG with quality q_i, when other IGs have quality q_{-i}. When the policymaker is fully informed about q, he will implement $a_i = A(q_i, q_{-i})$ for each $i = 1, ..., n$. We impose two assumptions on A in order to simplify the analysis. First, the PM-preferred a_i is strictly increasing in i's own quality, and strictly decreasing in the quality of all other IGs. That is, for each i, $\partial A(q_i, q_{-i})/\partial q_i > 0$ and $\partial A(q_i, q_{-i})/\partial q_j < 0$ for all $j \neq i$ and every $q \in \mathcal{Q}^n$. Second, the optimal allocation functions are independent of the IGs' identities: $A(q_i, q_{-i})$ is independent of the ordering of q_{-i}, which also implies that $\partial A(q_i, q_{-i})/\partial q_j = \partial A(q_i, q_{-i})/\partial q_k$ for $q_j = q_k$ and $j, k \neq i$.

The structure of the game otherwise remains unchanged from the non-divisible prize framework considered in the body of the paper. The PM reviews k (where $k \in 1, ..., n-1$) IGs before choosing an allocation $a = \{a_1, ..., a_n\}$. If the PM reviews IG_i, he directly observes q_i. If the PM does not review IG_i, then he updates his beliefs about q_i accounting for any contribution $c_i \geq 0$ provided by the IG. The game takes place as follows: First, IGs independently and simultaneously provide contributions. The PM observes all contributions, and directly observes the quality of the k IGs that provide the highest contributions. He updates his beliefs about q given these observations. Finally, the PM implements an allocation.

Here, we derive an equilibrium of the contest for attention with divisible prizes in which each IG_i contributes according to a payment function $\bar{C}^*$ that is strictly increasing in its privately observed quality q_i. Lemma 1 continues to hold in this environment, and implies that such an equilibrium is a *full-information equilibrium* in which the PM implements policy as if he is fully informed. That is, in such an equilibrium, the PM implements $a_i = A(q_i, q_{-i})$ for each i. Since $\bar{C}^*$ is strictly increasing, it is invertible. We define $Q^* \equiv \bar{C}^{*-1}$.

To derive the equilibrium payment function $\bar{C}^*$, we consider the optimal choice of contribution c_i by IG_i when all other IGs contribute according to the strictly increasing contribution function. Notice that because the other $n-1$ IGs contribute according to the equilibrium contribution function, the PM's beliefs about q_{-i} are always correct. However, his beliefs about q_i will be incorrect if IG_i chooses some $c_i \neq \bar{C}^*(q_i)$ and does not receive attention. IG_i will receive attention if fewer than k other IGs contribute $c_j > c_i$. This is equivalent to fewer than k others having q_j such that $\bar{C}^*(q_j) > c_i$, or equivalently $q_j > Q^*(c_i)$.

Function $\Omega(q_i; q_{-i})$ indicates whether IG_i receives attention in equilibrium when it has quality q_i and the other IGs have quality q_{-i}. Therefore, $\Omega(Q^*(c_i); q_{-1})$ indicates whether IG_i receives attention when it contributes c_i. It equals 1 when fewer than k other IGs have $q_j > Q^*(c_i)$ and equals 0 otherwise. If IG_i receives attention, the PM directly observes q_i and implements an allocation a such that $a_i = A(q_i, q_{-i})$. If IG_i does not receive attention, the PM infers q_i from c_i, believing $q_i = Q^*(c_i)$. In this case, he implements an allocation in which $a_i = A(Q^*(c_i), q_{-i})$.

IG_i's expected payoff from contribution c_i when the other $n-1$ IGs contribute according to strictly increasing equilibrium payment function $\bar{C}^*$ is

$$\int_{q_{-i}} f(q_{-i})\Big[\Omega(Q^*(c_i);q_{-i})A(q_i,q_{-i}) + (1-\Omega(Q^*(c_i);q_{-i}))A(Q^*(c_i),q_{-i})\Big]dq_{-i} - c_i. \tag{36}$$

Following the proofs in the body of the paper, we can apply the revelation principle in solving the problem. This approach means that each IG announces its quality $\hat{q}_i$, and the equilibrium payment functions C_i^* must be each IG prefers to announce quality truthfully, $\hat{q}_i = q_i$. Therefore, (36) may be rewritten in terms of IG_i's choice of $\hat{q}_i$.

$$\int_{q_{-i}} f(q_{-i})\Big[\Omega(\hat{q}_i;q_{-i})A(q_i,q_{-i}) + (1-\Omega(\hat{q}_i;q_{-i}))A(\hat{q}_i,q_{-i})\Big]dq_{-i} - \bar{C}^*(\hat{q}_i). \tag{37}$$

The derivative of this expression with respect to c_i is

$$\int_{q_{-i}} f(q_{-i})\Big[\tfrac{\partial\Omega(\hat{q}_i;q_{-i})}{\partial q_i}\Big(A(q_i,q_{-i}) - A(\hat{q}_i,q_{-i})\Big) + (1-\Omega(\hat{q}_i;q_{-i}))\tfrac{\partial A(\hat{q}_i,q_{-i})}{\partial q_i}\Big]dq_{-i} - \bar{C}^{*\prime}(\hat{q}_i). \tag{38}$$

We set (38) equal to zero and simplify the expression given the equilibrium requirement that $\hat{q}_i = q_i$. This gives us an equation for $\bar{C}^{*\prime}(q_i)$.

$$\bar{C}^{*\prime}(q_i) = \int_{q_{-i}} f(q_{-i})(1-\Omega(q_i;q_{-i}))\frac{\partial A(q_i,q_{-i})}{\partial q_i}dq_{-i}. \tag{39}$$

We show that $\bar{C}^*$ such that $\bar{C}^*(0) = 0$ and (39) is an equilibrium of the game. Such a function will be an equilibrium if, given $\bar{C}^*$ and for all $q_i \in \mathcal{Q}$, (38) is increasing in $\hat{q}_i$ for all $\hat{q}_i < q_i$, and decreasing in $\hat{q}_i$ for all $\hat{q}_i > q_i$. To see that this is the case, first simplify (38) by substituting in an expression for $\bar{C}^{*\prime}$ as given by (39). Doing this causes (38) to simplify to

$$\int_{q_{-i}} f(q_{-i})\tfrac{\partial\Omega(\hat{q}_i;q_{-i})}{\partial q_i}\Big(A(q_i,q_{-i}) - A(\hat{q}_i,q_{-i})\Big)dq_{-i}. \tag{40}$$

This expression is strictly positive if $\hat{q}_i < q_i$, and strictly negative if $\hat{q}_i > q_i$. Therefore, it is unique best response for IG_i to truthfully announce $\hat{q}_i = q_i$ when payments are imposed by $\bar{C}^*$ satisfies $\bar{C}^*(0) = 0$ and (39). This means that in the original game, prior to the use of the revelation principle to transform the game, it is a unique best response for IG_i to contribute according to $\bar{C}^*$ when all other IGs also do so, and the PM expects IG_i to do so. That is, there is a symmetric full-information equilibrium in which $C_i^* = \bar{C}^*$ for all $i = 1, ..., n$.

There are some noteworthy differences between the equilibrium of the game with divisible prizes and the equilibrium of the game with a limited number of non-divisible prizes studies in the body of the paper. First, one can show that the symmetric full-information equilibrium derived above is the unique symmetric full-information equilibrium of the game with divisible prizes. This is in contrast with the body of the paper, where there were multiple symmetric full-information equilibria in the discrete prize game. Second, one can also show that the IGs each expect positive payoffs in the equilibrium of the divisible prize game. In this environment, unlike in the discrete prize game, no payment-maximizing full-information equilibrium exists. This was an essential component of the analysis of the more simple structure in Cotton (2009), where directly selling policy resulted in higher payments than selling attention.

Despite these differences, however, the main result remains the same in both environments. By selling attention to the highest bidder, the PM can become fully informed about the quality of all IGs, even those he does not review directly. This allows him to implement his first best allocation, as if he was fully informed. Selling attention to the highest bidder can improve policy outcomes.