Biased Informative Lobbying: Targets and Timing*

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September 22, 2006

Abstract

This paper investigates the role of biased informative lobbying on political decision making. A lobby, holding relevant information, may send a biased message to the politician and / or to the public before and / or after an irreversible decision. It turns out that ex post comments are often best for the interest group, with desastrous welfare consequences. Furthermore, the optimality of different "target and timing" strategies renders the decision quality non-monotonic in the politician´s quality.

Keywords: biased signals, informative lobbying

JEL classification: D72, D73, P16

*I thank Hans Peter Grüner, Ernst-Ludwig von Thadden and the seminar participants in Mannheim for useful comments and suggestions.

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1 Introduction

Politicians and society often face the dilemma that decision relevant information is privately held by special interest groups. There are plenty examples, e.g. in monopoly regulation, like in the telecommunication or energy sector, where the technological or strategic issues may be beyond an outsider´s expertise. This paper investigates the effects of lobbying on decision making via the costless provision of *biased messages*. Messages are biased in the sense that they recommend the lobby´s preferred policy more often then justified by ex ante probabilities.

Several recent papers (e.g. Morris (2001)) have pointed out that reputational concerns give advisors or politicians an incentive to ignore their own information and to confirm the receiver´s prior. This paper argues that special interest lobbies may try to exploit such an incentive. Instead of directly providing biased messages to the politician, they could also exercise influence indirectly by manipulating opinion polls.[1]

Along these lines, this work highlights how (i) the *timing* and *target* strategies and (ii) the ability of politicians and the public´s a priori informativeness affect the quality of decision making. The timing refers to whether the lobby publishes the message before or after the decision. Recipients of the message - i.e. targets - may be a politician or the public. Combining these aspects yields four promising strategies:[2] (I) The lobby exclusively provides the message to the policy maker before the decision. For instance, a lobbyist may privately discuss matters with the politician over an exclusive dinner in a fine restaurant.

[1] In contrast to Morris (2001) this paper does not explicitly model the reputational concerns but takes the bias technology as reduced form.

[2] Of course, combining the aspects, results in more than 4 strategies. But (later) it can easily be seen, that only the four considered here are potentially interesting for the lobby.

(II) The lobby may in addition also send the message to the public. For example, special interest experts frequently offer their expert opinions in talk shows or newspapers. (III) The lobby may not provide any information at all before the decision, but release the message to everyone ex post. Here, the messages resemble aftermath comments or complaints. (IV) Finally, the interest group may reveal no information at all.

In the first part of the paper it is shown that all strategies (I) - (IV) can be optimal for the lobby depending on circumstances. Perhaps, the optimality of ex post revelation a la (III) is most surprising, in particular, if the decision is irreversible which is assumed in the following.[3] Ex post publication has disastrous welfare effects.

As an illustration consider the following framework. A politician has to decide upon an issue. The public´s preferred option matches an unknown state of the world. A lobby prefers a particular policy regardless of the state but may send a precise but biased message. The politician is not interested in social welfare but cares about public opinion.[4] The public receives an unbiased and not very informative signal about the state ex post.

Suppose the interest group publishes the biased message exclusively after the decision. Since it is rather precise, it will be used by the public to update on the politician's choice. Ex ante, the politician anticipates that the announcement and hence the update will be biased. If he is poorly informed himself, he optimally chooses in the lobby´s interest, *regardless* of his own information. Due to

[3] Notice that if there is a strict benefit of strategy (III) given that the decision is irreversible, then the benefit would be even greater if the decision could be altered. This assumption is made in order to show that the argument holds even in the most critical case.

[4] I take these preferences as given, in order to reduce complexity. They could also result endogenously from a voting game, where the politician´s reelection chances depend on the perceived quality of his decisions. It is not uncommon that politicians care about opinion polls when they choose their policies.

the bias, the decision will match the updated information by the public more often. From the lobby´s point of view this is the best result possible. Whatever the state of the world, the interest group´s preferred option is always chosen. In contrast, if the lobby provides the message before the decision, then in some states the politician prefers to choose against the interest group. Clearly, this is suboptimal for the lobby, though better for society.

The second part of the paper studies how the politician´s ability and the public´s a priori informativeness influence the overall decision quality. The politician tries to predict the public´s update as good as possible. In many cases this means that he optimally ignores his own information. However, the politician´s quality indirectly has a huge effect on social welfare by influencing *which* of the lobby´s strategies is optimal. Surprisingly it turns out that an increase in the politician´s quality may decrease the quality of his decision. This happens, if an increase in the quality of the politician´s information induces the lobby to choose a publication strategy, where the equilibrium decision relies on less information. For example an increase in the politician´s quality may lead to a switch from ex ante revelation (I) to no revelation (IV). The lobby´s switch may be attractive, because a better informed politician would use the biased message only if it is against the lobby. This in turn renders the decision biased against the interest group. Similarly the decision quality may be non-monotonic in the quality of the public´s a priori information.

The driving forces behind the arguments are the biased messages. But are biased messages plausible? One justification is that the receiver has to pay indirectly by accepting a certain fraction of misinformation and wrong decisions. The sender's commitment to stick to a given bias can be obtained by repeated games arguments. Alternatively a special interest party may contract a professional lobbyist, who cares for his reputation and may release only a certain

fraction of misinformation. One may also assume different types of lobbies ex ante. All of them obtain an unbiased signal and all prefer, say, state 1 but some of them less than others. If there are legal penalties and detection probabilities for submitting the wrong messages then some lobbies send a favorable message regardless of their own information and others optimally report truthfully. Hence, the message is biased.[5]

2 Related literature

Lobbying may take many different forms. For instance there are blatant illegal bribes (e.g. in Felgenhauer and Grüner (2004)), legal campaign contributions (e.g. Grossman and Helpman (1996)) or informative lobbying (Potters and van Winden (1992), Lagerlöf (1997) and Bennedsen and Feldmann (2002)). The present work is concerned with informative lobbying, but in contrast to these papers, the focus here is on the optimal targets and timing of an interest group that may send biased messages.

Biased messages receive a growing attention in the literature. In a repeated cheap talk game, Morris (2001) studies an advisor´s reputational considerations. He shows that even a good advisor may have an incentive to provide a message contrary to his signal. By doing so he confirms the receiver´s prior and thus enhances his reputation and influence in upcoming decisions. Thus biased messages occur in equilibrium. The incentive to confirm the decision maker´s prior also plays a role in Heidhues and Lagerlöf (2003)'s model of electoral competition and in Baron (2004) and Gentzkow and Shapiro (2005) who focus on media bias[6]. In the present paper I simply assume that a politician exclusively

[5] In spirit, a similar source for biases is deployed for example by Corneo (2006).

[6] Sources of media bias are discussed in Mullainathan and Shleifer (2002), Strömberg (2002) and Besley and Pratt (2005). In the latters' paper the bias is due to media capture. Strömberg

cares about public opinion.[7] This is convenient since the focus here is not on how messages can be biased in equilibrium but more on the degree to which the politician´s decision is biased in response to the lobby´s "target and timing" strategies.

There is a related literature that studies the selection of biased advisors by a policy maker (e.g. Calvert (1985), Frisell (2000), Krishna and Morgan (2001), Kydd (2003) and Dur and Swank (2005)). Calvert´s seminal contribution shows that biased advisors may be superior to their unbiased counterparts. The basic idea is that an advisor who is biased in the same direction as the policy maker may reverse the policy maker´s prior, if he recommends a policy against both player´s interests. The lobby in the present paper sometimes also acts as an advisor. In contrast to the above work, the lobby and not the receiver chooses whom to advise when, i.e. the interest group selects the *targets* and *timing*.

3 Model

The model contains three actors: a politician, the public and a lobby. Suppose the politician has to choose an irreversible binary policy $x \in \{0, 1\}$. A policy is socially best if it matches an unknown state of the world $s \in \{0, 1\}$, where both states are equally likely ex ante.

The public observes the policy chosen. After the decision, the public receives signal $s_g \in \{0, 1\}$ about the true state of the world, which is correct with probability $g \in (\frac{1}{2}, 1)$. The public assesses the quality of the politician´s decision using its own signal, the lobby´s message (if available) and the decision itself.

focuses on advertising and technological pressures. Mullainathan and Shleifer study media bias when agents do not form Bayesian beliefs.

[7] This assumption is not uncommon in the literature. For a recent example see Visser and Swank (2006) who study reputational concerns in committees with communication.

Policy $x = 1$ is said to *match* the public´s update $E(s|$ all information observed by public) with probability one if $E(s|.) > \frac{1}{2}$. Similarly policy $x = 0$ is said to match the public's update with probability one if $E(s|.) < \frac{1}{2}$. In case $E(s|.) = \frac{1}{2}$, then the update matches the decision with probability $0 < \mu < 1$. The public updates via Bayes rule on the equilibrium path and - for simplicity - does not choose any action.[8]

The probability of a match may be interpreted as reelection chances. For example, in case $E(s|.) = \frac{1}{2}$ we could say that the public is indifferent to reelect a politician, regardless of his decision. All reelection probabilities $\mu \in (0, 1)$ are then in a sense "best responses" for the public and it may "pick" one of them. If in contrast $E(s|.) \neq \frac{1}{2}$ then the reelection probability is one if the decision is in the same direction as the update and zero otherwise.

The politician privately receives a signal $s_p \in \{0, 1\}$ about s, which is correct with probability $p \in (\frac{1}{2}, 1)$. He does not intrinsically care about the social optimum. The politician derives utility 1 if he matches the public´s update about the true state of the world with his decision and 0 otherwise. In addition, I assume that the politician chooses the policy he believes is welfare maximizing if he is indifferent between this policy and other best responses.

The lobby may send a *biased message* s_l about the true state of the world. The lobby´s strategies are to send s_l either (I) before the decision exclusively to the politician, (II) to the politician and to the public ex ante, (III) to everyone exclusively after the decision, (IV) not at all. The lobby prefers decision $x = 1$, regardless of the state of the world.

The lobby´s message s_l is biased in the following sense. If the true state of

[8] From a conceptual perspective one could easily construct a voting game, where the incumbent politician has different types and where the update results in an optimal voting decision. The main results would hold but the complexity would be increased unnessecarily.

the world is 0 then the message is correct with probability $\frac{1}{2}$ and if the true state is 1 then the message is correct with probability 1, i.e.

	$s=0$	$s=1$
$prob(s_l=0\|s)$	$\frac{1}{2}$	0
$prob(s_l=1\|s)$	$\frac{1}{2}$	1

Thus the message is biased and the lobby sends $s_l = 1$ more often than justified by the state of the world. The particular probabilities were chosen for simplicity. Given these messages, the receiver knows the true state of the world, if he observes $s_l = 0$. Note that the bias is not a matter of strategic choice, but is considered as a technology. Several justifications for this - reduced form - view can be found in the introduction. The view that possibly fits best is an interest group contracting a professional lobbyist or think tank, whose reputation is one of their most important assets. The contract allows to publish anything, as long as a certain percentage of the messages is in favor of the interest group.

The equilibrium concept deployed in this paper is perfect Bayesian equilibrium.[9] If there is more than one equilibrium behavior possible for a given "target and timing" strategy, then I assume that the politician and the public coordinate on the one where the expected number of matches is greatest.

3.1 Optimal "target and timing" strategies

The public assesses the quality of the politician´s choice ex post, using all information available. Even a biased - but informative - message sent by the interest group is valuable and will be used for updating. The politician cares for the public´s opinion. He is not intrinsically motivated to choose the social optimum. As a consequence, he wants to predict the public´s update as good as possible and to match the prediction with his decision. Even a biased - but

[9] Off the equilibrium path belief´s are formed via Kreps and Wilson´s (1982) condition C.

informative - message sent by the interest group *ex ante* is valuable and will be used for prediction. His choice is complicated by the possibility that this very choice may convey sufficiently strong information about the state of the world such that it reverses the public´s update.

Before we obtain the optimal "target and timing" strategies, we have to derive the politician´s equilibrium decisions for all of the lobby´s strategies and all possible qualities p and g of the public´s and the politician´s signals. A complete equilibrium analysis is relegated to the Appendix. Given these equilibrium decisions, the lobby´s optimal "target and timing" strategy boils down to a simple decision problem. It just picks the strategy, where the preferred decision $x = 1$ is chosen most often in expected terms.

Proposition 1 *The lobby´s optimal "target and timing" strategies are summarized in Figure 1.*

The proof can be found in the Appendix.

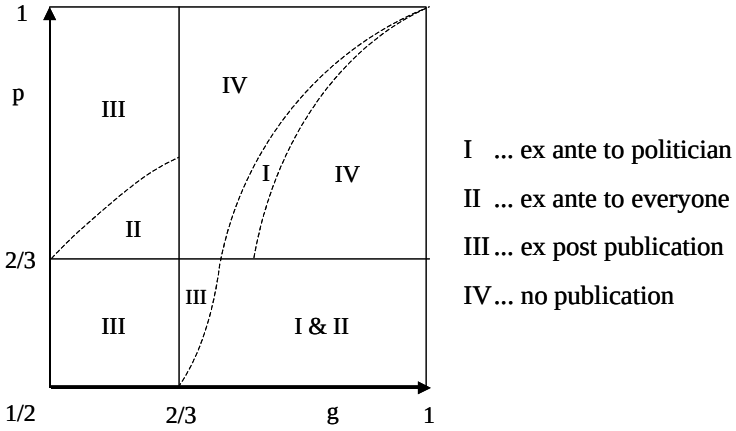

Figure 1

The horizontal and the vertical line in Figure 1 stem from $E(s|s_l = 1, s_p = 0) = \frac{1}{2}$ and $E(s|s_l = 1, s_g = 0) = \frac{1}{2}$ respectively. That is, for $i = g, p$ greater

(smaller) than $\frac{2}{3}$ the signal s_i is individually strong enough to better (worse) predict the true state of the world than the message $s_l = 1$.[10] However, for example, even if signal s_p is individually better than $s_l = 1$, then it can still be the case, that $s_l = 1$ in combination with s_g better predicts the true state of the world than s_p. The dotted curves in Figure 1 follow from this kind of considerations and are inherent in the equilibrium analysis in the Appendix.

The following part of the paper comments on the regions in Figure 1 and describes the politician´s equilibrium behavior for the optimal "target and timing" strategies.

Poorly informed public and poor quality politician ($p < 2/3, g < 2/3$) Here, ex post publication (III) is unambiguously best for the lobby. This is one of the main results in this paper. In equilibrium the politician chooses $x = 1$ regardless of s_p. Therefore the decision itself does not convey any information to the public and x does not contribute to the update. The public´s signal s_g is always less powerful than the lobby´s message s_l. Since the lobby´s message is biased, the public´s update is also biased. The politician´s signal s_p has such a poor quality, that he matches the public´s update more often by choosing $x = 1$ regardless of s_p, which confirms the equilibrium.

By their very nature, ex post comments can not change an irreversible decision. Therefore potential - out of the model - commitment problems do not arise. The lobby may announce anything, without altering the policy. For the interest group, ex post publication (III) is the best "target and timing" strategy possible. Whatever information exists in form of s_p, s_g and s_l, the politician always chooses $x = 1$. From a welfare point of view (III) is worst. The social optimum is chosen with a meager fifty percent chance.

[10] Notice that as soon as $s_l = 0$, the politician´s signal can not predict s better, since $s_l = 0$ predicts s perfectly.

Poorly informed public and high quality politician ($p > 2/3, g < 2/3$) Surprisingly ex post publication (III) is optimal even if the politician is well informed. The politician faces the *"curse of the clever"*: he can not credibly decide according to his own information if he is too well informed.[11] However, there is an equilibrium, where the politician chooses $x = 1$ regardless of s_p. In this equilibrium the decision does not convey information and the public´s update is always adjusted towards the lobby´s biased message.[12]

For the remaining (p, g) constellations (III) is not best. It can easily be shown, that a focal equilibrium exists, where $x = s_p$. In contrast to above, the politician´s own signal here is not strong enough to always change the public´s update if $s_l = 1$, but it is valuable for *predictive* purposes. Thus the decision is unbiased under (III). By sending the message to everyone (II) on the other hand, the lobby induces an equilibrium with $x = s_l$. The public understands that $x = s_l$ and since it is ignorant, the lobby´s message always determines the direction of the update. Thus the politician´s decision always matches the update with probability one and he has no incentive to deviate. It follows that the decision is biased towards the lobby´s preferred alternative under (II).[13]

Well informed public and poor quality politician ($p < 2/3, g > 2/3$) Here, most often ex ante revelation to the politician (I) and publication to everyone (II) are equally good for the lobby and better than any other "target

[11] There is no equilibrium, where the politician chooses $x = s_p$. In this region the politician´s signal is always strong enough to change the public´s update if $s_l = 1$, but it can not change the public´s update for $s_l = 0$. Thus, if the public thinks that $x = s_p$, then the politician has an incentive to deviate to $x = 0$, even if $s_p = 1$.

[12] For $s_p = 1$ the decision $x = 1$ is clearly optimal. But even if $s_p = 0$ - yielding a strong prediction towards $s = 0$ - the politician knows that $s_l = 1$ realizes with a fifty percent chance in state $s = 0$. Thus $x = 1$ is also optimal for $s_p = 0$, which confirms the equilibrium.

[13] Revealing the message exclusively to the politician (I) can not be optimal for the lobby in this regime, since in that case the politician´s update and choice is biased against the lobby.

and timing" strategy. The lobby´s message is stronger than the politician´s signal. He optimally uses all information available and thus - under both "target and timing" strategies - his decision is biased towards $x = 1$. The lobby appreciates such a bias.

However sometimes a mixed strategy equilibrium with a stronger bias towards $x = 1$ exists under ex post publication (III). Suppose there is an equilibrium where the politician chooses $x = 1$ with probability $\sigma > 0$ if he observes $s_p = 0$. Such a strategy reduces the informative content of $x = 1$. The probability σ is such that $E(s|s_l = 1, s_g = 0, x(s_p) = 1) = \frac{1}{2}$. Thus the public does not know which policy is best if it observes $(s_l = 1, s_g = 0, x = 1)$ and any "reelection chance" μ is a best response. In the Appendix it is shown that there is a μ such that the politician is just indifferent between choosing $x = 1$ and $x = 0$ for $s_p = 0$. This in turn makes the politician willing to gamble for $s_p = 0$, which confirms the equilibrium. In the respective region in Figure 1, σ is large enough to induce a stronger bias than under (I) and (II).

Well informed public and politician ($p > 2/3, g > 2/3$) In most of this region no publication (IV) is best.[14] Any biased message would make the receiver biased against the lobby: if $s_l = 0$ then the message is stronger than any signal and if $s_l = 1$ then the individual signals are stronger than s_l. A bias against the lobby tends to make decision $x = 0$ - i.e. the lobby´s least preferred alternative - more attractive for the politician. (IV), in contrast, yields $x = 1$ with a fifty percent chance and therefore is best for the lobby. From a social point of view, the informational value of the lobby´s message is lost.

The only exception is the region where ex ante revelation to the politician

[14] For some parameters other "target and timing" strategies are strategically equivalent to no publication (IV), in the sense, that the message does not alter the decision. For expositional clarity, Figure 1 depicts only (IV) in these cases.

(I) is optimal. Here too, $s_l = 0$ results in $x = 0$ regardless of s_p. However in equilibrium - derived in the Appendix - the politician chooses $x = 1$ with probability $\sigma > 0$ if he observes $(s_l = 1, s_p = 0)$. This appears weird at first glance, since s_p is stronger than s_l and in a sense the politician decides against his better knowledge. However, by doing so, he reduces the informative content of $x(s_l, s_p) = 1$. In equilibrium σ results in $E(s|s_g = 0, x(s_l, s_p) = 1) = \frac{1}{2}$. Thus the public does not know which decision is best given $s_g = 0$ and $x = 1$. It can be shown that there is a μ such that the politician is just indifferent between between the policies if he observes $(s_l = 1, s_p = 0)$, which confirms the equilibrium. For any other (s_l, s_p) the politician uses the available information efficiently. In the respective region in Figure 1 σ is large enough, in order to bias the decision towards $x = 1$, which is better for the lobby then no publication (IV).[15]

To briefly sum it up so far, the optimal "target and timing" strategy depends on the quality of the public´s and the politician´s information. In a world, where decision relevant information is privately held by special interest groups, a poorly informed politician and public are a plausible description of reality. In such a world ex post publication (III) is best for the lobby and the politician chooses in favor of the interest group regardless of his own information. In contrast, whenever ex ante (I) or ex ante to everyone (II) is optimal, the lobby´s

[15] Perhaps it is surprising, that ex ante revelation to everyone (II) may be inferior to (I). We could have the intuition that sending s_l to everyone strengthens the politician´s incentive to imitate s_l. This intuition is not always correct.

Suppose both signals s_p and s_g are relatively good and the lobby sends the message s_l to everyone (II). Now if $s_l = 0$, then everyone knows that $s = 0$ with certainty. Hence the politician chooses $x = 0$, regardless of s_p. However if $s_l = 1$, then the politician better predicts the update by choosing $x = s_l$. It follows that ex ante the politician´s choice is biased towards $x = 0$ under (II). If the lobby reveals the message exclusively to the politician ex ante (I) on the other hand, then there is a mixed strategy equilibrium with a bias towards $x = 1$.

valuable information enters but also biases the politician´s choice. Under no publication (IV) the decision is unbiased.

3.2 Non-monotonicity of the decision´s quality

Naturally the question arises, how the politician´s quality affects social welfare. Clearly, his quality p has a direct impact on the decision quality. In addition it indirectly influences the lobby´s optimal "target and timing" strategy.

Proposition 2 *The quality of the politician´s decision may be non-monotonic in the quality p of his own signal.*

For a particular "target and timing" strategy, the quality of the politician´s decision is weakly increasing in p. However an increase in p may result in a switch of the "target and timing" strategy. The lobby may switch to a strategy, where less information is available to the politician (e.g. from (I) & (II) to (IV), see Figure 1). This switch is attractive, because under (I) & (II) the politician´s better signal would turn the bias against the lobby: he only chooses $x = 1$ if $s_p = 1$ (regardless of s_l) but he chooses $x = 0$ if $s_p = 0$ or $s_l = 0$. Under no publication (IV) instead, the decision is unbiased. Alternatively, the lobby may switch to a strategy, where the equilibrium behavior ignores s_p after the switch and does not ignore s_p before the switch (e.g. from (II) to (III)). In both cases the decision quality decreases with a minor increase in p.

Figure 1 also illustrates nicely, that the welfare maximizing quality p of the politician crucially depends on the quality g of the public´s information. For example, if the public is poorly informed then an intermediate p is socially best. For other p the lobby chooses ex post publication (III), yielding an equilibrium, where $x = 1$ regardless of s_p. On the other hand, an intermediate p is in general not welfare maximizing if the public is well informed.

Proposition 3 *The decision quality may be non-monotonic in the quality g of the public´s signal.*

Consider an increase in g leading to a move from the region where (II) is optimal in Figure 1 to where (IV) is optimal. The switch from (II) to (IV) is attractive, because now the increased public´s informativeness would make its *update* biased against the lobby. The reasoning is similar to above. But if the update is biased against the lobby then the politician´s incentive to decide against the interest group also grows stronger. In equilibrium $x = s_l$ under (II) and thus the expected number of correct decisions is 3/4. Under (IV) however $x = s_p$ and the expected number of correct decisions is p. For $p \in (\frac{2}{3}, \frac{3}{4})$ the decision quality decreases with an increase in g.

Suppose we have a politician of a given quality and independent experts who may raise the public´s informativeness ex post to some extent. Then sometimes those experts should try to avoid cameras. Otherwise an increase in the public´s quality may lead to a switch of the optimal "target and timing" strategy, where the overall decision quality decreases (e.g. from (II) to (IV)).

4 Discussion

Ex post publication is often viewed as weak attempt to influence follow-up decisions in the future. This paper argues that ex ante and / or ex post revelation has crucial strategic effects on present decisions. If the politician anticipates that a special interest lobby publishes a biased but informative message tomorrow, then he may be tempted to choose in favor of the lobby regardless of his own information. This paper highlights the dangers of different target and timing strategies given that the decision maker cares for opinion polls. In addition, it offers insights on the optimal quality of the decision maker in response to

these dangers. For example, an intermediate quality policy maker is welfare maximizing for a poorly informed public.

This paper considers a particular bias technology: Whenever the state of the world corresponds to the lobby´s preferred policy, then the message always says so. Otherwise there is a fifty percent chance that the message is in favor of the lobby. One can easily conceive bias technologies with different probabilities. There are several effects. Increasing the bias is not costless. The more the lobby´s message is biased, the more valuable becomes the politician´s own information for predictive purposes. Increasing the precision of the lobby´s message on the other hand, makes it more valuable for the receiver, such that it may change the receiver´s update / prediction sometimes. But more precise messages may also make the decision less biased in favor of the lobby. The strength of these effects is relative to the quality of the public´s and the politician´s information. By allowing a wide range of (p, g) - constellations, this paper captures the trade-off to a great extent in a parsimonious model.

We often observe more than one special interest party. The analysis could be extended along these lines by assuming opposing lobbies who engage in informative lobbying in a common agency framework. A setting with equally powerful groups is a rather complex animal and beyond the scope of this paper.[16] The results should not be changed substantially if there is one ill informed party, say some small group of citizens, competing against a superbly informed group, say a large chemical company. The biased messages sent by the ill informed group would be almost uninformative and hence lack the power to change the recipients' assessments. Such a world is well approximated by the one lobby case considered in this paper.

[16] See Heidhues and Lagerlöf (2003) for a paper with competing interest groups engaging in informative lobbying, but with a different focus.

An application of the arguments - among many others - concerns strategic interaction between governments and oppositions. Suppose the opposition holds some relevant private information and has different aims than the government. It may decide to publish biased information before or after a policy has been chosen. An opposition is called *cooperative* if it provides the biased message before the decision. A *competitive* opposition reveals the information afterwards. The argument put forth above thus provides a rationale when either type of opposition occurs.

5 Appendix

In order to derive the lobby´s optimal strategy, we have to check the equilibrium behavior for the lobby´s strategies in the four regions defined by the vertical and the horizontal line in Figure 1. Let $EM(x,.)$ denote the expected number of matches conditional on decision x and all information available to the politician.

Poorly informed public and poor quality politician, i.e.

$E(s|s_l = 1, s_g = 0) > \frac{1}{2}$ (i.e. $g < \frac{2}{3}$) and $E(s|s_l = 1, s_p = 0) > \frac{1}{2}$ (i.e. $p < \frac{2}{3}$)

- Suppose $E(s|s_l = 1, s_g = 0, s_p = 0) < \frac{1}{2}$ (i.e. $p > \frac{g-1}{(\frac{1}{2}g-1)}$).

** Ex post publication (III):

Suppose the public thinks that the politician decides $x = 1$ regardless of s_p. The expected number of matches with the politician´s update when following this strategy is $EM(x = 1, s_p = 0) = P(s_l = 1|s_p = 0) = 1 - \frac{1}{2}p$, which is always greater than the expected number of matches from a deviation $EM(x = 0, s_p = 0) = P(s_l = 0|s_p = 0) = \frac{1}{2}p$ ($x = 0$ does not enter the update, since it only occurs off the equilibrium path). Thus there is an equilibrium, where $x = 1$ regardless of s_p.[17] It can be shown that there is no equilibrium where the

[17] It can be shown that there is no mixed strategy equilibrium, where $prob(x = 1|s_p = 0) = \sigma > 0$, since there is no μ, such that the expected numbers of matches are equal.

politician decides truthfully. Since the unique equilibrium always yields $x = 1$, (III) is optimal.

- Suppose $E(s|s_l = 1, s_g = 0, s_p = 0) > \frac{1}{2}$ (i.e. $p < \frac{g-1}{(\frac{1}{2}g-1)}$).

** Ex post publication (III) is best by an analogous argument.

Well informed public and poor quality politician, i.e.

$E(s|s_l = 1, s_g = 0) < \frac{1}{2}$ (i.e. $g > \frac{2}{3}$) and $E(s|s_l = 1, s_p = 0) > \frac{1}{2}$ (i.e. $p < \frac{2}{3}$)

** Ex ante to the politician (I):

Suppose the public thinks that $x = s_l$, which implies that the politician makes the best use of all information available. Thus $E(s|s_g, x(s_l, s_g)) = E(s|s_g, s_l)$. If $s_l = 0$, then it will always change the public´s prior, hence $x = 0$ is optimal for the politician regardless of s_p. If $s_l = 1$, then the update goes in the direction of s_g. The politician wants to predict s_g as good as possible if $s_l = 1$. But since $E(s|s_l = 1, s_p = 0) > \frac{1}{2}$, the politician chooses $x = s_l = 1$ regardless of s_p. Thus there is an equilibrium with $x = s_l$ regardless of s_p.[18]

** Ex ante to everyone (II):

By a similar argument $x = s_l$ regardless of s_p is the unique equilibrium. Therefore (I) and (II) are equivalent for the lobby.

** Ex post publication (III):

- Suppose $E(s|s_l = 1, s_g = 0, s_p = 1) > \frac{1}{2}$, i.e. $p > \frac{-g}{g-2}$.

Since p is too low, it can be shown that there is no equilibrium where $x = s_p$. Suppose the public thinks $x = 0$ regardless of s_p. The critical type is $s_p = 1$. The expected number of matches from this strategy is $EM(x = 0, s_p = 1) = P(s_l = 0|s_p = 1) + P(s_l = 1, s_g = 0|s_p = 1) = \frac{1}{2}g + \frac{1}{2}p - \frac{3}{2}gp + \frac{1}{2}$, whereas for a deviation $EM(x = 1, s_p = 1) = P(s_l = 1, s_g = 1|s_p = 1) = \frac{3}{2}gp - \frac{1}{2}p - \frac{1}{2}g + \frac{1}{2}$. A deviation is not profitable for $p < \frac{-g}{1-3g}$. Thus there is an equilibrium, where $x = 0$ regardless of s_p for $\frac{-g}{g-2} < p < \frac{-g}{1-3g}$, which is worse than (IV).

[18] Analogous: there is no equilibrium, where $x = s_p \neq s_l$.

There is a mixed strategy equilibrium. Suppose there is an equilibrium with $prob(x = 1|s_p = 0) = \sigma > 0$, where σ is such that $E(s|s_l = 1, s_g = 0, x = 1) = \frac{1}{2}$. In this equilibrium the politician has to be indifferent to choose either x if he observes $s_p = 0$. Thus there has to be a μ such that the expected number of matches given $s_p = 0$ is equal for either x:

$EM(x = 0, s_p = 0) = P(s_l = 0|s_p = 0) + P(s_l = 1, s_g = 0|s_p = 0)$

$= \frac{3}{2}gp - \frac{1}{2}p - g + 1$

$\stackrel{!}{=} EM(x = 1, s_p = 0) = P(s_l = 1, s_g = 1|s_p = 0) + \mu P(s_l = 1, s_g = 0|s_p = 0)$

$= g + \frac{1}{2}p - \frac{3}{2}gp + \mu - g\mu - p\mu + \frac{3}{2}gp\mu.$

The $\mu = \frac{2g+p-3gp-1}{g+p-\frac{3}{2}gp-1}$ satisfies this equality.

The equilibrium probability σ follows from $E(s|s_l = 1, s_g = 0, x = 1) = \frac{2p+2\sigma-2gp-2g\sigma-2p\sigma+2gp\sigma}{g+2p+2\sigma-3gp-2g\sigma-2p\sigma+3gp\sigma} \stackrel{!}{=} \frac{1}{2}$, i.e. $\sigma = \frac{g-2p+gp}{-2g-2p+gp+2}$.

(III) is worse for the lobby than (I), if $x = 1$ is chosen with probability less than $\frac{3}{4}$. This corresponds to a $\sigma < \frac{1}{2}$, i.e. $p < \frac{2-4g}{g-2}$. Otherwise (III) is better than (I) or (II).

For $\frac{-g}{g-2} < p < \frac{-g}{1-3g}$ two equilibria exist. By the equilibrium selection criterion the politician and the public coordinate on the mixed strategy equilibrium, since here the expected number of matches is larger.

Thus for $p < \frac{2-4g}{g-2}$ (III) is worse than (I) and (II). For $p > \frac{2-4g}{g-2}$ (III) is better than (I) and (II). The latter case corresponds to the region where (III) is optimal in Figure 1.

- Suppose $E(s|s_l = 1, s_g = 0, s_p = 1) < \frac{1}{2}$, i.e. $p < \frac{-g}{g-2}$.

Since the public´s update is biased towards $x = 0$ and the politician can never change the update with his decision, it can be shown that x is either unbiased in equilibrium or biased towards $x = 0$. Both kinds of equilibria are worse for the lobby than the equilibria under (I) and (II).

Well informed public and politician, i.e.

$E(s|s_l = 1, s_g = 0) < \frac{1}{2}$ (i.e. $g > \frac{2}{3}$) $\wedge$ $E(s|s_l = 1, s_p = 0) < \frac{1}{2}$ (i.e. $p > \frac{2}{3}$).

** Ex post publication (III):

- Suppose $E(s|s_l = 1, s_g = 1, s_p = 0) < \frac{1}{2}$, i.e. $p > \frac{2g}{g+1}$. There is no pure strategy equilibrium. There is a mixed strategy equilibrium, with $prob(x = 0|s_p = 1) = \sigma > 0$ and $prob(x = 0|s_p = 0) = 1$. The equilibrium probability $\sigma = \frac{-2g+p+gp}{g+p+gp-1}$ follows from $E(s|s_l = 1, s_g = 1, x = 0) = \frac{2g-2gp+2gp\sigma}{2g+p+\sigma-3gp-g\sigma-p\sigma+3gp\sigma} = \frac{1}{2}$.[19] Since $prob(x = 0|s_p = 1) = \sigma > 0$, it follows that the decision is biased towards $x = 0$. Thus (III) is worse than (IV).

- Suppose $E(s|s_l = 1, s_g = 0, s_p = 1) > \frac{1}{2}$ (i.e. $p > \frac{-g}{g-2}$) and

$E(s|s_l = 1, s_g = 1, s_p = 0) > \frac{1}{2}$ (i.e. $p < \frac{2g}{g+1}$).

Suppose there is an equilibrium where $x = s_p$. The expected number of matches for $s_p = 0$:

$EM(x = 0, s_p = 0) = P(s_l = 0|s_p = 0) + P(s_l = 1, s_g = 0|s_p = 0)$

$= \frac{3}{2}gp - \frac{1}{2}p - g + 1 > EM(x = 1, s_p = 0) = P(s_l = 1|s_p = 0) = 1 - \frac{1}{2}p.$

Thus a deviation is not profitable. Similarly for $s_p = 1$:

$EM(x = 1, s_p = 1) = P(s_l = 1|s_p = 1) = (pq - r - p + pr + 1) = \frac{1}{2}p + \frac{1}{2}$

$> EM(x = 0, s_p = 1) = P(s_l = 0|s_p = 1) + P(s_l = 1, s_g = 0|s_p = 1).$

Again a deviation is not profitable, which confirms the equilibrium. This equilibrium is played by the selection criterion. Therefore (III) is as good as (IV) for $\frac{-g}{g-2} < p < \frac{2g}{g+1}$.

- Suppose $E(s|s_l = 1, s_g = 0, s_p = 1) < \frac{1}{2}$, i.e. $p < \frac{-g}{g-2}$.

Suppose there is an equilibrium where $x = s_p$. The expected number of matches for $s_p = 1$:

$EM(x = 1, s_p = 1) = P(s_l = 1, s_g = 1|s_p = 1) = \frac{3}{2}gp - \frac{1}{2}p - \frac{1}{2}g + \frac{1}{2}$

$> EM(x = 0, s_p = 1) = P(s_l = 0|s_p = 1) + P(s_l = 1, s_g = 0|s_p = 1)$

$= \frac{1}{2}g + \frac{1}{2}p - \frac{3}{2}gp + \frac{1}{2}.$

[19] Analogous to above, there is a $0 < \mu < 1$ supporting this equilibrium.

Thus a deviation is not profitable. Similarly for $s_p = 0$:

$EM(x = 0, s_p = 0) = P(s_l = 0|s_p = 0) + P(s_l = 1, s_g = 0|s_p = 0)$

$= \frac{3}{2}gp - \frac{1}{2}p - g + 1$

$> EM(x = 1, s_p = 0) = P(s_l = 1, s_g = 1|s_p = 0) = g + \frac{1}{2}p - \frac{3}{2}gp$

Again a deviation is not profitable, which confirms the equilibrium. This equilibrium is played by the selection criterion. Therefore (III) is as good as (IV) for $p < \frac{-g}{g-2}$.

** ex ante (I)

For $p > \frac{3g-1}{g+1}$, it can easily be shown that there is a pure strategy equilibrium, where the politician uses all the information available efficiently. This equilibrium is played by the selection criterion, since it yields the highest number of matches. The efficient use of the available information implies a bias towards $x = 0$. Thus the lobby prefers (IV) to (I).

- Suppose $E(s|s_g = 1, x(s_l, s_p) = 0) > \frac{1}{2}$ and $E(s|s_g = 0, x(s_l, s_p) = 1) > \frac{1}{2}$, i.e. $\frac{-g}{g-2} < p < \frac{3g-1}{g+1}$.

There is a mixed strategy equilibrium with $prob(x = 1|s_l = 1, s_p = 0) = \sigma > 0$ and $prob(x = 1|s_l = 0) = 0$ and $prob(x = 1|s_l = 1, s_p = 1) = 1$. The equilibrium probability $\sigma = \frac{g-2p+gp}{-2g-2p+gp+2}$ follows from $E(s|s_g = 0, x(\sigma) = 1) = \frac{2p+2\sigma-2gp-2g\sigma-2p\sigma+2gp\sigma}{g+2p+2\sigma-3gp-2g\sigma-2p\sigma+3gp\sigma} \stackrel{!}{=} \frac{1}{2}$. For $\mu = \frac{6gp-3p-4g+2}{3gp-2p-2g+2}$, the politician is indifferent between choosing either decision if he observes $(s_l = 1, s_p = 0)$.

The policy is biased towards $x = 1$, if $prob(x = 1)$ under this equilibrium strategy is greater than 1/2 ex ante, i.e. $prob(x = 1) = P(s_l = 1, s_p = 1) + \sigma P(s_l = 1, s_p = 0) > \frac{1}{2}$, which is true for $p > -\frac{1-2g}{g}$. Therefore the lobby prefers (I) to (II) for $\frac{3g-1}{g+1} > p > -\frac{1-2g}{g}$. For $\frac{-g}{g-2} < p < -\frac{1-2g}{g}$ the lobby prefers (IV) to (I).[20]

[20] There is no mixed strategy equilibrium with $prob(x = 1|s_l = 1, s_p = 0) = 0$ and $prob(x = 1|s_l = 0) = 0$ and $prob(x = 0|s_l = 1, s_p = 1) = \sigma > 0$, since within this parameter region no

- Suppose $E(s|s_l = 1, s_g = 0, s_p = 1) < \frac{1}{2}$ (i.e. $p < \frac{-g}{g-2}$).

Similar to above, a pure strategy equilibrium exists, where the politician uses all available information efficiently, since it yields good predictions. This implies a bias towards $x = 0$ and thus the lobby prefers (IV) to (I) in this region.

** Ex ante to everyone (II):

There is a pure strategy equilibrium, where the politician uses all information efficiently (if $s_l = 0$ then $x = 0$ and if $s_l = 1$ then $x = \begin{cases} 0 \text{ if } s_p = 0 \\ 1 \text{ if } s_p = 1 \end{cases}$). Thus the decision is biased towards $x = 0$ and (IV) is better for the lobby than (II).

Poorly informed public and high quality politician, i.e.

$E(s|s_l = 1, s_g = 0) > \frac{1}{2}$ (i.e. $g < \frac{2}{3}$) and $E(s|s_l = 1, s_p = 0) < \frac{1}{2}$ (i.e. $p > \frac{2}{3}$)

** Ex ante (I):

- Suppose $E(s|s_g = 1, s_l = 1, s_p = 0) < \frac{1}{2}$. Suppose the politician decides optimal given info available, then he can always change the public´s update and hence there is a pure strategy equilibrium with $x = 0$ if $\{s_l = 0\}$ or $\{s_l = 1, s_p = 0\}$ and $x = 1$ if $\{s_l = 1, s_p = 1\}$. In this equilibrium (I) worse than (IV).

- Suppose $E(s|s_g = 1, s_l = 1, s_p = 0) > \frac{1}{2}$. It can easily be shown that there is an equilibrium where the politician uses all information efficiently (like in the previous regime). It follows that (I) is worse for the lobby than (IV).

** Ex ante to everyone (II):

- Suppose $E(s|s_g = 1, s_l = 1, s_p = 0) < \frac{1}{2}$. Suppose the politician uses all information available efficiently, then he can always change the public´s update and hence there is a pure strategy equilibrium with $x = 0$ if $\{s_l = 0\}$ or $\{s_l = 1, s_p = 0\}$ and $x = 1$ if $\{s_l = 1, s_p = 1\}$. Thus there is bias towards $x = 0$ and (II) is worse for the lobby than (IV).

- Suppose $E(s|s_g = 1, s_l = 1, s_p = 0) > \frac{1}{2}$, i.e. $\frac{2g}{g+1} > p$. Now in a potential

$0 < \mu < 1$ exists such that the politician is indifferent between either policy if he observes $(s_l = 1, s_p = 1)$.

equilibrium, where the politician uses all information efficiently, he can not always change the public´s update, namely if $s_g = 1, s_l = 1, s_p = 0$. But there is an equilibrium, where his decision always matches the update. In this equilibrium $x = s_l$, regardless of s_p. Thus x does not convey information about s_p, but s_l is strong enough to always change the public´s prior, which confirms the equilibrium. In this equilibrium the decision is biased towards $x = 1$ and therefore (II) is better than (IV).

** Ex post publication (III):

- Suppose $E(s|s_g = 1, s_l = 1, s_p = 0) < \frac{1}{2}$, i.e. $\frac{2g}{g+1} < p$. There is no equilibrium with $x = s_p$, since type $s_p = 1$ would have an incentive to deviate to $x = 0$. However there is an equilibrium with $x = 1$ regardless of s_p. The critical type is $s_p = 0$ and this type´s expected number of matches from playing $x = 1$ is greater than from playing $x = 0$, since

$EM(x = 1, s_p = 0) = P(s_l = 1|s_p = 0) = (p + q - pq - pr) = 1 - \frac{1}{2}p$

$> EM(x = 0, s_p = 0) = P(s_l = 0|s_p = 0) = (pq - q - p + pr + 1) = \frac{1}{2}p$

A deviation is not profitable. The lobby prefers (III) to any other strategy.[21]

- Suppose $E(s|s_g = 1, s_l = 1, s_p = 0) > \frac{1}{2}$, i.e. $\frac{2g}{g+1} > p$.

In this region there is an equilibrium, where the politician chooses $x = s_p$. If the politician´s signal is $s_p = 1$, then the expected number of matches from $x = s_p$ is greater than from a deviation, since:

$EM(x = s_p = 1) = P(s_l = 1|s_p = 1) = pq - r - p + pr + 1 = \frac{1}{2}p + \frac{1}{2}$

$> EM(x = 0 \neq s_p) = P(s_l = 0|s_p = 1) + P(s_l = 1, s_g = 0|s_p = 1)$

$= \frac{1}{2}g + \frac{1}{2}p - \frac{3}{2}gp + \frac{1}{2}$

Thus no deviation is profitable for $s_p = 1$. Similarly for $s_p = 0$, the expected

[21] There is no mixed strategy equilibrium, with $prob(x = 0|s_p = 1) = \sigma > 0$ and $prob(x = 0|s_p = 0) = 1$, because there is no $0 < \mu < 1$, such that the politician is indifferent between either decision if he observes $s_p = 1$. Perhaps there is a mixed strategy equilibrium with a bias towards $x = 1$, but this would not change the optimality of ex post publication.

number of matches from $x = s_p$ is greater than from a deviation, since:

$EM(x = s_p = 0) = P(s_l = 0|s_p = 0) + P(s_l = 1, s_g = 0|s_p = 0)$

$= \frac{3}{2}gp - \frac{1}{2}p - g + 1 > EM(x = \widehat{s}_p = 1 \neq s_p) = P(s_l = 1|s_p = 0) = 1 - \frac{1}{2}p$

Again no deviation is profitable for $s_p = 0$. Similarly there is also an equilibrium, where the politician chooses $x = 1$ regardless of s_p, however the expected number of matches is larger in the sincere equilibrium. Thus the latter is focal. Thus (III) is as good for the lobby as (IV), but both are worse than (II).

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