Informational lobbying: only pieces of truth

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Abstract

In this paper, we present a simple model of informational lobbying, to analyze the incentives of an interest group to reveal information when the issue at stake is complex. We show that a multidimensional issue can provide the interest group with more opportunities to manipulate the decision-maker, and that it can allow the interest group to reveal only parts of its information in equilibrium. In an attempt to better explain interest groups' behavior, we argue that such equilibria have more realistic features and show that they exist under more general conditions. Furthermore, we arguethat revealing parts of information can be relatively more effective to influence the decision-maker.

1 Introduction

In this paper, we present a simple model of informational lobbying, to analyze the incentives of an interest group to reveal information when the issue at stake is complex. We show that a multidimensional issue can provide the interest group with more opportunities to manipulate the decision-maker, and that it can allow the interest group to reveal only parts of its information in equilibrium. In an attempt to better explain interest groups' behavior, we argue that such equilibria have more realistic features and show that they exist under more general conditions. Furthermore, we arguethat revealing parts of information can be relatively more effective to influence the decision-maker.

Although this paper focuses on informational lobbying, it is not the only way for interest groups to exert influence.In this paper however, we limit ourselves to informational lobbying. Our motivation for doing so is twofold. First, we believe that informational lobbying works in a manner that is distinct from the other means of influence: by conveying information to the decision-maker, the interest group impacts her decision by shaping her beliefs with regards to the issue, which is different from compensating her with material benefits for a favorable policy shift. Second is a concern for clarity: our purpose in this paper is to underline how influence through informational lobbying may vary with the nature of the issue of interest. Thus, we abstract from other phenomena in order to present our arguments more clearly. With these limitations in mind, our approach still holds some relevance, as numerous cases of policy decisions where interest groups are involved hinge around the provision of information.

We model a game of informational lobbying where an uninformed policy-maker has to make a policy decision, and may receive information from an interest group. Though simple, this framework already lends itself to analyzing existing decision processes. For instance, before they are released on the market, new pharmaceuticals have to be approved by public health regulators through a procedure that is very similar across countries[1]. When they apply for the authorization to release a new drug, pharmaceutical companies have to provide the regulators with evidence that their product is effective and safe. Heatlh administrations require them to perform clinical trials and produce the results of various tests, which are reviewed before reaching a decision. In order to add further credibility, it is also very common to release these information within the medical community, through publications in scientific journals. Quite clearly, an agency problem may arise. However, strategic behavior can sometimes come at the expense of the concern for public health. Such occurences have been observed within the medical and pharmaceutical profession, and documented: Turner et al. (2008) for instance, examined the studies and the results published on the efficacy of a number of antidepressant drugs marketed in the United States, and showed that pharmaceutical companies selectively reported trial results, publishing generally positive ones in an apparent attempt to overstate the effectiveness of their drugs. Data on tests wich showed more mitigated results was also available by pharmaceutical companies, and usually registered at the FDA, but they were not presented on the application for marketing and sale, or released to the medical community. With more complete data over the clinical trials, the authors demonstrated that the efficacy of the drugs considered had been exaggerated, thus shedding doubt on whether they should have been allowed on the market at all. Another illustrative example of the agency problems associated with drug approval procedures, and their adverse consequences is the case of Rofecoxib, a drug marketed by the company Merck&Co, authorized by the FDA in 1999, and withdrawn by Merck in 2004, over serious concerns that it raised the risk of cardiovascular problems. By the time the drug was taken out of the market, more than 80 million people had

[1] see for example the Food and Drug Administration (FDA) website, for the United States, that of the European Medicines Agency (EMA) in the EU, or the Gezondheidsraad in the Netherlands.

taken the medicine[2]. Pasty and Kronmal (2008) showed that the company originally withheld evidence from tests and trials about the mortality risks associated with the drug. The authors were able to do so after having access to documents released through litigation against the company. Drawing from these examples, it seemed that the pharmaceutical companies used a communication strategy which took advantage of the fact that the evaluation of a new drug requires a wide array of different information. Moreover, it appears that these firms were successful to induce a positive decision by revealing only selected pieces of evidence. So, we designed our model with the intuition that the issues of interest between a policy maker and interest groups are usually complex, and that interest groups take advantage of this complexity by communicating only partial information. Though lobbying has been extensively studied, previous theoretical works have generally not focused on this phenomenon, for which we present an explanation in the present paper.

There are two players in our model: a policy-maker and an interest group. On behalf of the public, the policy maker has to decide whether or not to implement a project with complex and uncertain consequences. However she is uninformed about them so that the optimal decision from the public's perspective is unclear. The interest group is fully informed and can communicate with the policy maker about the project prior to her decision. We choose to model complexity by assuming that the uncertain consequences can be represented as two independent random variables. In other words, the issue of interest is mutidimensional, as it has two distinct aspects that must be considered. We limit the number of dimensions to two, to keep our model and the computations as simple as possible. The policy maker's decision affect both players's payoffs: if the project is implemented, both of them bear the consequences, and if the status quo is maintained, they both receive payoffs normalized to

[2] this figure is quoted in a few sources, we took it fromTopol (2004).

zero. The two players also have different preferences over the project: mirroring the cases described above, we assume that the interest group is more biased towards implementation than the policy-maker[3]. Depending on the values of the random variables, there are then three situations: 1) both the policy maker and the interest group would prefer the status quo (the consequences are so bad that nobody would benefit from the project); 2) the policy maker would prefer the status quo, but the interest group would prefer to implement the project (given the difference in preferences, the project may be beneficial to the interest group, but not to the policy maker); 3) both would prefer to implement the project (the consequences are good enough that everyone would benefit). So, if the policy maker were fully informed, she would sometimes make decisions which are not optimal for the interest group. Thus, the interest group may have incentives to communicate strategically and manipulate the policy maker into making a decision that furthers its ends.

The interest group communicates by sending a message before the decision. This message may contain information about both dimensions of the project, or information about one dimension only, or no information at all. Importantly, in our model, we assume that the interest group can only send verifiable information, and that communicating information is costly. As the examples above can illustrate, the policy makers often have the skills and the resources to verify the information they receive. They have administrations, special agencies, and experts at their disposal. In the case of market authorizations for new drugs, there are even scientific publications checking the validity of the evidence provided by pharmaceutical companies. The intuition behind our assumption is that when issues are complex, when the interaction between interest groups and policy makers is more or less institutionalized, lying or forging evidence becomes difficult, either because the information can be verified to a

[3] This assumption has no impact on the validity of our results: assuming the opposite would lead to a symmetric analysis. We make it by reference to the examples provided above, for ease of understanding.

certain extent, or because it carries a high risk. We do not argue that lying is impossible or that our framework is the most relevant, but that there is a large number of situations where our assumption, although simplifying, makes sense. Moreover, we assume that sending an informative message is costly. The idea is that interest groups cannot communicate in a completely free manner: they need to establish a connection and engineer their message so that it can be received by the policy maker, which requires resources and effort.

Our main results are the following: we establish that there may exist two kinds of equilibria where the interest group can manipulate the policy maker: one where the interest group uses empty messages to induce implementation, and one where the interest group uses partial messages to induce implementation. We compare these two cases and show that manipulation can only occur if the preferences of the players are not too different. Moreover, we show that in these equilibria, the closer their preferences the more informative messaging becomes. We also discuss the conditions for the existence of such equilibria, and show that equilibria where the interest group manipulates the policy maker with partial messages exist under more general conditions. Finally, we show that there always exist values of the random variables such that manipulation with partial information is more effective than manipulation with no information.

2 Literature review

Informational lobbying has been widely studied in the literature. A large part of the research has often focused on cheap talk models (see Grossman and Helpmann (2001) for a review), where the issue of interest is usually unidimensional. Crawford and Sobel (1982) have established general results for such models, and our analysis of informational lobbying does not depart too much from theirs, but our assumptions of multidimensionality and verifiable information bring these issues under a different light. Some papers have studied the effects of multidimensionality, such as Battaglini (2002), with a general cheap talk model, who showed that multidimensionality matters, and that it yields qualitatively different results than the unidimensional case. On the other hand, Bennedsen and feldmann (2004) studied a model of informational lobbying with unidimensional issues, where interest groups can send verifiable information or give contributions to the decision maker. Milgrom and Roberts (1986), or Okuno-Fujiwara, Postlewaite and Suzumara (1990) have presented models where interest groups can communicate multidimensional and verifiable information but their focus was rather on the conditions under which information would be revealed, than on the effects of multidimensionality and the interest groups' behavior. Finally, Dewatripont and Tirole (1999) establish results which are very similar to ours (see section IV A of the paper), but in their model, manipulation becomes possible because the decision maker is uncertain about what information the interest group possesses, and thus cannot perfectly infer whether she is being manipulated or not. In our model, the decision maker is fully aware of the dimensions of the issue and that the interest group has full information, thus she also knows when the interest group is hiding it.

We will present the model in section III, then our analysis and results in section IV, and section V will conclude.

3 Model

We model a game of informational lobbying, with two players. On behalf of the public, a policy maker (PM) must make a decision $x \in \{0, 1\}$. PM can decide either to implement a project ($x = 1$), or to maintain the status quo ($x = 0$). The consequences of the project are uncertain, and PM does not have any prior information about them. However, an interest group (IG) may send her some information before she makes her decision. For both players, the outcome of the game depends on PM's decision x. We define the players' preferences as follows:

$$PM : U_{PM}(x) = \begin{cases} p + \mu + \epsilon, \text{ if } x = 1 \\ 0, \text{ if } x = 0 \end{cases} ; IG : U_{IG}(x) = \begin{cases} q + \mu + \epsilon - c(m_{IG}), \text{ if } x = 1 \\ 0, \text{ if } x = 0 \end{cases} ;$$

p and q represent the players' respective bias towards the project. μ and ϵ are two independent stochastic terms, which represent the uncertain consequences of the project. c represents messaging costs. If the project is implemented ($x = 1$), the payoffs are the sum of the player's bias and the realizations of the stochastic terms (and the communication costs for IG). If the status quo is maintained ($x = 0$), payoffs are normalized to 0.

We assume that $\mu \sim U[-h, h]$ and $\epsilon \sim U[-h, h]$. The value of p, q, and the distributions of μ and ϵ are common knowledge. Thus, on the basis of prior information only, the expected payoffs of the project for PM and IG are equal to p and q respectively.

Furthermore, we assume that $p, q \in [-2h, 2h]$, so that none of the players has an absolute preference towards implementation or status quo. In what follows, we also assume that $p < q$, which means that IG has a stronger bias towards implementation than PM.

PM has no information about the realizations of μ and ϵ. However, IG does and it communicates with PM before she makes her decisions. At the beginning of the game, IG receives a private signal $s_{IG} = \{\mu, \epsilon\}$, i.e IG is fully informed about the realizations of μ and ϵ. Once it has received a signal, IG sends a message $m_{IG} \in \{\{\mu, \epsilon\}, \{\mu\}, \{\epsilon\}, \{\emptyset\}\}$ to PM. IG can then choose to reveal the full information, parts of it, or nothing at all.

We also assume that IG incurs communication costs when it sends a message which is not empty. For simplicity purposes, we also assume here that this cost is the same for a message with partial information, or a message disclosing the full information.

Formally:

$$c(m_{IG}) = \begin{cases} c > 0 \text{ if } m_{IG} \in \{\{\mu, \epsilon\}, \{\mu\}, \{\epsilon\}\} \\ 0 \text{ if } m_{IG} = \{\emptyset\} \end{cases}$$

The timing of the game is the following:

1. Nature draws μ, ϵ; IG receives its signals s_{IG}.
2. IG sends a message m_{IG}.
3. DM chooses x.
4. Payoffs are realized.

We solve this game using Perfect Bayesian Equilibrium. In equilibrium, the players' beliefs must coincide with the strategies played, and the strategies must maximize expected payoffs. Also, DM updates her beliefs about μ, ϵ with Bayes' rule.

4 Analysis

In this section, we present different equilibria that may arise. However, we direct our attention to a restricted set of equilibria. First, we focus on pure strategy equilibria only. Equilibria with mixed strategies also exist, but they do not bring much to the analysis. Futhermore, communication between the two players is natural: IG's messages are delivered in a language that PM understands perfectly, and their contents are not ambiguous: the information displayed in the messages and the information received by PM are strictly the same. Also, we assume that the communication costs are always small enough so that if the project is implemented, IG's payoffs will always be higher than those of PM. Basically, we do not want the costs to distort IG's preferences so much, so that it will always favor implementation more than PM. Though restrictive, this assumption allows us to disregard situations which do have an interest of their own, but do not bring much additional insight. Lastly, we have made specific distributional assumptions on the random variables, which came from a concern for simplicity. Nevertheless, we are fully aware that our results could be refined against more general specifications.

We show the existence of three equilibria: an informative equilibria, where PM always makes her decision as though she were perfectly informed (this equilibrium is also first best); and two equilibria where IG manipulates PM, with a empty message in the first case, and a partial message in the second. We will then discuss these two equilibria and argue that it is always possible that manipulation with partial information be more effective than with an empty message, providing a rationale for the observation that interest groups do seem to rely on partial information to lobby decision makers.

4.1 Informative equilibrium

We mentioned in the introduction that if the policy maker were fully informed, she would sometimes make decisions against the interest group's interests. In our framework, this means that PM chooses the status quo ($x = 0$) when IG would incur positive payoffs from the project, i.e. when $q + \mu + \epsilon + c(m_{IG}) > 0$ and $p + \mu + \epsilon < 0$. This situation can actually arise in equilibrium, although IG does not always reveal the full information: given IG's messaging strategy, PM is always able to infer whether it is worthwile for her to implement the project or not. We formalize this in the following proposition:

Proposition 1 *There always exists an equilibrium where PM makes an informed decision. This equilibrium is also first best. In this equilibrium, IG plays the following strategy: it sends* $m_{IG} = \{\emptyset\}$ *if* $p + \mu + \epsilon < 0$*, and* $m_{IG} = \{\mu, \epsilon\}$ *if* $p + \mu + \epsilon > 0$*.*

If PM demands full information to implement the project, and always maintains the status quo short of that, there is no possibility for IG to have the project implemented when $p + \mu + \epsilon < 0$. In other words, PM constrains IG to playing an informative strategy: when IG sends $m_{IG} = \{\mu, \epsilon\}$, PM has full information and can always make an informed decision, and if IG sends any other message, PM infers that $p + \mu + \epsilon < 0$ and chooses the status quo. IG's dominant strategy is then to reveal the full information when $p + \mu + \epsilon > 0$, to ensure that the project is implemented (since $p < q$, IG also prefers the project then), and to send $m_{IG} = \{\emptyset\}$ otherwise, as it is least costly message to signal that $p + \mu + \epsilon < 0$. Clearly, this leads to a decision which is optimal from the public's perspective.

We make two observations: first, it is not necessary that IG always reveals the full information for PM to make informed decisions. Second, we see that the agency problem is suppressed when PM adopts the right set of equilibrium beliefs[4]. If anything, this proposition suggests relying on the information of interested parties can sometimes be socially efficient.

[4] This can be related to Milgrom and Roberts (1986), who showed that a *skeptical* decision maker can coerce the interest group into full revelation. Our result is very similar, although PM is a Bayesian player in our model, which is not the case for the decision maker in their model, in this case evoked above.

This, however,does not imply that agency problems can always be avoided, as can be shown with the examples given in the introduction, and in the next paragraphs.

4.2 Equilibria with manipulation

4.2.1 Manipulating the policy maker

Before we present the other equilibria, we want to make clear what we understand as manipulation. In our framework, we call manipulation the fact that the interest group adopts a messaging strategy which induces the policy maker to choose its favourite outcome. As we have said before, there are three possible situations depending on the realizations of the random variables: when both players would prefer the status, when they would both prefer implementation, and when IG prefers implementation and PM the status quo. Manipulation is aimed at this last situation: to make PM choose implementation when she would actually favor the status quo if she were informed.

The informative equilibrium case is a good starting point to introduce how manipulation works in equilibrium. In the equilibrium presented above, given PM's beliefs, IG's messaging strategy leaves no ambiguity as to whether PM should implement the project or not. The interest group basically signals to PM what decision **she** would prefer. Manipulation does the opposite: IG signals to PM what decision **it** would prefer. Since $p < q$, when IG prefers the status quo, then PM also prefers the status quo. However when IG prefers implementation, it comprehends cases where PM would prefer the status quo but also cases where she would prefer implementation. More precisely, if IG signals that it prefers implementation with message m_{IG}, PM can infer that $q + \mu + \epsilon + c\,(m_{IG}) > 0$, but she does not know whether $p + \mu + \epsilon < 0$ or $p + \mu + \epsilon > 0$. IG tells her that the project payoffs are somewhat high, but not whether they are high enough for her to prefer implementation. In the equilibria presented below, manipulation always operates in the same manner: IG will reveal when it prefers the status quo and when it prefers implementation. Revealing its preference for the status quo (by sending a message m_{IG}) will always induce PM to choose the status quo: $q + \mu + \epsilon + c(m_{IG}) < 0 \Rightarrow p + \mu + \epsilon < 0$. This is always true if costs are small enough, as we assumed above. Thus, when IG reveals its preference for implementation it does two things: first, it maintains uncertainty about what decision is optimal for PM, but second, and more importantly, it makes PM update her beliefs about the expected value of $\mu + \epsilon$. Assume that IG reveals its preference for implementation with message m_{IG}. We can then rewrite PM's expectations as:

$$\begin{aligned} E(\mu + \epsilon | m_{IG}) &= E(\mu + \epsilon | q + \mu + \epsilon + c(m_{IG}) > 0) \\ &= E(\mu + \epsilon | \mu + \epsilon > -q - c(m_{IG})) \end{aligned}$$

When IG reveals that it prefers implementation, PM updates her beliefs and infers that $\mu + \epsilon > -q - c(m_{IG})$. Manipulation can be effective because it increases PM's expectations about the consequences of the project. Givent that IG reveals that it prefers implementation with message m_{IG}, the general condition for manipulation to be successful is then:

$$p + E(\mu + \epsilon | \mu + \epsilon > -q - c(m_{IG})) > 0$$

In both cases below, this condition has to be fulfilled so that manipulation can arise in equilibrium. Moreover, this condition already allows us to describe the circumstances in which manipulation becomes possible. The agency problem between PM and IG stems from the fact that they have different bias towards the project, which creates a conflict of interest that we can characterize in two ways. The respective positions of p and q on the $[-2h, 2h]$ interval define the *terms of the conflict of interest*, i.e. how moderate or extreme PM and IG are, respectively, with regards to implementation or status quo. Furthermore, the size of the difference between the two bias, $q - p$ represents the *intensity of the conflict of interest*, i.e. how much the players may disagree about the decision. Looking at the manipulation condition, and given that $E(\mu + \epsilon | \mu + \epsilon > -q - c(m_{IG}))$ is decreasing in q, we can say that manipulation becomes possible if the terms of the conflict of interest are not too extreme and if the intensity of the conflict of interest is not too large: if p is very low, or q very high, independently of the other, the condition does not hold anymore; and the same goes if $q - p$ is too large.

Now that we have presented how the interest group can manipulate the policy maker, we move on to describing equilibria where manipulation occurs. There are then two kinds of equilibrium with manipulation: one where IG manipulates PM with an empty message $m_{IG} = \{\emptyset\}$, and one where IG manipulates PM with a partial message $m_{IG} = \{\mu\}$ or $m_{IG} = \{\epsilon\}$ (these are different equilibria). For clarification: we call manipulation with an empty message, a messaging strategy where IG sends $m_{IG} = \{\emptyset\}$ when $q + \mu + \epsilon + c(m_{IG}) > 0$ to induce PM to choose $x = 1$. Though the whole messaging strategy participates to the manipulation, we refer to it by the message that signals that IG prefers implementation. The same applies to manipulation with partial messages.

4.2.2 Manipulation with an empty message

Now let us assume that IG sends an empty message $m_{IG} = \{\emptyset\}$ when it prefers implementation. This implies that, when it prefers the status quo, IG will have to send a costly message $m_{IG} \in \{\{\mu, \epsilon\}, \{\mu\}, \{\epsilon\}\}$ to signal that it prefers the status quo. All of these messages are then equivalent: they all signal that IG prefers the status quo, so they yield the same outcome (PM chooses $x = 0$), and they are equally costly. If the empty message $m_{IG} = \{\emptyset\}$ is successful in inducing PM to choose $x = 1$, the payoffs to IG in this case are equal to $q + \mu + \epsilon$. On the other hand, if the status quo is maintained after IG sends $m_{IG} = \{\mu, \epsilon\}$ (or $\{\mu\}$, or $\{\epsilon\}$), its payoffs are equal to $-c$. This implies that IG prefers implementation when $q + \mu + \epsilon > -c$, and the status quo when the inequality is reversed. Such a messaging strategy is possible in equilibrium only if the condition manipulation holds. If that is the case, there are then no profitable deviations for IG. Thus:

Proposition 2 *If $p + E(\mu + \epsilon | \mu + \epsilon > -q - c) > 0$, then there exists an equilibrium with manipulation, where IG induces PM to implement the project when $q + \mu + \epsilon + c > 0$. In this equilibrium, IG plays the following strategy: if $q + \mu + \epsilon + c < 0$ then $m_{IG} = \{\mu, \epsilon\}$ (or alternatively $\{\mu\}$, or $\{\epsilon\}$)[5], and if $q + \mu + \epsilon + c > 0$, $m_{IG} = \{\emptyset\}$.*

Before we comment on this proposition, we make a few observations: first, multidimensionality does not matter in this equilibrium. The two random variables are considered as one and its distribution can be found by computing the convolution of the sum of the two (detailed computations can be found in the appendix). Second, the manipulation condition

[5] the three messages are equivalent in terms of equilibrium outcomes. There actually exist three different pure strategy equilibria with manipulation with an empty message. The one with $m_{IG} = \{\mu, \epsilon\}$ seemed the most natural here.

depends only on parameter values: the realizations of μ and ϵ do not play a role. Manipulation with an empty message is thus a phenomenon that is generated exogenously: either the characteristics of the conflict of interest allow for it, or they do not, but whether it is possible to manipulate PM with an empty message does not depend on μ and ϵ.

Our proposition is quite similar to the results previously obtained in the literature about unidimensional cases: interest groups will either reveal all the information or conceal it all in equilibrium (in the case of cheap talk models: the interest group will either reveal truthfully or lie). While it sheds some light on interest groups' behavior and the way they influence policy makers, it does not fully explain what is observed empirically. The next paragraph will provide further leads for an explanation.

4.2.3 Manipulation with partial information

Manipulating PM with partial messages operates in a slightly different manner than in the previous case. Assume IG sends partial message to signal that it prefers implementation, say $m_{IG} = \{\mu\}$. Then the least costly message to signal its preference for the status quo is $m_{IG} = \{\emptyset\}$. If the partial message $m_{IG} = \{\mu\}$ is successful in inducing PM to choose $x = 1$, the payoffs to IG in this case are equal to $q + \mu + \epsilon - c$. On the other hand, if the status quo is maintained after IG sends $m_{IG} = \{\emptyset\}$, its payoffs are equal to 0. This implies that IG prefers implementation when $q+\mu+\epsilon > c$, and the status quo when the inequality is reversed. Now, by sending partial information, IG reduces the uncertainty to only one stochastic term. Assuming IG sent $m_{IG} = \{\hat{\mu}\}$ (i.e. the random variable μ takes value $\hat{\mu}$) , PM's expectations of the consequences of the project then become:

$$\begin{aligned} E(\mu+\epsilon|m_{IG}=\{\hat{\mu}\}) &= E(\mu+\epsilon|\mu+\epsilon>-q+c,\mu=\hat{\mu}) \\ &= \hat{\mu}+E(\epsilon|\epsilon>-q+c-\hat{\mu}) \text{ } (\mu \text{ and } \epsilon \text{ are independent}) \end{aligned}$$

Recall that $\epsilon \sim [-h,h]$, so that the expected value of ϵ in the second equality can take two values:

$$E(\epsilon|\epsilon>-q+c-\hat{\mu}) = \begin{cases} \frac{-q+c-\hat{\mu}+h}{2}, \text{ if } -q+c-\hat{\mu}>-h \\ 0, \text{ if } -q+c-\hat{\mu}<-h \end{cases}$$

In the second case the constraint on ϵ is not binding: sending $m_{IG}=\{\hat{\mu}\}$ does not yield any additional information about ϵ. It is only informative if the information condition $(-q+c-\hat{\mu}>-h \Leftrightarrow \hat{\mu}<-q+c+h)$ holds.

First case:

Assume that paramater values and $\hat{\mu}$ are such that $E(\epsilon|\epsilon>-q+c-\hat{\mu})=\frac{-q+c-\hat{\mu}+h}{2}$. The manipulation condition is then:

$$p+\hat{\mu}+E(\epsilon|\epsilon>-q+c-\hat{\mu})>0 \Leftrightarrow \hat{\mu}>-2p+q-h-c$$

The information condition and the manipulation condition fulfill different roles. The manipulation condition tells us that in order to induce PM to implement the project by revealing only partial information, the information revealed must so good that PM will expect positive payoffs from the project. I.e. manipulation with a partial message $m_{IG}=\{\hat{\mu}\}$ is effective only if $\hat{\mu}$ is sufficiently high. However, the information condition tells us that in order for $\hat{\mu}$ to be informative about the value of the second stochastic term, it needs be sufficiently low. The intuition for the fact that these conditions go in opposite directions is the following: sending a partial message signals to PM that IG prefers implementation, but, at the same time, it also discloses the value of one of the stochastic term. The larger this value, the more redundant becomes the information that IG prefers implementation: if $\hat{\mu} > -q + c + h$, then regardless of the value of ϵ, IG will always prefer implementation over status quo, so that ϵ could take any value in $[-h, h]$. The fact that IG prefers implementation becomes uninformative to PM, with regards to the consequences of the project.

In order for both the information condition and the manipulation condition to hold at the same time, we need that:

$$\begin{aligned} -2p + q - h - c &< -q + c + h \\ &\Leftrightarrow q - p < h + c \end{aligned}$$

In other words, a partial message can only be manipulative and informative at the same time if the conflict of interest is not too intense. Note however that it is possible to have $q - p < h + c$ and $\hat{\mu} > -q + c + h$, which means that a partial message needs not be informative in this situation. If both these inequalities hold, then $E(\epsilon|\epsilon > -q + c - \hat{\mu}) = 0$, and the manipulation condition reads $\hat{\mu} > -p$, which holds immediately[6].

If $q - p > h + c$, then we always have $E(\epsilon|\epsilon > -q + c - \hat{\mu}) = 0$.

Second case:

Assume that that paramater values and $\hat{\mu}$ are such that $E(\epsilon|\epsilon > -q + c - \hat{\mu}) = 0$. The manipulation condition is then:

$$\hat{\mu} > -p$$

[6] It is easy to show that $q - p < h + c \Rightarrow -p < -q + c + h$, so that $\hat{\mu} > -q + c + h \Rightarrow \hat{\mu} > -p$

Here the information condition and the manipulation condition go in the same direction.

One notable difference with the case where IG manipulates with an empty message is that the possibility to manipulate PM depends on the values of the stochastic terms here. If these values are not high enough, the manipulation condition does not hold, and the partial message fails to induce PM to implement the project. However, if one partial message fails, it is impossible to use another partial message. The proof for this is relatively straightforward. Assume that IG would first try to manipulate by sending $m_{IG} = \{\mu\}$, and in the event that μ is not high enough to carry out the manipulate PM, IG would use $m_{IG} = \{\epsilon\}$. Upon receiving $m_{IG} = \{\epsilon\}$, PM the infers two things: that IG favors implementation, i.e. $q + \mu + \epsilon - c > 0$, and also that μ is not high enough to induce implementation, i.e. $\mu < -2p + q - h - c$ (we show the proof for this case, it is similar for the case $\mu < -p$).

Then we have:

$$\begin{aligned} E\left(\mu | m_{IG} = \{\epsilon\}\right) &= E\left(\mu | \mu \in [-q - \epsilon + c, -2p + q - c - h]\right) \\ &= \frac{-2p - h - \epsilon}{2} \end{aligned}$$

And the manipulation condition would read:

$$p + \epsilon + \frac{-2p - h - \epsilon}{2} > 0 \Leftrightarrow \epsilon > h$$

Which can never hold. Thus, when one partial message does not work, IG can never use the other partial message to manipulate PM. The dominant strategy for IG then, is to ensure that the project is implemented when PM would prefer so, i.e. when $p + \mu + \epsilon > 0$. IG does so by revealing the full information in that case. In a sense, this is equivalent to falling back on an informative strategy. This also means that an equilibrium where IG tries to manipulate with partial information exists for all paramater values: if manipulation fails, IG's behavior becomes informative, which applies to all parameter values.

Before we establish our next proposition, our analysis in this section has focused on the situation where IG would manipulate with the partial message $m_{IG} = \{\mu\}$. Our proposition does the same, but we should point out that the analysis is completely similar, should we assume that IG uses the partial message $m_{IG} = \{\epsilon\}$ instead.

Proposition 3 *There always exists an equilibrium manipulation with a partial message may occur. In such an equilibrium, IG plays the following strategy:*

$$\begin{cases} \text{if } q+\mu+\epsilon-c<0, \text{ then } m_{IG}=\{\emptyset\} \\ \text{if } q+\mu+\epsilon-c>0 \text{ and } \mu>T(q,p) \text{ then } m_{IG}=\{\mu\} \\ \text{if } q+\mu+\epsilon-c>0,\ \mu<T(q,p)\,, \text{ and } p+\mu+\epsilon>0, \text{ then } m_{IG}=\{\mu,\epsilon\} \\ \text{in all other cases, all messages are equivalent.} \end{cases}$$

With this proposition, we show that there always exist equilibria where an interest group may influence a policy maker by sending partial information. In such equilibria, manipulation arises endogenously: IG needs to possess a piece of information which satisfies the manipulation condition. Short of that, it can only play informatively. And evidently, the existence of such equilibria stems directly from the fact that the issue of interest is multidimensional. As can be seen in our analysis also, the manipulation conditions require that the conflict of interest be not too intense, and that its terms be not too extreme.

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4.3 Discussion

The first observation we make is that our assumption that the issue of interest is multi-dimensional entails the existence of more equilibria where manipulation occurs. As such, multidimensionality allows for more occurences of manipulation. However, this manipulation is carried out differently in these equilibria.The two kinds of equilibrium with manipulation have different characteristics: with an empty message, manipulation is generated exogenously, whereas with partial messages, it arises endogenously, depending on the draws of μ and ϵ. In a sense manipulation with partial messages is more random.

Also, the informativeness of the equilibria is different. Because information is verifiable, when IG sends a partial message, it changes the terms of the conflict of interest: for instance, a high value will make both players relatively more favorable to the project. Thus, it also changes the informational worth of knowing whether IG prefers the project or the status quo. This does not happen with an empty message. Nevertheless the two kinds of equilibria do become more informative as the conflict of interest gets less intense, i.e. as $q-p$ gets smaller. When the bias are close, there is a higher chance that both PM and IG will favor the same decision.

Based our analysis, and the comparison of these two kinds of equilibria, we argue that the equilibria where manipulation occurs with partial messages have slightly more complex features, which appear to be more realistic. The examples in the introduction showed that interest groups do use partial information to influence policy makers. So far, we have provided a theoretical framework that account for these phenomena. We now provide a rationale to explain why interest groups may want to use partial information, instead of simply concealing information.

Proposition 4 *Given that parameter values allow for manipulation with an empty message and manipulation with partial messages, there always exist values of* μ *and* ϵ *such that manipulation is more effective with partial messages than with empty messages. Formally: say* $m_{IG} = \{\mu\}$ *is used, there always exists some* $\bar{\mu} \in [-h, h]$*, such that* $E(\mu + \epsilon | \mu + \epsilon < -q - c) < \bar{\mu} + E(\epsilon | \epsilon > -q + c - \bar{\mu})$.

The proof is provided in the appendix. Then, given that equilibria with partial manipulation exist under more general conditions, and that it is always possible that manipulation with partial messages be more effective than with an empty message, we can better explain the empirical observations

5 Conclusion

In this paper, we have studied a simple model of informational lobbying and showed that multidimensionality of the issue of interest matters. First, it allows for more equilibria where the interest group is able to manipulate the policy maker. Furthermore, it allows the interest group to use partial information in order to lobby the decision in equilibrium. We have compared equilibria where the interest group influences the policy maker by hiding information, and equilibria where the interest group influences the policy maker by revealing partial information, and showed that the latter exist under more general conditions. Finally, we have argued that manipulation with partial information can always be more effective. As such our model provides a theoretical explanation for the empirical observations that interest groups use partial information. Some of our assumptions may limit the scope of our results however, and it remains for our conclusions to be tested against more general specifications.

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