Indirect Lobbying and Media Bias

Sobbrio, Francesco

IMT Institute For Advanced Studies, Lucca

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Francesco Sobbrio†

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Abstract

In this paper, we study a model where voters have state-contingent preferences over policies and lobbies engage in influence activities to affect the information that a media outlet collects on the state of the world. The media outlet acts as a "filter" between lobbies and voters. It has to decide what to communicate to voters given the information it collects and its idiosyncratic bias. We show that, by targeting voters, lobbies are able to *indirectly* influence the political outcome and thus create a distortion in the political process. When the media outlet has a small idiosyncratic bias the (unique) equilibrium is characterized by a large level of lobbies' influence activities and no "news-slanting" by the media outlet. When the media outlet's idiosyncratic bias is large, the (unique) equilibrium involves a low level of lobbies' influence activities and a high probability of "news-slanting" by the media outlet. Moreover, we show that a higher idiosyncratic bias of the media outlet may be associated with a lower policy distortion and a higher voters' welfare. On the other hand, public policy measures aimed at increasing the cost of lobbies' influence activities would decrease the distortion in the policy outcome and increase voters' welfare. Finally, asymmetries in lobbies' influence activities lead to different probabilities of "news-slanting" by different media outlet's types.

JEL Classification: D72, D82, D83

Key Words: Indirect Lobbying, Media Bias, Influence Activities, Cheap-Talk

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†Department of Economics, IMT Lucca Institute for Advanced Studies, Piazza San Ponziano 6, 55100, Lucca, Italy. Email: f.sobbrio@imtlucca.it

1 Introduction

> *"One of the most potent and cunning lobbying tactics of the past decade, grassroots campaigning, will also probably escape oversight. This secretive hybrid of telemarketing, data mining and spin doctoring is used to generate public support for otherwise unpopular corporations caught in a legislative battle"*
>
> - "A tap on the wrist", *The Economist*, May 18th 2006

What are the effects of lobbies' influence activities on the political outcome? The economic literature has long being interested in this question. In a seminal paper, Becker (1985) introduced the concept of "influence function" suggesting that by exerting some kind of political pressure interest groups are able to affect the tax or subsidy that they pay/receive. In the twenty years that have followed, many scholars have analyzed this issue by focusing on the relationships between lobbies and politicians. This extensive literature has shown that special interest groups may *directly* influence the policy outcome by targeting politicians.[1] Indeed, lobbies allocate large amount of resources in trying to influence politicians.[2] Nevertheless, such direct channel of policy influence is not always effective or feasible for lobbies. First of all, in the case of direct democracy (i.e., referenda, ballots, propositions, etc.), politicians are simply not the "policy-makers". Moreover, there are issues where the political cost that any politician would incur by endorsing a lobby and deviating from the median voter's preferred policy would be extremely high. Examples of such "non-pliable" issues are abortion, death penalty, gun control and gay marriage.[3] Therefore, whenever lobbies cannot *directly* affect the policy outcome by influencing politicians, they have to try to do so *indirectly* by targeting voters. In the US, "527 groups" constitute a clear example of special interest groups whose activities are explicitly focused on voters.[4] Thus, the question that remains to be addressed is whether and how lobbies can create a policy distortion when they cannot directly influence politicians. Moreover, given that media represent the main communication channel between lobbies and voters, another question arises. How are lobbies' influence activities and media bias related? Finally, what is the overall effect of lobbies and media on the efficiency of the political outcome and on voters' welfare?

In this paper we provide a theoretical framework to investigate these questions by considering an environment where lobbies do not have any direct relationship with politicians

[1] See among the others Austen-Smith (1993), Baron (1994), Grossman and Helpman (1994, 1996, 2001), Lohmann (1998), Coate (2003, 2004), Prat (2002a, 2002b), Felli and Merlo (2006).

[2] In the 2004 presidential elections, George W. Bush and John Kerry received around 274 and 227 million dollars, respectively, from individuals and Political Action Committees' contributions. Source: http://www.opensecrets.org/presidential/index_2004.asp

[3] Matsusaka (2007) finds that the *congruence* (i.e., the correlation) between policy and public opinion in US states is 88% for gay marriage and higher than 70% for public funding of abortion and death penalty.

[4] A 527 group is "a tax-exempt group organized under section 527 of the Internal Revenue Code to raise money for political activities including voter mobilization efforts, issue advocacy and the like.[...] Many 527s run by special interest groups raise unlimited "soft money," which they use for voter mobilization and certain types of issue advocacy, but not for efforts that expressly advocate the election or defeat of a federal candidate or amount to electioneering communications" (http://www.opensecrets.org/527s/types.asp)

and voters acquire information through media. We analyze a multistage game where two parties compete on a single issue and voters' preferences are a combination of a private value component (their idiosyncratic preferences) and a state-dependent public value component (the expected benefits and costs that alternative policies deliver in different states of the world). In the first stage of the game, two opposing lobbies compete to influence the information that a media outlet collects on the state of the world. The media outlet represents a filter between lobbies and the "public" (i.e., voters and parties): it has to decide what to communicate to people given the information it collects and its own idiosyncratic bias. That is, the media outlet's report is the result of three different components: the true state of the world, lobbies' influence activities and the media outlet's idiosyncratic bias. After having observed the report of the media outlet, voters update their beliefs on the state of the world. Then, in the final stage, parties choose their platforms to maximize the number of votes. Hence, lobbies try to *indirectly* affect the policy outcome by influencing voters' beliefs on the state of the world (i.e., on the costs and benefits of alternative policies).

More specifically lobbies try to influence the information on the state of the world that the media outlet collects by searching for favorable evidence. Since every policy involves at the same time costs and benefits (e.g., implementing an environmental treaty typically involves economic costs and benefits for the environment), opposing lobbies are able to find pieces of hard information going in opposite directions in every state of the world. However, since in a given state of the world one policy is more efficient than another (i.e., it has a better benefit/cost ratio than the other), there are relatively more possible pieces of hard evidence in favor of that policy. Therefore, *ceteris paribus*, it is more likely that the overall evidence will be in favor of the most efficient policy. The evidence produced by such interest group decreases the noise in the information that the media outlet collects (i.e., relatively more evidence in support of the most efficient policy). *Viceversa,* the other interest group produces evidence that increases the noise in the information that the media outlet collects (i.e., relatively less evidence in favor of the most efficient policy). Therefore, theoretically, two different cases can arise:

i) The first one is the case where, overall, an equal increase in the influence activities of both lobbies increases the noise in the information that the media outlet collects (*noise-increasing* lobbies).

ii) The second one is the case where, overall, an equal increase in the influence activities of both lobbies decreases the noise in the information that the media outlet collects (*accuracy-increasing* lobbies).

We analyze the *noise-increasing* case in section 4. We show there that by providing a micro-foundation for this indirect lobbying process, our model offers new insights on the effects of lobbies' influence activities and media bias on the political process. First, we point out that by targeting voters special interest groups are indeed able to indirectly affect the policy outcome and thus create an *ex-ante* policy distortion. That is, even if the policy

that office-motivated candidates choose and implement is the one preferred by a majority of voters, this policy is not the one that the median voter would have chosen if lobbies were not to engage in influence activities. Therefore, our analysis suggests that restricting the attention only to the relationships between politicians and lobbies may lead to a limited understanding of the actual impact of special interest groups on the policy outcome. Indeed, while there seems to be a general consensus on the idea of limiting the extent to which special interest groups can lobby politicians, there are yet no boundaries on how much lobbyists can try to influence voters.[5] Second, there are two intrinsically related sources of "slant" in the information that voters receive. Lobbies' influence activities introduce a "source driven" slant in the information that the media outlet collects (*lobbies-induced* slant). At the same time there is a "supply driven" slant resulting from the idiosyncratic bias of the media outlet (*media-induced* slant). When the media outlet has a small idiosyncratic bias, there will be a unique equilibrium characterized by a large level of lobbies' influence activities (high *lobbies-induced* slant) and no "news-slanting" by the media outlet (no *media-induced* slant). When the media outlet's idiosyncratic bias is large, the unique equilibrium involves a low *lobbies-induced* slant and a high *media-induced* slant (in a probabilistic sense). As a consequence, differences in the level of lobbies' activities and in the bias of the media outlet lead to differences in voters' beliefs and thus to different policy outcomes. Hence, our analysis provides a possible economic rationale to explain differences in the median voter positions across countries in presence of the same idiosyncratic preferences of voters. Moreover we show that by discouraging lobbies to engage in influence activities, a higher media outlet's bias may lead to a lower policy distortion and a higher voters' welfare. We also show that the more voters care about receiving accurate information, the more noisy will be the information they actually receive.

We then provide a microfoundation of this *noise-increasing* case in section 5 where the competition between lobbies is modeled as a "race for evidence" which generates a State Contingent Contest-Success Function (SCCSF). That is, we derive the *noise-increasing* property of lobbies' efforts starting from the primitive assumption that lobbies have different instantaneous probabilities of being successful in influencing the information that the media outlet collects on the state of the world.[6]

For theoretical completeness, in section 6 we also analyze the *accuracy-increasing* case. We show that even in this case lobbies have (almost always) higher incentives to engage in influence activities in presence of a media outlet with a small bias. Moreover, we show that in this case the *media-induced* slant and the *lobbies-induced* accuracy are positively related and thus multiple types of equilibria may arise for intermediate values of the media outlet's bias.

[5] In the US, for example, the 2002 McCain-Feingold campaign finance law prohibited parties from accepting soft money but it left unregulated 527 groups' activities.

[6] See also Sobbrio (2009) for a simple model of hard information showing how the presence of lobbies hiding unfavorable information leads to such *noise-increasing* property.

In section 7 we present and discuss various extensions of the benchmark model. We show that the main results and intuitions of the model are robust to *i)* Known direction of media outlet's bias, *ii)* No uncertainty on the bias of the media outlet; *iii)* Multiple media outlets. More specifically, we show that asymmetries in media bias *do not* generate asymmetric incentives for lobbies to engage in influence activities. Moreover, we also point out that a (not too much) biased media outlet may affect the policy outcome even in presence of rational, bayesian voters who know its bias. We also consider the case where the media outlet is unbiased and we highlight how the case where lobbies communicate *directly* with voters is indeed nested in our model.

On the other hand, we also show that asymmetries in lobbies' influence activities *do* generate asymmetric incentives for different media outlet's types to slant their reports. That is, asymmetries between lobbies lead to different probabilities of "news-slanting" by different media outlet's types. More specifically, when only the leftist (rightist) lobby is present, for a given *ex-ante* bias, a rightist (leftist) media outlet will have higher incentives to slant its reports than a leftist (rightist) one. This suggests that, in presence of asymmetries between lobbies, a correct measure of the bias of a media outlet should take into account the equilibrium difference between the *ex-post* slant in a media outlet's reports and the *ex-ante* bias of the media outlet itself.

1.1 Empirical Evidence

There is a considerable amount of evidence showing that special interest groups do not limit their activities to politicians but they also care about influencing voters. In the US, lobbies use three main types of instruments to influence voters: advocacy groups, issue advertising and think tanks.[7]

According to the Center for Responsive Politics, in the 2004 election cycle advocacy groups (527 groups) spent more than 600 million dollars in trying to influence how voters look at the issues they are interested in. In particular, ideological and single issue advocacy groups spent between 400 and 500 million dollars.[8]

"Issue advertisements" are ads run by political action committees (PACs), advocacy groups and other kinds of lobbies (e.g., private firms), about public policy issues (i.e., not products or candidates). Falk et al. (2006) estimate that more than 400 million dollars were spent on print and television issue advertisements just inside the Washington DC metropolitan area, between 2003 and 2004.[9]

Think tanks are non-profit research organizations which analyze public policy issues and

[7] In other countries (e.g., western Europe) the lobbying sectors are typically "informal" (i.e., not institutionalized). Thus, while there is anecdotal evidence on lobbies' influence over voters in many countries, it is difficult to know the exact amount of money spent in indirect lobbying outside the US.

[8] Source: http://www.opensecrets.org/527s/527cmtes.asp?level=E&cycle=2004

[9] More specifically, their estimates report that 79% of the total spending in issue ads was done by corporations. Notice that, issue advertisements are not regulated under federal campaign finance laws. Thus, it is not possible to exactly quantify the amount of resources spent on this type of political expenditure.

advocate solutions.[10] The number and the importance of think tanks have been growing over time. Rich (2004) estimates that in 1996 there were 306 think tanks operating in the US.[11] While some think tanks are non-partisan, some others engage in ideologically oriented research. As depicted by a 2002 Note of the *Harvard Law Review*, "think tanks often provide a platform for particular viewpoints by packaging and popularizing policy proposals".[12] Out of the 306 think tanks listed by Rich (2004), 165 were identified as being ideologically oriented (i.e., either conservative or liberal).[13]

While in the case of "issue advertising" the communication between lobbies and voters is "unfiltered", in other instances lobbies' influence activities are channeled through the media.[14] A clear example of such "filtered" communication is media reports over think tanks' research. While an unbiased media outlet would report the research of different think tanks in a balanced way, a biased media outlet may slant its reports by *selectively omitting* relevant information (i.e., emphasize the results of a think tank's research and hide the ones of another). Indeed, there is an emerging empirical evidence showing the presence of this kind of bias in the media. Groseclose and Milyo (2005) propose a measure of media bias by comparing the number of times a media outlet cite a think tank with the number of times members of the congress cite the same think thank. They find that, with few exceptions, most of US news media outlets are more leftist than the average member of the congress.[15] At the same time, the recent empirical literature on media have shown that media bias matters. That is, media do influence voters behavior (Della Vigna and Kaplan 2006, Gerber et al. 2006). Della Vigna and Kaplan (2006) study the effect of the entry of "Fox News" in the cable market and they find that between 3 to 8 percent of its viewers were indeed convinced to vote Republican. Gerber et al. (2006) conduct a natural field experiment to measure the effect of exposure to the Washington Times and Washington Post in the month before the 2005 Virginia Gubernatorial election. They find that individuals assigned to the Washington Post treatment group were eight percent more likely to vote for the democratic candidate than those belonging to the control group.[16] This emerging empirical literature is,

[10] Think tanks are tax exempt organizations (regulated under section 501(c)(3) of the IRS code). The main advantage of such exemption is to allow think tanks to receive unlimited contributions from private foundations. Moreover, contributions to think tanks are tax deductible. For a comprehensive description and discussion of think tanks' legal status and activities see "The Political Activity of Think Tanks: The Case for Mandatory Contributor Disclosure", *Harvard Law Review*, March 2002, 115(5): 1502-1524.

[11] Rich also shows that the 80% of the think tanks in existence in 1996 were formed after 1970 and their number has been steadily growing over time. Other studies use different classification of think tanks and report an even higher number of think tanks (e.g., Hellebust (1996) lists 1,212 think tanks operating in 1996).

[12] Source: "The Political Activity of Think Tanks: The Case for Mandatory Contributor Disclosure", *Harvard Law Review*, 2002, page 15203.

[13] See Pepper (2005) for a discussion of ideologically-oriented research on gun control.

[14] The case of "unfiltered" communication is formally analyzed in section 7.4.

[15] For additional evidence on the presence of bias in the media see Gentzkow and Shapiro (2007). See also Anderson and McLaren (2007) for anecdotal evidence and a discussion on the political motivations of media corporations and how media can bias their reports by *selectively omitting* information.

[16] For additional evidence on the effect of media on policy-making see Besley et al. (2002), and Stromberg (2004b).

thus, highlighting the importance of considering and analyzing in our theoretical framework, the presence of biased news media acting as a "filter" between lobbies and voters.

1.2 Related Literature

The economic literature seems to have largely overlooked the issue of grassroots activities and special interests' influence on voters.[17] The papers that are most closely related to our work are Baron (2005) and Yu (2005). Baron (2005) considers a model of hard information where an activist lobby and an industry search for evidence on the true state of nature, and if they find such information they have to decide whether to conceal it or report it to the media. Baron shows that the activist lobby has an incentive to conceal while the industry does not, moreover the media will find optimal to bias its report in favor of the policy preferred by the activist lobby. This model, while analyzing a more complex structure of the media market, restricts lobbies' strategic decisions to be binary (conceal/not conceal) while we construct a more general (and symmetric) framework where lobbies' influence activities are a continuous function of the incentives structure of the game and in particular of the idiosyncratic bias of the media. Moreover, such framework allows us to derive a direct measure of the policy distortion arising from interest groups' influence activities and media bias and then analyze the effects of such distortion on voters' welfare.

In Yu (2005), lobbies compete by influencing both politicians and voters. Yu shows that such influence activities are complementary. Moreover, an increase in the effectiveness of voters' persuasion or awareness induces a substitution effect between the influence activities targeted to politicians and the one aimed towards voters. However, contrary to our work, Yu assumes an exogenous relation between voters' posterior beliefs and lobbies' efforts and does not analyze the role played by media.

Our paper is also related with Dewatripont and Tirole (1999) since both papers look at the issue of production of information by agents and efficient decision making. However, the focus and thus the conclusions of the two papers are quite different. Dewatripont and Tirole analyze the problem of an organization who has to take a decision based on the information provided by agents engaging in moral hazard. They show that an advocacy system where two agents compete to produce favorable evidence is, in general, more efficient of a system with a single non-partisan agent. In our model there is no such moral hazard problem in information gathering since interest groups want to produce favorable evidence to ensure a beneficial political outcome. This creates strong incentives to conceal unfavorable information. Therefore, in our setting, a single unbiased agent collecting information (e.g., academia) may indeed lead to a more efficient policy outcome than the one arising in presence of two lobbies advocating their respective positions.[18]

[17] The first contribution looking at this issue is Grossman and Helpman (2001). In their model a lobby wants to educate the public by sending a costless message. They show that the median voter is likely to be harmed by such communication whenever her preferences are not close to the ones of the lobby.

[18] Indeed, Dewatripont and Tirole (1999) notice that "we assumed all along that moral hazard in infor-

Our paper also contributes to the literature on media bias. This literature has, so far, identified two different forces creating a bias in media reports. The first one is a "supply-driven" one: media bias is the result of the idiosyncratic preferences of journalists (Baron 2006), owners, editors (Djankov et al. 2003, Anderson and McLaren 2007), governments (Besley and Prat 2006) or advertisers (Ellman and Germano 2008). The second one is a "demand-driven" bias. Part of this literature assumes that voters like to receive information confirming their bias and thus media just reflect and confirm the bias of their audience (Mullainathan and Shleifer 2005, Bernhardt et al. 2008). On the other hand, Gentzkow and Shapiro (2006) show that even when voters do not like biased information, if media have reputation concerns and there is uncertainty on the quality of the media, a bias towards consumer prior beliefs will arise in equilibrium even in absence of any exogenous media bias. Our model suggests that even when media do not have any biased preferences or any incentive to produce biased reports, their reports may still be biased since the information they collect may be biased itself. That is, there is a "source-driven" bias in media reports due to the distortion in information created by lobbies' influence activities.

Finally, our paper is related to the literature on cheap-talk where the Receiver is uncertain about the Sender's preferences.[19] Our model considers an environment where the Receiver (voters and parties) does not know whether the Sender (media outlet) is biased and at the same time does not know the direction of the possible bias. Moreover, the probability distribution of the signal that the Sender receives on the state of the world is also endogenously dependent on the size and probability of its bias. We show that different types of informative equilibria may arise depending on the size of the bias and on the probability of the Sender being biased.

The paper is organized as follows. Section 2 describes the structure and timing of the game. Section 3 analyzes the interactions among the media outlet, voters, parties and lobbies. Section 4 derives the different types of perfect bayesian equilibria in the *noise-increasing* case and discusses the results of the model. Section 5 provides a microfoundation of the *noise-increasing* property. Section 6 briefly analyzes the *accuracy-increasing* case. Section 7 discusses several extensions of the benchmark model. Section 8 concludes. All the proofs are provided in the Appendix.

2 The Model

The political process involves a single issue or policy P. Without loss of generality we assume the policy space to be $\Psi = [0, 1]$. The political system is characterized by two office-

mation acquisition made it necessary to provide powerful incentive schemes for agents leading to advocacy [...]. These incentive schemes induce concealment as well as acquisition. If information collection is easy, it makes sense to reduce the power of incentive schemes so as to [...] induce truthful release of existing information." (Dewatripont and Tirole, 1999, page 20).

[19] See among the others Morris (2001) and Morgan and Stocken (2003).

motivated parties L and R that choose their platforms, P_L and P_R respectively, in order to maximize their votes. There are two possible states of the world $s \in \{A, B\}$. The prior probability of the state of the world $s = A$ is assumed to be common knowledge and it is denoted by θ.

There is a continuum of voters of measure one with quadratic utility function:

$$U_i(P, d_i) = -(P - d_i)^2 \tag{1}$$

Voter i policy preference d_i is a combination of a private value component and a state-dependent public value component, i.e., $d_i(x_i, v) = x_i + v$, where

$$v = \begin{cases} -\gamma & \text{if } s = A \\ \gamma & \text{if } s = B \end{cases} \tag{2}$$

The private value component x_i represents the idiosyncratic policy preference of voter i. The state-dependent public value component v captures the fact that, regardless of their idiosyncratic policy preferences, voters value the costs and benefits that different policies deliver in different states of the world. In other words, by convention, if the state of the world is A then the public benefits of a policy $P = 0$ are assumed to be higher than the public costs and as P increases the benefits decrease and the costs increase (*viceversa* if $s = B$). That is, if the state of the world is A individuals prefer, *ceteris paribus,* a policy closer to the left end of the political space. Instead if the state of the world is B individuals prefer a policy closer to the right end of the political space.[20] The parameter γ measures the importance of the state-dependent public value component in individuals' utility functions. The private value component of voter i's preferences, x_i, can be seen as the policy that voter i would choose if she were to believe that both states of the world are equally likely.[21] Such idiosyncratic preferences are distributed with a common knowledge c.d.f. $F(x)$ with density function $f(x)$. Without loss of generality we restrict the support of $f(x)$ to be $[\gamma, 1 - \gamma]$, so that the *ex-ante* support of voters' policy preferences is the policy space Ψ.[22] We denote the median of $f(x)$, that is the idiosyncratic preference of the median voter, as x_m.

An example may help to clarify the meaning of this voter's utility specification. Suppose the issue on which voters have to decide is to what extent the Kyoto's protocol should

[20] This specification of the voters' utility function is similar to the one of bidders in an affiliated value auction. In the same way the valuation of the object is correlated across bidders in an affiliated value auction, the valuation of the policy is correlated across voters in our setting.

[21] Notice that having a more general specification of voters' utility functions would not change our results in any significant way. For example as an alternative specification we could have the following: $d_i(x_i, v) = (x_i)^v$, with $v = \begin{cases} \gamma & \text{if } s = A \\ 1/\gamma & \text{if } s = B \end{cases}$ and the support of $f(x)$ being $[0, 1]$ and $\gamma \geq 1$. That is the policy preferences of more centrist voters would have a higher correlation with the true state of the world with respect to the ones of more "extremists" ones. Notice also that the presence of "stubborn" voters (i.e., voters whose preferences are not state-contingent), would not change our results.

[22] Note that for $\gamma \to 0$, we are in a pure private value setting. *Viceversa*, if $\gamma \to \frac{1}{2}$ we are in a pure public value environment. We are going to focus our attention on the general case where $\gamma \in (0, \frac{1}{2})$.

be implemented. Let the states of the world be A ="strong effects of pollution on global warming" and B ="mild effects of pollution on global warming". Each voter has some idiosyncratic preferences about the importance of protecting the environment. Nevertheless, in order to choose her optimal policy, each of them also take into account the information she receives on the likelihood of the state of the world. For example, if voters receive (credible) reports saying that pollution does not have a strong impact on global warming ($s = B$), each of them would revises downward her idea of the benefits deriving from the Kyoto's protocol. Instead, if voters receive the opposite report they would revise upward their beliefs on the importance of implementing the Kyoto's protocol. Figure 1 below, illustrates an example of the distributions of voters' policy preferences in the two polar cases where there is no uncertainty regarding the state of the world (i.e., $\Pr(s = A) = 1$ and $\Pr(s = B) = 1$).[23]

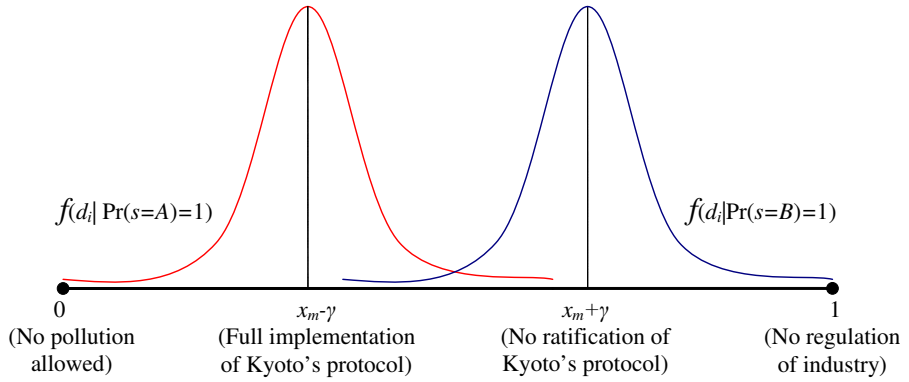

Figure 1. Distribution of voters preferences with no uncertainty.

There is one media outlet whose quadratic utility function is:

$$U_n(P, d_n) = -(P - d_n)^2 \tag{3}$$

where d_n contains a private value component and a state-dependent public value component, i.e., $d_n(\varphi_n, v) = \varphi_n + v$, where v is defined as in (2). The idiosyncratic preference parameter $\varphi_n \in \Phi = \{\varphi_l, \varphi_0, \varphi_r\}$ and it is private information of the media outlet. The possible media outlet idiosyncratic preferences are assumed to satisfy the following:

Assumption 1.

$$\varphi_l < \varphi_0 = x_m < \varphi_r$$
$$x_m - \varphi_l = \varphi_r - x_m$$

That is if the media outlet has idiosyncratic preferences φ_l (φ_r) it prefers a more "leftist" ("rightist") policy than the median voter. On the other hand, a media outlet of "type" φ_0 has preferences over policies equal to the median voter's ones. More specifically, in the following analysis a media outlet will be said to be "unbiased" if $\varphi_n = \varphi_0$.[24] A media outlet

[23] Clearly, in presence of uncertainty the distribution of voters' preference will be a convex combination of such two "extreme" distributions.

[24] Notice that our results would not change assuming the presence of an unbiased media outlet with a

will be said to be "leftist" ("rightist") if $\varphi_n = \varphi_l$ ($\varphi_n = \varphi_r$). Moreover, we assume the possible bias of the leftist and rightist media outlet types to be symmetric. The probability distribution of the media outlet's preferences, $g(\varphi_n)$, is common knowledge and it is such that $\Pr(\varphi_n = \varphi_l) = \Pr(\varphi_n = \varphi_r) = y$. That is, the media outlet is unbiased with probability $(1-2y)$ and has instead a bias $|\varphi_n - x_m|$ in a direction or another with probability y.[25] At this point, we should remark that we assume such symmetry in the media outlet's types just to avoid introducing any exogenous asymmetry in the benchmark model. In section 7 we relax *Assumption 1* by considering more realistic assumptions on the media outlet's bias. More specifically, we show that the main results of the benchmark model do not change when the media outlet's types are asymmetric (i.e., the direction of the media outlet's bias is known to all the players), when there is just one media outlet's type (i.e., there is no uncertainty on the media outlet's bias) or even when there are multiple media outlets.

It is also important to point out that the fact that the media outlet is just a "political actor" in our model (i.e., it is not explicitly maximizing profits) is without loss of generality. If the media outlet was a profit maximizer, given that in our model voters value unbiased information, it would have a strictly dominant strategy of not slanting its reports. The model would thus be equivalent to the case where the media outlet is unbiased with probability one. On the other hand, if the media outlet was maximizing profits and at the same time it had a "political agenda", then it would care both about the true state of the world (which is reflected in the state-contingent public value component of its utility function) and about its idiosyncratic preferences (which is reflected in the private value component of its utility function). Thus we can think of our specification of the media outlet utility function as a reduced form of a model where the media outlet is a profit maximizer and at the same time it has (possibly) an exogenous bias. Since we are mainly interested on how the media outlet's bias interacts with the endogenous bias arising from lobbies' influence activities, we will consider the media outlet preferences, and hence the media outlet's bias, as exogenous. Following the literature on media bias we can think of such exogenous bias as just arising from journalists, editors, owners or advertisers idiosyncratic preferences (e.g., Djankov et al. 2003, Baron 2006, Anderson and McLaren 2007, Ellman and Germano 2008).

2.1 The game

There are two lobbies a and b who, by exerting efforts e_a and e_b respectively, compete to affect the distribution of a binary signal $z_i \in \{z_a, z_b\}$ that the media outlet receives on the state of the world. Lobbies a and b's bliss points are ϕ_a and ϕ_b, respectively. We assume

purely "public value" utility function. That is, we could have defined as "unbiased" a media outlet with no idiosyncratic preferences, thus having preferences $d_0 = \begin{cases} 0 \text{ if } s = A \\ 1 \text{ if } s = B \end{cases}$; That is our definition of unbiased media outlet does not have to be rely on the median voter's idiosyncratic preferences.

[25] Similarly to what we have specified regarding the distribution of voters' idiosyncratic preferences, we assume that *supp* $g(\varphi_n) = [\gamma, 1-\gamma]$. Nevertheless, notice that our results would generalize to the case where *supp* $g(\varphi_n) = [0, 1]$.

lobbies' preferences to be "extreme", $\phi_a = 0$ and $\phi_b = 1$. That is lobby a always prefers a policy close to the left-hand side of the political space regardless of the state of the world and similarly b always prefers a policy close to the right-hand side of the political space. Then, lobby i quadratic utility function is:

$$W_i(P, \phi_i, e_i) = -(P - \phi_i)^2 - C(e_i) \tag{4}$$

Where C is the cost function of effort, which is assumed to be linear (i.e., $C'(e) = c > 0$).[26]

The likelihood of the signal $z_i \in \{z_a, z_b\}$ received by the media outlet depends on the true state of the world and on lobbies' influence activities. We can interpret this as a situation where both lobbies spend resources to produce/collect *hard* information in favor of their preferred policy.[27] The signal can be seen as a reduced form of media outlet's investigative journalism. In other words, the signal that the media outlet receives can be interpreted as indicating whether the evidence that it collected in favor of a state of the world is *stronger* than the one in favor of the other state (i.e., amount of hard information in favor of one state higher than the one in favor of the other state). As we have pointed out in the introduction, from a "public value" perspective in both states each policy has costs and benefits, however the amount of such costs and benefits differs in the two states of the world. Thus lobbies are able to find hard information both on the benefits and on the costs of each policy in both states. Indeed for many issues we have "mixed" evidence on the efficiency of a given policy (e.g., the costs and benefits of implementing the Kyoto's protocol, the effectiveness of death penalty in preventing crime, the effects of gun control on citizens' security and so on). At the same time, the true state of the world plays a role in the evidence collected by the media outlet. That is, *ceteris paribus*, it is more likely that the overall evidence will be in favor of the lobby on the "correct" side. More specifically, the probability that the media outlet receives the "correct" signal in a given state of the world is characterized by the following functions:

$$h_a(e_a, e_b, \Delta) = \Pr(z_a | s = A, e_a, e_b, \Delta) \tag{5}$$

$$h_b(e_a, e_b, \Delta) = \Pr(z_b | s = B, e_a, e_b, \Delta) \tag{6}$$

where the parameter Δ denotes the "importance of the truth" in this game. In other words, the higher is Δ the greater the likelihood that the amount of hard information in support of the true state of the world is higher than the one in support of the other state.[28] The

[26] Notice that considering a convex cost function, $C' > 0$, $C'' > 0$, would not change our results.

[27] Obviously, whenever a lobby finds an unfavorable piece of hard information it will always have an incentive to conceal it. See Sobbrio (2009) for a simple model of collection of hard information by lobbies.

[28] How much higher such evidence is likely to be depends on the specific issue. We can think that issues where the difference between the cost-benefit ratio of the "bad" policy and the one of the "good" policy is very high are the ones were the evidence in favor of the correct state of the world is likely to be much stronger. These are the issues where Δ is likely to be large (notice that also γ is likely to be large since voters would probably care more about knowing the true state of the world).

assumptions on the properties of the signal probability function $h_i(e_i, e_j, \Delta)$ are summarized by *Condition 1.*[29]

Condition 1 *For* $\forall i, j \in \{a, b\}$ *such that* $i \neq j$, $h_i(e_i, e_j, \Delta)$ *and* $h_j(e_i, e_j, \Delta)$ *are assumed to satisfy the following properties:*

$i)$ $\quad h_i(\tilde{e}, \bar{e}, \Delta) = h_j(\bar{e}, \tilde{e}, \Delta), \ \ \forall \bar{e}, \tilde{e}$

$ii)$ $\quad h_i(e_i, e_j, \Delta) > 1 - h_j(e_i, e_j, \Delta)$

$iii)$ $\quad \frac{\partial h_i}{\partial e_i} > 0, \quad \frac{\partial h_i}{\partial \Delta} > 0, \quad \frac{\partial h_i}{\partial e_j} < 0$

$iv)$ $\quad \left(\frac{\partial^2 h_i}{\partial^2 e_i} - \frac{\partial^2 h_i}{\partial^2 e_j} \right) < 0$

Property $i)$ is just a symmetry assumption on the signal probability functions. Property $ii)$ requires the signal to be informative.[30] Property $iii)$ is a straightforward necessary condition to have an interior solution. Property $iv)$ signifies decreasing marginal productivity of effort.

After having received the signal, the media outlet decides upon the (costless) message $m_n \in \{m_a, m_b\}$ to send to the public (voters and parties).[31] Hence, the game between the media outlet and voters takes the form of a cheap-talk game. Indeed, as it is usually assumed in the literature on media bias, the media outlet can slant its reports by *selectively omitting* relevant information, that is by simply hiding unfavorable evidence (e.g., show the benefits and hide the costs of a given policy).

Given the message received from the media outlet, voters update their beliefs on the state of the world according to Bayes' rule. That is, they discount for the possible slant present in the media outlet's report arising from lobbies' influence activities and media outlet's bias. Parties L and R take into account the effect that media outlet's report has on voters' beliefs and then choose their political platform to maximize the number of votes. In the last stage of the game, voters choose their most preferred policy between the platforms proposed by the parties. The timing of the game is summarized below:

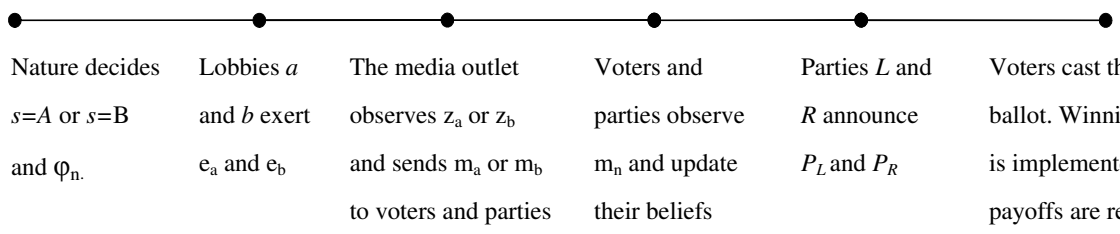

Figure 2. Timing of the game

[29] Section 5 provides a characterization of a signal probability function satisfying this condition.

[30] Notice that properties $i)$ and $ii)$ imply that $h_i(e, e, \Delta) = h_j(e, e, \Delta) > \frac{1}{2}$.

[31] It could appear restrictive to have a message space with just two elements given the uncertainty on media outlet's type. However, given that there are just two states of the world and the media outlet can receive just two signals, voters' uncertainty is just relative to such signals. For a similar cheap-talk model where there is uncertainty on the sender's type see Morris (2001).

In what follows, we will refer to *media outlet's bias* as the difference between the media outlet and the median voter idiosyncratic preferences (i.e., $|\varphi_n - x_m|$). We will denote as *information slant* the noise in the information that agents receive due to the presence of media outlet's bias and/or lobbies' influence activities. Finally, we will indicate as *policy distortion* the difference between the policy outcome with and without information slant.

We now turn to the analysis of the strategic interactions among lobbies, the media outlet, voters and parties and then derive the properties of the equilibria of the game.

3 The Interactions among Lobbies, the Media Outlet, Voters and Parties

Since lobbies' efforts are unobservable, we must solve for a rational expectation equilibrium (REE) in which the media outlet, voters and parties correctly anticipate the optimal level of effort exerted by lobbies in equilibrium and all players' strategies maximize their expected utilities given their beliefs.

A rational expectation equilibrium of this game is a perfect bayesian equilibrium. In the last stage voters update their beliefs according to Bayes' rule, choose their most preferred policy and vote for the platform closer to it. Parties anticipate such behavior and propose platforms that maximize their chances of winning. The media outlet chooses its optimal strategy taking into account how the message that it is going to send to the public (voters and parties) will affect the policy outcome. Finally, lobbies anticipating all such interactions decide upon the effort to exert in order to try to influence the beliefs that voters will hold on the state of the world.

3.1 Voters

Given the message received by the media outlet, $m_n \in \{m_a, m_b\}$, voters form their posterior beliefs using Bayes' rule and then decide their preferred policy platform. Thus, voters have the following expected utility:

$$U_i(x_i, m_n) = \Pr(s = A|m_n)\left[-(P - (x_i - \gamma))^2\right] + \Pr(s = B|m_n)\left[-(P - (x_i + \gamma))^2\right] \quad (7)$$

Thus the policy that maximizes voter i's expected utility is $P_i^*(m_n) = \arg\max_P U_i(x_i, m_n)$ that is:

$$P_i^*(m_n) = x_i + \gamma\left[1 - 2\Pr(s = A|m_n)\right] \quad (8)$$

Individuals will, thus, simply vote for the proposed platform that is closer to their preferred one. As usual, we assume that when the voter is indifferent between the two platforms, she

simply randomizes between voting for party L and party R.[32]

Thus denoting as $r_i(P_L, P_R)$ the probability that individual i votes for party L given the set of proposed platforms by the two parties, we have that a strategy for a voter is a function:

$$r_i : P \times P \to \left\{0, \frac{1}{2}, 1\right\}$$

3.2 Parties

Since the median voter is going to be pivotal in this model, parties platforms will simply converge to the expected median voter position. In other words, parties L and R both know that given message m_n, the policy platform that maximizes the median voter's expected utility is $P_m^*(m_n) = \arg\max U_m(P, x_m, m_n)$, where $U_m(P, x_m, m_n)$ is the median voter's expected utility. That is:

$$P_m^*(m_n) = x_m + \gamma\left[1 - 2\Pr(s = A|m_n)\right] \tag{9}$$

Thus $P_L^*(m_a) = P_R^*(m_a) = P_m^*(m_a)$ and $P_L^*(m_b) = P_R^*(m_b) = P_m^*(m_b)$. In other words, both parties' platforms converge to the expected median voter preferred policy and they both have probability of winning equal to $\frac{1}{2}$.[33] Notice that, in any equilibrium where the messages sent by media outlet are informative, such platforms are going to be contingent on the specific message that the public (voters and parties) receives.[34]

3.3 The Media Outlet

The media outlet acts as a "filter" in this game. The private cost that any individual should bear in order to acquire direct information is assumed to be higher than any private benefit. Hence, voters rely on media to receive information on a given issue.[35] The expected utility

[32] Abstention is not allowed. However, given that voting is costless and all voters receive the same information there would be no strategic abstention here. Moreover, even in presence of a positive cost of voting, our model would still apply to the portion of population that would turnout in equilibrium (i.e., the median voter policy would be defined on the subset of voters).

[33] The fact that parties are just office-motivated and converge to the median voter position is without loss of generality. Having parties that are both policy-motivated and office-motivated would not change our results in any significant way.

[34] Again, using our example on the Kyoto's protocol, this means that parties will choose platforms more or less in favor of the protocol, depending on the message sent by the media outlet. Parties know that if the media outlet sends a (credible) message stating that pollution has strong effects on global warming, *ceteris paribus*, voters will be more likely to vote for a policy in favor of Kyoto's protocol.

[35] We believe that this assumption is realistic. Any single individual would find too costly to read the Kyoto protocol and evaluate whether its costs are higher than the benefits or not. The opportunity cost or simply the knowledge required to analyze such information would far exceed any private benefit. News media thus constitute the most efficient (even though not perfect) way to acquire information for any single citizen.

for a media outlet having idiosyncratic preferences φ_n is:

$$U_n(\varphi_n, z_i, P) = \Pr(s = A|z_i)\left[-(P - (\varphi_n - \gamma))^2\right] + \Pr(s = B|z_i)\left[-(P - (\varphi_n + \gamma))^2\right]$$

The media outlet observes the signal on the state of the world and updates its beliefs according to Bayes' rule. It then decides on the message to be sent to voters. Since the media outlet has rational expectations, its posterior beliefs upon receiving signal z_a or z_b depend on the expected effort that lobbies exert, $\hat{e}_a$ and $\hat{e}_b$. Therefore the media outlet posterior beliefs are as follows:

$$\Pr(s = A|z_a) = \frac{h_a(\hat{e}_a, \hat{e}_b, \Delta)\theta}{h_a(\hat{e}_a, \hat{e}_b, \Delta)\theta + (1 - h_b(\hat{e}_a, \hat{e}_b, \Delta))(1 - \theta)}$$

$$\Pr(s = A|z_b) = \frac{(1 - h_a(\hat{e}_a, \hat{e}_b, \Delta))\theta}{(1 - h_a(\hat{e}_a, \hat{e}_b, \Delta))\theta + h_b(\hat{e}_a, \hat{e}_b, \Delta)(1 - \theta)}$$

The interaction between the media outlet and voters assumes here the typical structure of a cheap-talk game. Denote the signal space as $Z = \{z_a, z_b\}$ and the message space as $M = \{m_a, m_b\}$. The media outlet will choose the message to be sent to voters in order to maximize its expected utility. That is, by *selectively omitting* (i.e., hiding) unfavorable evidence the media outlet is able to slant the evidence collected and send the message that will make the median voter choose a policy as close as possible to its preferred policy $P^*_{\varphi_n}(z_i)$. Where $P^*_{\varphi_n}(z_i)$ is simply the policy that maximizes $U_n(P, \varphi_n, z_i)$, that is:

$$P^*_{\varphi_n}(z_i) = \varphi_n + \gamma\left[1 - 2\Pr(s = A|z_i)\right] \tag{10}$$

The, possibly mixed, strategy for a media outlet with preferences φ_n is a mapping from the signal space into a probability distribution over the set of possible messages:

$$\sigma(\varphi_n) : Z \rightarrow \Sigma(M)$$

Where Σ is the space of probability distribution over the message space M. More specifically, a media outlet with preferences φ_n can have two different kinds of pure strategies, pooling or separating respectively. We will say that a media outlet with preference φ_n plays a pooling strategy if $\sigma(\varphi_n|z_a) = \sigma(\varphi_n|z_b) = m^*$. Instead, a media outlet with preference φ_n is said to play a separating strategy if $\sigma(\varphi_n|z_a) = \hat{m}$ and $\sigma(\varphi_n|z_b) = \tilde{m}$, with $\tilde{m} \neq \hat{m}$. A mixed strategy will simply specify the probability that a media outlet plays a separating strategy.

There are three possible kinds of informative equilibria in this game: two pure strategy equilibria (*partially informative*, *maximally informative*) and one mixed strategy equilibrium (*semi-separating*).[36]

[36] An analysis of the types of uninformative equilibria that can arise in this game is available upon request to the author.

Definition 1 *An equilibrium is said to be "partially informative" if* $\exists\varphi_n \in \Phi$ *such that* $\sigma(\varphi_n|z_a) = \sigma(\varphi_n|z_b)$ *and* $\exists\varphi_h \in \Phi$ *with* $\varphi_h \neq \varphi_n$ *such that* $\sigma(\varphi_h|z_a) \neq \sigma(\varphi_h|z_b)$. *An equilibrium is said to be "maximally informative" if* $\forall\varphi_n \in \Phi$, $\sigma(\varphi_n|z_a) \neq \sigma(\varphi_n|z_b)$.

That is in a *partially informative* equilibrium some media outlet types choose a pooling strategy and some others adopt a separating strategy. From these definitions, it is clear that the only *maximally informative* equilibrium (that is the one where all agents in our economy have the same information regarding the state of the world and thus share the same beliefs) is the one where all media outlet types play a separating strategy.

Definition 2 *An equilibrium is said to be "semi-separating" if* $\exists\varphi_n \in \Phi$ *such that, for* $p, q \in [0,1]$*:*

$$\sigma(\varphi_n|z_a) = \begin{cases} m_a \text{ with prob. } q \\ m_b \text{ with prob. } (1-q) \end{cases} \quad ; \quad \sigma(\varphi_n|z_b) = \begin{cases} m_a \text{ with prob. } p \\ m_b \text{ with prob. } (1-p) \end{cases}$$

Clearly for $p, q \in \{0;1\}$, a media outlet with idiosyncratic preferences φ_n plays a degenerate mixed strategy and the *semi-separating* equilibrium converges to a pure strategy equilibrium.

The following lemma provides a characterization of the possible types of symmetric informative equilibria that can arise in this cheap-talk subgame.[37]

Lemma 1 $\exists\tilde{\varphi}, \bar{\varphi}_l \in [\gamma, 1-\gamma]$ *such that:*

i) For all $\varphi_l < \tilde{\varphi}_l$, *there exists a* ***partially informative*** *equilibrium where the leftist media outlet type pools on* m_a, *the rightist media outlet type pools on* m_b *and the unbiased media outlet type adopts a separating strategy.*

ii) For all $\varphi_l > \bar{\varphi}_l$, *there exists a* ***maximally informative*** *equilibrium where the leftist and the rightist media outlet types adopt the same separating strategy of the unbiased media outlet type.*

iii) If $\bar{\varphi}_l > \tilde{\varphi}_l$, *for all* $\tilde{\varphi}_l < \varphi_l < \bar{\varphi}_l$ *there exists a* ***semi-separating*** *equilibrium where the leftist media outlet type sends message* m_a *upon receiving signal* z_a *and sends* m_a *with probability* q *and* m_b *with probability* $(1-q)$ *upon receiving signal* z_b, *the rightist media outlet type sends message* m_b *upon receiving signal* z_b *and sends* m_b *with probability* q *and* m_a *with probability* $(1-q)$ *upon receiving signal* z_a *and the unbiased media outlet type adopts a separating strategy.*

That is, $\tilde{\varphi}_l$ and $\bar{\varphi}_l$ represent the leftist media outlet no-deviation thresholds in a *partially informative* and *maximally informative* equilibrium, respectively.[38] The above proposition is thus showing that the unbiased media outlet type will never try to "deceive" the median voter by sending out a message that would induce her beliefs to be revised in a direction

[37] See Appendix B in Sobbrio (2009) for a discussion and characterization of these equilibria.

[38] Symmetric no-deviation thresholds exist for the rightist media outlet.

opposite to the media outlet's ones. Moreover, upon receiving a signal favorable to the lobby of "their side", the two biased media outlet types do not have any incentive to slant their reports. Thus which equilibrium will ultimately arise in this cheap-talk subgame depends on whether the biased media outlet types will find optimal to adopt a separating strategy, send the same message regardless of the signal received or mix between a separating and a pooling strategy.[39] As section 4.1 will show, the size of the media outlet's idiosyncratic bias and the endogenous level of effort exerted by lobbies will, ultimately, determine which of these equilibria will arise.

3.4 Lobbies

Lobbies anticipate that the platform the winning party will implement in equilibrium is the one that maximizes the median voter's utility. That is, lobbies know that the equilibrium policy will depend on voters' posterior beliefs and thus on the message of the media outlet. Since voters have rational expectations their posterior beliefs upon receiving message m_n depend on the expected effort that lobby a and b exert in a given equilibrium, $\hat{e}_a^*$ and $\hat{e}_b^*$ respectively. In other words, the median voter's policy is a function of such expected efforts levels:

$$P_m^*(m_n, \hat{e}_a^*, \hat{e}_b^*) = x_m + \gamma \left[1 - 2\mu^*(s = A|m_n, \hat{e}_a^*, \hat{e}_b^*)\right] \tag{11}$$

Thus from lobbies' *ex-ante* perspective, conditional on the media outlet message, the implemented policies are not affected by their effort decision. Therefore, lobbies choose their efforts in order to influence the signal that the media outlet receives and hence the message that voters get. In other words, lobbies' expected utilities depend on the exerted efforts (which affect $\Pr(m_a)$ and $\Pr(m_b)$) and on the expected efforts (which affect the median voter's preferred policy). Thus, from (4) lobby a and lobby b expected utilities are:

$$\begin{aligned} W_a(e_a, e_b, \hat{e}_a^*, \hat{e}_b^*, \Delta) \;=\; & -\Pr(m_a|e_a, e_b, \Delta)\left(P_m^*(m_a, \hat{e}_a^*, \hat{e}_b^*, \Delta)\right)^2 \\ & -\Pr(m_b|e_a, e_b, \Delta)\left(P_m^*(m_b, \hat{e}_a^*, \hat{e}_b^*, \Delta)\right)^2 - C(e_a) \end{aligned} \tag{12}$$

$$\begin{aligned} W_b(e_a, e_b, \hat{e}_a^*, \hat{e}_b^*, \Delta) \;=\; & -\Pr(m_a|e_a, e_b, \Delta)\left(1 - P_m^*(m_a, \hat{e}_a^*, \hat{e}_b^*, \Delta)\right)^2 \\ & -\Pr(m_b|e_a, e_b, \Delta)\left(1 - P_m^*(m_b, \hat{e}_a^*, \hat{e}_b^*, \Delta)\right)^2 - C(e_b) \end{aligned} \tag{13}$$

In their optimization problem lobbies take into account that the final policy outcome, P_m^*, will depend on which message voters will receive from the media outlet. Moreover, lobbies anticipate that such message depends on the possible media outlet's bias and their expected efforts. Thus each lobby faces a different optimization problem depending on whether it is

[39] Note that restricting the media outlet to always send a message is without loss of generality. Allowing the media outlet to not send any message would not change our results in any significant way. A formal analysis of this case is available upon request to the author.

expecting the equilibrium of the cheap talk game between media outlet and voters to be a *partially informative, semi-separating* or *maximally informative* equilibrium.

4 Informative Equilibria

We now derive and characterize the possible equilibria of our game. Since we focus on symmetric equilibria, from now on we assume $\theta = \frac{1}{2}$ and $x_m = \frac{1}{2}$. Moreover, in this section we focus on the *noise-increasing* case. Hence we consider here a setting where the following condition holds:

$$\textit{Noise-Increasing Condition} \qquad \left(\frac{\partial h_i}{\partial e_i}\right)_{e_i=e_j} < \left(\left|\frac{\partial h_i}{\partial e_j}\right|\right)_{e_i=e_j} \tag{14}$$

That is we analyze the situation where an equal increase in lobbies' efforts increases the noise of the signal.[40]

4.1 Symmetric Equilibria

Let's analyze the optimal strategies of lobbies. From (11) and (12) lobby a optimality conditions in a *maximally informative, partially informative* and *semi-separating* equilibrium respectively, are:[41]

$$V_a^{MI} = \gamma\left(\frac{\partial h_a}{\partial e_a} - \frac{\partial h_b}{\partial e_a}\right)\left[\mu^{MI}(s=A|m_a) - \mu^{MI}(s=A|m_b)\right] - c = 0 \tag{15}$$

$$V_a^{PI} = \gamma(1-2y)\left(\frac{\partial h_a}{\partial e_a} - \frac{\partial h_b}{\partial e_a}\right)\left[\mu^{PI}(s=A|m_a) - \mu^{PI}(s=A|m_b)\right] - c = 0 \tag{16}$$

$$V_a^{SS} = \gamma(1-2qy)\left(\frac{\partial h_a}{\partial e_a} - \frac{\partial h_b}{\partial e_a}\right)\left[\mu^{SS}(s=A|m_a) - \mu^{SS}(s=A|m_b)\right] - c = 0 \tag{17}$$

Where $\mu^{MI}(s=A|m_a)$ represents voters' posterior beliefs in a *maximally informative* equilibrium given that they received message m_a and q is the probability that a biased media outlet slants its reports in a *semi-separating* equilibrium.[42] Notice that for $q \to 1$, the optimality condition of the *semi-separating* equilibrium degenerates into the one of the *partially informative* equilibrium. *Viceversa*, for $q \to 0$, this optimality condition converges to the

[40] In section 5 we provide a microfoundation of this property. See also Sobbrio (2009) for a simple model of hard information showing that how lobbies' incentives to hide unfavorable evidence leads to such *noise-increasing* property.

[41] A formal derivation of these FOCs and a formal analysis of lobbies a and b's reaction functions is available upon request to the author.

[42] A similar interpretation applies to $\mu^{PI}(s=A|m_n)$, $\mu^{SS}(s=A|m_n)$, for $\forall m_n \in M$.

one of the *maximally informative* equilibrium.[43] The first necessary step to understand the interactions between lobbies' influence activities and media outlet's bias is to compare lobbies' efforts across equilibria. Let e^{PI}, e^{SS} and e^{MI} be the level of effort that lobbies a and b exert in a symmetric PI, SS and MI equilibrium respectively. Then we have the following lemma.

Lemma 2 *Lobbies exert a lower effort in an equilibrium where they expect the media outlet to bias its report with a higher probability. Hence,*

$$e^{PI} < e^{SS} < e^{MI}$$

Moreover:

$$\frac{\partial e^{SS}}{\partial q} < 0 \text{ and } \lim_{q \to 0} e^{SS} = e^{MI}, \ \lim_{q \to 1} e^{SS} = e^{PI}$$

Therefore, the greater the likelihood that the media outlet adopts a pooling strategy, the lower the incentives of lobbies to engage in influence activities. Indeed, from an *ex-ante* perspective when the media outlet chooses to disregard the information it collects (i.e., the signal it receives on the state of the world), lobbies would just waste resources in trying to influence such information (i.e., signal). *Viceversa*, when the media outlet does not bias its report and sends a message according to the signal it receives (*maximally informative* equilibrium), lobbies have strong incentives to exert effort to influence the distribution of this signal.

The second step is to determine how the media outlet's incentives to slant its report change as a function of lobbies' efforts.

Lemma 3 *The media outlet incentives to slant its reports are increasing in lobbies' expected efforts. Hence:*

$$\tilde{\varphi}_l < \bar{\varphi}_l$$

The higher the lobbies' expected efforts the higher (in a probabilistic sense) the slant that the media outlet will introduce in its report. Moreover, by rational expectations, in equilibrium the expected effort will be equal to the effort exerted by lobbies. Therefore, since the higher the effort exerted by lobbies the more "noisy" the signal that the media outlet receives, we can interpret this result as telling us that the more "controversial" and unclear the information that media outlet collects are, the greater the likelihood that the media outlet will slant such information. When instead lobbies do not engage in influence activities (i.e., $e_a = e_b = 0$), the media outlet receives the correct signal with high probability and thus

[43] Notice that $\forall q \in [0,1]$ the second order condition is:

$$\gamma(1-2qy)\left(\frac{\partial^2 h_a}{\partial^2 e_a} - \frac{\partial^2 h_b}{\partial^2 e_a}\right)\left[\mu^{SS}(s=A|m_a, \hat{e}_a^{SS}, \hat{e}_b^{SS}) - \mu^{SS}(s=A|m_b, \hat{e}_a^{SS}, \hat{e}_b^{SS})\right]$$

which is negative by *condition 1.* Thus the stationary point is a global maximum.

it will slant such information only when it has very extreme preferences.[44] Therefore, since from lemma 2 we know that $e^{PI} < e^{MI}$ the above reasoning implies that the leftist media outlet no-deviation threshold in a PI equilibrium is lower than the one in a MI one (i.e., $\tilde{\varphi}_l < \bar{\varphi}_l$). Hence, lemma 1, 2 and 3 are showing that the cheap-talk game, and therefore the lobbying game, has a unique informative equilibrium depending on how large the possible bias of the media outlet is. We thus have the following proposition characterizing the possible types of equilibria of the game:

Proposition 1 *For any given set Φ of media outlet idiosyncratic preferences, there is a unique informative equilibrium. More specifically:*

i) If $\varphi_l \in [\bar{\varphi}_l, x_m]$ there is a unique maximally informative equilibrium where each biased media outlet type adopts a separating strategy and lobbies exert effort e^{MI}.

ii) If $\varphi_l \in (\tilde{\varphi}_l, \bar{\varphi}_l)$ there is a unique semi-separating equilibrium where each biased media outlet type adopts a mixed strategy and lobbies exert effort e^{SS}.

iii) If $\varphi_l < \tilde{\varphi}_l$ there is a unique partially informative equilibrium where each biased media outlet type pools on the message most preferred by the lobby on its side and lobbies exert effort e^{PI}.

The following graph illustrates the possible types of equilibria that can arise depending on where the media outlet's idiosyncratic preferences lie:

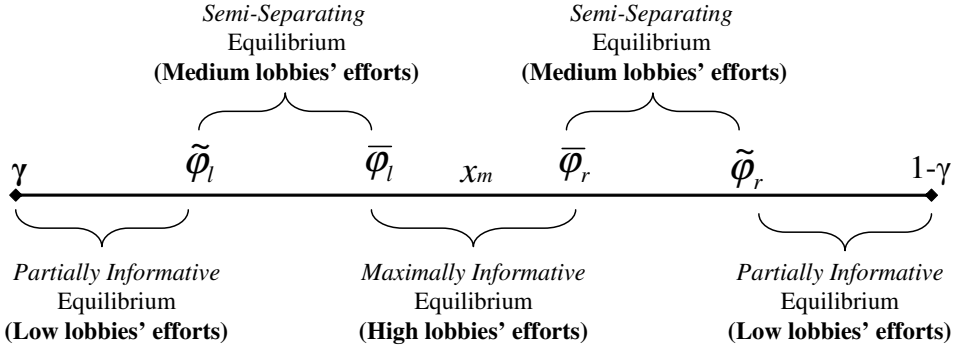

Figure 3. Media Bias and Informative Equilibria.

Therefore, the higher the possible bias of the media outlet, the lower the equilibrium level of effort that lobbies will exert. Indeed, if the media outlet turn out to be strongly biased in the opposite direction of the lobby, no matter how much effort the lobby is going to exert and whether it is lobbying for the efficient policy or not, the media outlet will always send a message that drives voters induced preferences further from the lobby's optimal policy. Moreover, even if the media outlet turn out to be strongly biased in favor of the lobby's optimal policy, lobby's effort would be totally worthless by virtue of being unnecessary. In

[44] For example assuming that $h_i(0,0,\Delta) = 1$ and that x_i is uniformly distributed, then for $\gamma = \frac{1}{4}$ the leftist media outlet will never slant its report upon receiving message z_b (since $\bar{\varphi}_l = \frac{1}{4} = \gamma$ and hence φ_l always greater than $\bar{\varphi}_l$). The same reasoning applies for the rightist media outlet. Notice that such result hold in our cheap talk setting and thus it abstracts from any cost of slanting information.

this case, it will be the media outlet that will take care of trying to influence voters' beliefs in a direction favorable to the lobby. Therefore, in either case, the possibility of facing a very biased media outlet lowers the incentives of lobbies to spend resources to affect the signal distribution.

Notice that for intermediate values of the media outlet's bias, an equilibrium in pure strategies cannot exist. This is due to the discontinuity in the equilibrium level of effort of lobbies: for $\varphi_l < \tilde{\varphi}_l$ lobbies play according to a *partially informative* equilibrium and put an effort equal to e^{PI}. *Viceversa*, for $\varphi_l = \tilde{\varphi}_l + \varepsilon$, the leftist media outlet has an incentive to deviate from its pooling strategy. However, this gives higher incentives to lobbies to exert a higher level of effort and thus increases the incentives of the media outlet to play a pooling strategy. Therefore, for $\tilde{\varphi}_l < \varphi_l < \bar{\varphi}_l$, the only possible equilibrium is a *semi-separating* equilibrium where lobbies exert effort e^{SS}. Moreover, to any φ_l in this interval corresponds a unique optimal probability of the media outlet slanting its reports, q, which supports the unique *semi-separating* equilibrium.

4.2 Distortion of the Policy Outcome and Welfare

We now analyze the efficiency and welfare implications of this game. To simplify the analysis we now assume, without loss of generality, the following:

Assumption 2. $$h_i(0, 0, \Delta) = 1, \quad \forall i = a, b$$

In other words, we focus on the case where in absence of lobbies, there is no noise in the signal that the media outlet receives. Thus, given *Assumption 2*, with no lobbies' influence activities and no "news-slanting" by the media outlet the equilibrium would be a *fully revealing* one where voters learn the true state of the world and no distortion is present in the implemented policy.

4.2.1 Distortion in the Policy Outcome

In order to evaluate the policy distortion arising from this game, we should compare the policy outcomes that arise in a *maximally informative (MI), partially informative (PI),* and *semi-separating* (SS) type of equilibrium with the one of a *fully-revealing (FR)* equilibrium. From an *ex-ante* perspective, the expected policy outcome is the same in all types of equilibria of our game. On the other hand, the more voters care about the state of the world and the higher the noise in the information that they receive, the higher will be the expected policy distortion.

Proposition 2 *In all types of equilibria of the game (PI, SS, MI), the expected policy outcome is equal to the median voter idiosyncratic policy preference. The ex-ante policy distortion is positively related with γ and with the effort exerted by lobbies in equilibrium*

(i.e., e^*). Moreover, in a PI and SS type of equilibrium, the ex-ante policy distortion is also positively related with q and y.

Therefore, from an *ex-ante* perspective, lobbies' influence activities create an upward distortion when the state of the world in A and a downward distortion when the state is B. The expected policy distortion depends on the size of the state-contingent public value component of the voter utility function (i.e., γ). In other words, the more voters care about receiving accurate information on the state of the world, the more *noisy* the information they actually receive will be.

the efficiency of the implemented policy, the higher the policy distortion. This result suggests that we should expect, *ceteris paribus*, a higher policy distortion in an issue like global warming than in an issue like abortion where preferences are mostly idiosyncratic. On the other hand, the expected policy distortion also depends on the overall slant in the message that voters receive from the media outlet. More specifically, the media outlet's message contains two different kinds of slant. There is a "source-driven" slant introduced by lobbies in the signal that the media outlet receives (*lobbies-induced* slant). At the same time, in a *partially informative* and *semi-separating* type of equilibrium, the media outlet's message contains also a "supply-driven" slant due to the idiosyncratic bias of the media outlet (*media-induced* slant). Hence, the expected policy distortion is positively related with the *lobbies-induced* slant (i.e., with the equilibrium level of effort exerted by lobbies) and also with the *media-induced* slant (i.e., with the probability of the media outlet slanting its reports q and with the probability of the media outlet being biased y).

In any case, despite the fact that parties in our model do not introduce any distortion and they simply implement the policy preferred by a majority of voters, there will be an *ex-ante* distortion in the policy outcome. Even though voters are rational and discount the possible presence of slant in the information they receive, the noise that lobbies and the media outlet introduce in the political process prevents them from choosing the *fully revealing* optimal policy.

4.2.2 Winners and Losers of the Influence Game

We now analyze the welfare implications of the policy distortion derived in the previous section. That is, we now focus on who is winning and who is losing in this "influence game".

Proposition 3 *From an ex-ante perspective, all voters and the media outlet are always worse off in any type of equilibrium of the game (PI, SS, MI) than in a fully revealing equilibrium. Their expected utility loss is larger the higher is the expected policy distortion. Viceversa, lobbies' expected utility gain is positively related with the expected policy distortion. Hence, lobbies are better off in any type of equilibrium of the game than in a fully revealing equilibrium whenever the expected policy distortion is "large enough" relative to the cost of effort.*

Voters, regardless of their idiosyncratic preferences, would prefer an equilibrium without any influence activity. Moreover, their expected utility loss is larger the higher is the expected policy distortion. The same is true for the media outlet. One question that may arise at this point is: why the media outlet does not ignore all the evidence produced by lobbies since such evidence increases the overall noise of the signal? The problem is that the media outlet simply cannot do that because lobbies' efforts are not observable. That is, the signal probability function $h_i(e_a, e_{b,}\Delta)$ is not invertible. In equilibrium, the media outlet will correctly anticipate the effort exerted by each lobby but it cannot distinguish between the evidence coming from lobbies and the one coming from non-ideological sources. Indeed, in reality it is not easy to distinguish between ideological and non-ideological think tanks (or even between ideological and non-ideological oriented research within a think-tank).[45]

On the other hand, lobbies would prefer to commit to a no-lobbying equilibrium if and only if the cost of effort is "too high" compared with the possible gain from engaging in influence activities (expected distortion that they create in the policy outcome).[46] On the other hand, we should also point out that a very biased media outlet may represents a commitment device for lobbies to not spend too many resources in this "arm-wrestle" game to influence voters. Indeed, the *ex-ante* preferred outcome for lobbies is an uninformative equilibrium where the media outlet always slants its reports.[47]

From an *ex-post* point of view (i.e., after the state of the world is realized), moderate voters are still always losing from such game. Instead, extremist voters may be better off when the policy that they like is not the one "matching" the true state of the world as the following lemma shows.

Lemma 4 *Let P_m^J be the equilibrium policy outcome (where $J = PI, SS, MI$). Let $x_A = 1 + \frac{(P_m^J - \gamma)}{2}$ and $x_B = 1 + \frac{(P_m^J + \gamma)}{2}$. Then voter i is better off in a fully revealing equilibrium than in any type of equilibrium of the game (PI, SS, MI) if and only if one of the following conditions is satisfied:*

i) $x_A \leq x_i \leq x_B$

ii) $x_i < x_A$ and the state of the world is A

iii) $x_i > x_B$ and the state of the world is B

Again, we can look at our example on the Kyoto's protocol to understand the intuition behind this result. Let's suppose that the state of the world is "mild effects of pollution on global warming". Lemma 4 is suggesting that in such case a very environmentalist voter

[45] Moreover, in presence of reputation concerns the same would be true even considering a different model where such efforts were observable. Let's say, for example, that an unbiased media outlet ignores the overall evidence coming from lobbies suggesting that pollution has strong effects on global warming. *Ex-post* such behavior may be the same as the one of a biased rightist media outlet. Hence, if the media outlet has reputation concerns, it may not want to disregard the evidence produced by lobbies.

[46] Notice that, if we were to consider an utilitarian social welfare function giving equal weights to each voter, the media outlet and lobbies, the net effect of this influence game on social welfare would clearly be negative.

[47] A formal proof of this result is available upon request to the author.

would prefer any type of equilibrium of the game, where the median voter chooses a policy more in favor of the Kyoto's protocol, to a fully revealing equilibrium where the median voter would choose a policy less in favor of the Kyoto's protocol.

4.3 Media Bias, Policy Distortion and Welfare

In the previous section we have derived and discussed the distortion in the policy outcome and its effects on the expected utilities of players regardless of which equilibrium is actually in place (i.e., regardless of the actual size of the possible bias of the media outlet). In this session we instead analyze the effect that the media outlet's bias has on the policy distortion and on the welfare of voters, lobbies and of the media outlet itself.[48] This will allow us to answer the following questions: is a larger idiosyncratic bias of the media outlet always associated with a higher policy distortion? Moreover, if voters and lobbies could decide how large the possible bias of the media outlet should be, what would be the "optimal media bias" from their perspectives?

When there are no lobbies' influence activities taking place, the presence of media bias always increases the expected policy distortion hence it always has a negative impact on the efficiency of the political outcome. However, when lobbies come into play this is not necessarily true anymore. As the following proposition shows, the expected policy distortion may be lower in a type of equilibrium where the biased media outlet types slant their reports than in one where they do not.

Proposition 4 *The expected policy distortion and the expected utility of voters are higher in a MI type of equilibrium than in a PI type of equilibrium if and only if $y < \frac{h^{PI}-h^{MI}}{2h^{PI}-1}$. Lobbies have a higher expected utility in a MI type of equilibrium than in a PI one if and only if $y < \frac{1}{2}\left(1 - \frac{\sqrt{\gamma^2(2h^{MI}-1)^2-[c(e^{PI})-c(e^{MI})]}}{\gamma(2h^{PI}-1)}\right)$.*

In other words, it is not possible to say *a priori* whether the *ex-ante* policy distortion is larger in a PI or MI type of equilibrium.[49] The expected policy distortion depends on γ but it also depends on the informativeness of the message that voters receive from the media outlet. That is, the expected policy distortion is positively related with the slant in the information that voters receive, which is different in the different types of equilibria. More specifically, as we have pointed out in section 4.2.1 the overall slant present in the media outlet's message derive from two different types of slants: the *lobbies-induced* slant and the *media-induced* slant. Voters know that when the possible bias of the media outlet is low, the media outlet always sends "truthful" reports (i.e., it will not slant the

[48] Without loss of generality we assume, as in the previous section, that *Assumption 2* holds.

[49] A similar intuition applies to the policy distortion in a SS equilibrium with respect to the one in a MI equilibrium. Notice that h^{PI} also depends on y trough e^{PI}. Therefore, whether $y < \frac{h^{PI}-h^{MI}}{2h^{PI}-1}$ or not will ultimately depend on the parameters of the model and on the functional form of the signal likelihood function (i.e., $h(e_a, e_b, \Delta)$).

information it received). However, in this case lobbies have strong incentives to exert effort. Therefore, the message that voters receive in a *maximally informative* equilibrium has no *media-induced* slant but it incorporates a high *lobbies-induced* slant. Instead, the message that voters observe in a *partially informative* equilibrium contains a high *media-induced* slant (in a probabilistic sense) and a low *lobbies-induced* slant. Therefore the expected policy distortion in a *partially informative* equilibrium is lower than the one in a *maximally informative* equilibrium when the *lobbies-induced* slant is higher than the *media-induced* slant. Intuitively, if lobbies introduce lots of noise in the signal that the media outlet receives, voters would discount this and thus they would not give much credit even to a report coming from an unbiased media outlet. If instead voters are in a *partially informative* equilibrium where lobbies exert a low level of effort, they may "buy" relatively more the media outlet report (provided that they believe the media outlet being biased with a low probability). That is, in presence of lobbies' influence activities, a higher bias of the media outlet may ultimately lead to a lower policy distortion by lowering the *lobbies-induced* slant.

Similarly, it is not possible to say *a priori* in which type of equilibrium voters would prefer to be. Since the strength of the *lobbies-induced* slant and the *media-induced* slant are inversely related across types of equilibria, voters would prefer a PI equilibrium to a MI one whenever the *lobbies-induced* slant is stronger than the *media-induced* one. In other words, from an *ex-ante* point of view, voters may sometimes prefer to face a potentially very biased media outlet. Indeed, such type of media outlet may discourage lobbies to engage in influence activities and hence may ultimately lead to a higher quality of information and lower policy distortion.[50] On the other hand, lobbies a and b's "ranking of equilibria" is opposite to the voters' one. Lobbies prefer a PI equilibrium to a MI one, provided that the *media-induced* slant is strong enough. Moreover, the higher the cost of effort the greater the likelihood that lobbies would prefer to face a media outlet with a large possible bias (since $e^{PI} < e^{MI}$).

In the next section we propose a possible characterization of the competition between lobbies and thus of the signal probability function which provides a microfoundation of the *noise-increasing* property of lobbies' efforts.

5 The State Contingent Contest between Lobbies

5.1 *Racing* for evidence

Following the "innovation race" literature we model the competition between lobbies as a "race for evidence" where one of them has an advantage over the other.[51] That is, lobbies

[50] Notice that while *ex-ante* voters may prefer the possible bias of the media outlet to be large, after the media outlet has received the signal on the state of the world, voters would always want it to not slant its reports. That is, an unbiased media outlet could never credibly commit to play a pooling or mixed strategy.

[51] For an extensive review of this literature see Reinganum (1989).

have different hazard rates depending on whether they are lobbying for the "good" cause or not.[52] To simplify notation let the state of the world be $s \in \{a; b\}$. Thus assuming the time at which each lobby wins the race, τ, being exponentially distributed, we have the following:

$$\Pr(\tau(e_i) \leq t | s = i) = 1 - \exp\{-(e_i + \Delta)\tau\} \tag{18}$$

$$\Pr(\tau(e_j) \leq t | s = i) = 1 - \exp\{-(e_j)\tau\} \tag{19}$$

That is to say, for $\tau \to 0$, if the state of the world is $s = i$, then lobby i will win the contest and thus have the media outlet receiving signal z_i with an instantaneous probability equal to $e_i + \Delta$, where Δ is a positive parameter measuring the importance of the true state of the world in the contest. *Viceversa*, lobby j will have an instantaneous probability of winning the contest simply equal to e_j.

If we define $v^i_{z_i}$ ($v^i_{z_j}$) as the net expected benefit that lobby i gets when signal z_i (z_j) is realized, we have that lobby i expected payoff in this state contingent contest will be:

$$W_i(e_i, e_j, \Delta, v^i_{z_i}, v^i_{z_j} | s = i) = \int_0^\infty v^i_{z_i}(e_i + \Delta) \exp\{-(e_j)t\} \exp\{-(e_i + \Delta)t\} dt +$$
$$+ \int_0^\infty v^i_{z_j} e_j \exp\{-(e_j)t\} \exp\{-(e_i + \Delta)t\} (e_i + \Delta) dt$$

That is:

$$W_i(e_i, e_j, \Delta, v^i_{z_i}, v^i_{z_j} | s = i) = v^i_{z_i} \frac{e_i + \Delta}{e_i + e_j + \Delta} + v^i_{z_j} \frac{e_j}{e_i + e_j + \Delta} \tag{20}$$

Thus we have the following probabilities of media outlet receiving signal z_i or z_j when the state of the world is $s = i$:

$$h_i(e_i, e_i, \Delta) = \Pr(z_i | s = i) = \frac{e_i + \Delta}{e_i + e_j + \Delta} \tag{21}$$

$$1 - h_i(e_i, e_i, \Delta) = \Pr(z_j | s = i) = \frac{e_j}{e_i + e_j + \Delta} \tag{22}$$

These "winning" probabilities are a straightforward generalization of the ones of the Contest-Success Function (CSF) introduced by Tullock (1980) and axiomatized by Skaperdas (1996). The contest success function captures a wide range of situations where players put an effort to win a prize. In our setting this prize is going to be the signal received by the media outlet.[53] It is immediate to verify that this State Contingent Contest-Success Function (SCCSF) satisfies all the properties of *Condition 1* and it also incorporates the *noise-increasing* property of lobbies' efforts.

[52] In other words, lobbies are going to have a "state contingent" hazard rates:
$\kappa(e_i | s = i) = e_i + \Delta$ and $\kappa(e_j | s = i) = e_j$

[53] A detailed and formal characterization of the properties of this State Contingent Contest-Success Function (SCCSF) is available upon request to the author.

5.2 Comparative Statics

We now discuss the effects that a change in the parameters of the model has on lobbies' influence activities and on the probability of "news-slanting" by the media outlet.

Proposition 5 *In all the types of equilibria of the game, a higher γ leads to a higher level of lobbies' efforts and a weakly lower probability of "news-slanting" by the media outlet.*

An increase in the importance of the public value component in the voters' utility function has two effects. A higher γ implies a larger "space for influence", therefore the higher is γ the stronger lobbies' incentives to try to influence voters' beliefs (higher *lobbies-induced* slant). On the other hand, a higher γ also decreases the relative importance of the media outlet's idiosyncratic bias. Hence the higher is γ the lower the media outlet's incentives to slant its reports (lower *media-induced* slant). Therefore, a higher γ has opposite effects on the incentives of lobbies and of the media outlet: it increases the *lobbies-induced* slant and it reduces the *media-induced* slant.

Proposition 6 *In all the types of equilibria of the game, a higher c and a higher y both result in a lower level of lobbies' efforts and/or a lower probability of "news-slanting" by the media outlet.*

An increase in c has a direct and an indirect effect. It decreases lobbies' incentives to exert effort and thus it increases the quality of the signal received by the media outlet. As a consequence the media outlet has lower incentives to slant its reports. However, this last effect increases lobbies' incentives to exert effort. Thus the direct and indirect effect of an increase in c on lobbies' efforts go in opposite directions. Nevertheless, the net effect on the slant in information is always negative. Notice that in some cases (e.g., in a SS equilibrium), the net effect of an increase in c on lobbies' efforts is null (the direct and indirect effects cancel each other). Thus in such cases an increase in c has a positive effect on the efficiency of the policy outcome not because it decreases the *lobbies-induced* slant but because it decreases the *media-induced* slant. Therefore, our result implies that public policy measures aimed at increasing the cost of lobbies influence activities (e.g., a linear tax on lobbying) would reduce the policy distortion and increase voters' welfare. Indeed, such measures would either reduce lobbies' influence activities or reduce "news-slanting" by the media (in a probabilistic sense) or reduce both.[54]

A similar effect and similar reasoning applies to an increase probability of the media outlet being biased, i.e., y. The policy outcome would be more efficient if everyone would attribute a low probability to the media outlet being unbiased. Thus knowing for sure that the media outlet is indeed biased would actually lead to a lower policy distortion.

[54] This result can also be reintepreted in the light of proposition 3. That is, imposing more strict academic and deontological requirements for think tanks research would improve the welfare of voters and of the media outlet by making it easier for the media outlet to distinguish between ideological and non-ideological sources of information.

6 Accuracy-Increasing Lobbies

Until now we have assumed that the overall "net" effect of lobbies' influence activities is to increase the noise in the information that the media outlet collects (*noise-increasing* lobbies). Moreover, we have also derived endogenously this property by modeling the competition between lobbies as a "race for evidence" (see section 5).

Now we instead discuss the other possible case where lobbies' efforts have a positive net effect on the "accuracy" of the signal. That is, the case where the more effort lobbies put in a (symmetric) equilibrium, the greater the likelihood that the media outlet will collect correct information.[55] Thus, we consider here a setting where the following condition holds:

$$\textit{Accuracy-increasing condition} \qquad \left(\frac{\partial h_i}{\partial e_i}\right)_{e_i=e_j} > \left(\left|\frac{\partial h_i}{\partial e_j}\right|\right)_{e_i=e_j} \tag{23}$$

In presence of *accuracy-increasing* lobbies, a higher probability of the media outlet slanting its reports corresponds to a lower equilibrium level of lobbies' efforts.[56] Thus, similarly to the *noise-increasing* case, lobbies find more productive to engage in influence activities in presence of a media outlet with a small bias. However, in this *accuracy-increasing* case, since the lower the *media-induced* slant the higher the *lobbies-induced* accuracy, multiple equilibria exist for intermediate values of the media outlet's bias (one with low and one with high lobbies' efforts).[57] The following graph characterizes the possible types of informative equilibria that can arise as a function of the media outlet's bias.

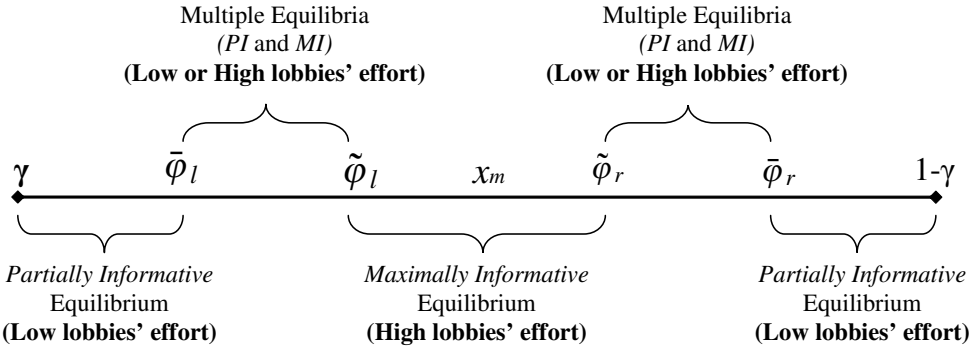

Figure 4. Media Bias and Informative Equilibria (*Accuracy-Increasing* case)

[55] Notice also that this case could be seen as an application of the model of Dewatripont and Tirole (1999) in a setting where there is a third party (i.e., the media outlet) filtering the information between the "advocates" and the decision maker.

[56] Notice that when y is small an alternative pattern of types of equilibria may *also* exist. In such pattern there is a positive correlation between lobbies' efforts and the probability of media outlet slanting its reports.

[57] For large values of the media outlet's bias, an increase or decrease in lobbies' efforts would not affect the media outlet equilibrium strategy. A similar reasoning applies when the media outlet's bias is small. A formal analysis of this *accuracy increasing* case is available upon request to the author.

7 Extensions

In this section we briefly describe and discuss several possible extensions of our benchmark model.[58]

7.1 Known direction of the media outlet's bias

We consider here a more realistic assumption on the beliefs about the media outlet's bias with respect to the benchmark model. That is, the situation where the direction of the media outlet's bias is common knowledge but the *strength* of such bias is private information. Suppose, for example, that parties, voters and lobbies knows that the media outlet is leftist but they do not know *how much* leftist it is. That is, let the space of possible media outlet types be $\Phi = \left\{\varphi_l^H, \varphi_l^L\right\}$ with $\varphi_l^H < \varphi_l^L < x_m$ and $\Pr(\varphi_n = \varphi_l^H) = y$. That is, with probability y the media outlet has a "large" leftist bias and with probability $(1-y)$ it has a "small" leftist bias.

When lobbies are *ex-ante* symmetric their incentives to exert effort remain symmetric even though the media outlet possible strategies are not symmetric. To understand why this is true, let's focus on a *partially informative* equilibrium where the "small" bias type adopts a separating strategy and the "large" bias type adopts a pooling one. From the rightist lobby's perspective, exerting an effort to influence the information that the media outlet collects is a waste with probability y (probability of "large" bias type) and is productive with probability $(1-y)$. Similarly, from the leftist lobby's point of view, exerting effort is unnecessary (and thus a waste) with probability y and it is productive with probability $(1-y)$. Therefore, asymmetries in the media outlet's bias do not generate asymmetric incentives and thus the equilibrium remains symmetric.

7.2 No uncertainty on the media outlet's bias

Suppose now that voters, lobbies and politicians are all informed about the exact bias of the media outlet (i.e., the media outlet's bias is common knowledge). When the media outlet has a large bias it would like to slant its reports. Therefore, voters would disregard the message coming from a very biased media outlet because simply uninformative. On the other hand, in such uninformative equilibrium lobbies would have no incentives to engage in influence activities, thus the signal that a very biased media outlet receives is very likely to be correct. From lemma 3 we know that in such case the media outlet has lower incentives to adopt a pooling strategy and thus it does so only when it has a very large bias. Hence, for intermediate values of the media outlet's bias the unique equilibrium is still a *semi-separating* one. Moreover, in such equilibrium lobbies exert a lower effort with respect to the one they exert in the benchmark case because of the certainty of facing a biased media outlet. Hence,

[58] Detailed formal proofs for these extensions are available upon request to the author.

our model shows that a (not too much) biased media outlet may affect the policy outcome even in presence of rational, Bayesian consumers who know its bias. On the other hand, when the media outlet has a very high bias, the unique equilibrium is an uninformative one where voters do not modify their beliefs and lobbies exert no effort.[59] Finally, for low values of the media outlet's bias the unique equilibrium is still a *maximally informative* one. The following graph illustrates the possible types of equilibria as a function of the media outlet's bias:

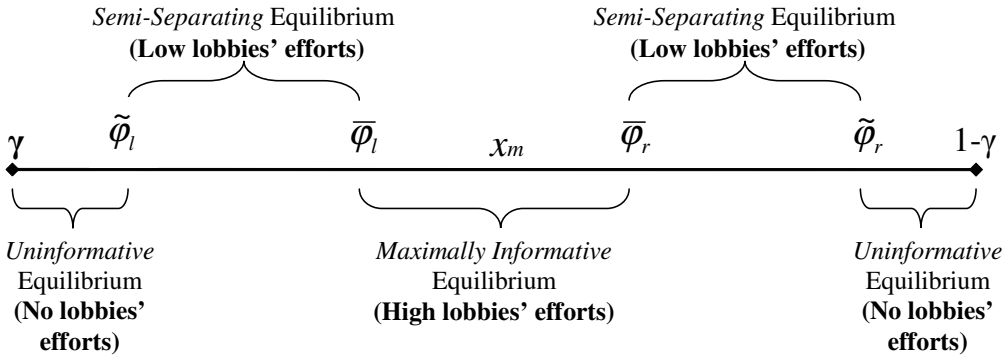

Figure 5. Equilibria with no uncertainty on the media outlet's bias.

7.3 Multiple Media Outlets

Suppose that there are two media outlets with idiosyncratic preferences φ_n^1 and φ_n^2. Denote m_1 the message of the first media outlet and m_2 the one of the second media outlet. Since voters value unbiased information, when updating their beliefs they take into account the message with the lowest slant. Therefore, whenever one of the two media outlets adopts a separating strategy, the unique equilibrium is a *maximally informative* one regardless of the type and size of the other media outlet's bias. The more interesting cases arise when the two media outlets have biases going in opposite directions and such biases are not "small" (i.e., the equilibrium is not a *maximally informative* one). Suppose for example, that the first media outlet is leftist and the second is rightist. Suppose also, without loss of generality, that their idiosyncratic preferences are symmetric with respect to the ones of the median voter (i.e., $|\varphi_n^1 - x_m| = |\varphi_n^2 - x_m|$). Then, in a symmetric equilibrium, upon receiving signal $z_b, (z_a)$ the leftist (rightist) media sends message m_b (m_a) with probability $(1-q)$ and message m_a (m_b) with probability q, where $q \in (0, 1]$. Thus, when the two media outlets receive signal z_a, with probability $(1-q)$ both of them send message m_a, in which case voters would infer the signal received by the media outlets. At the same time, with probability q the two media outlets send opposite messages in which case voters would not get any information from media reports (i.e., their posterior beliefs is equal to their prior).

[59] Notice that this case highlights the fundamental difference between a media outlet and a lobby. If the media outlet were to have extreme preferences (as the ones of a lobby), its reports would simply be uninformative and thus it would neither have any policy influence nor get any profits from readers and/or advertisers.

The exact same reasoning applies when the two media outlets receive signals z_b. Therefore, with probability $(1-q)$ lobbies' efforts are very productive and with probability q they are completely unproductive. Hence, in presence of two media outlets, lobbies still put less effort the more they expect the media outlets to slant their reports. Moreover, media outlets still have higher incentives to slant their reports, the higher lobbies' efforts are. Therefore, the main intuitions of the benchmark model carry out in the two media outlet case.

Notice that, in the limiting case where there is a large number of media outlets, there is a probability close to one that at least two media outlets having biases going in opposite directions report the same message. That is, in this case voter would know the signal received by media and the equilibrium would converge to a *maximally informative* one.[60]

7.4 Unbiased media outlet ("unfiltered" communication)

The case where the media outlet is unbiased with probability one is equivalent to a situation where there is no such "filter" as media and voters receive a *direct* signal on the state of the world. Thus, nested in our model is the case where lobbies communicate directly with voters. An obvious example where such situation arises is when lobbies compete by engaging in informative advertising (e.g., issue advertisement). In this case, the signal that voters receive can be interpreted as which informative content of the advertisements is stronger.

From lemma 1 we know that, in any informative equilibrium, when the media outlet is unbiased it never slants its reports. Therefore, the equilibrium with an unbiased media outlet is equivalent to a *maximally informative* one. Hence, even when the media outlet has no bias, the information that voters receive is still slanted and there is a distortion in the policy outcome, due to the presence of lobbies' influence activities.[61]

7.5 Single Lobby

We discuss here the case where there is just one lobby engaging in influence activities. We can think of such situation being the limiting case where there are two asymmetric lobbies. Without loss of generality suppose the unique lobby to be the leftist one (lobby a). In such case, the rightist media outlet is more willing to slant its reports than a leftist media outlet (in a probabilistic sense), despite having the same *ex-ante* bias. There is a simple reason behind this asymmetry in the behavior of the leftist and rightist media outlet types. If the leftist media outlet receives signal z_b, then given that lobby a engaged in influence activities to decrease the likelihood of such signal, it will consider this signal very informative. Therefore, the leftist media outlet will have, *ceteris paribus*, low incentives to disregard signal z_b and adopt a pooling strategy. On the other hand, if the rightist media outlet receives signal z_a, then given the presence of lobby a's influence activities, it will not consider this signal

[60] Which as shown by proposition 4 does not necessarily lead to a higher voters' welfare with respect to a SS or PI type of equilibrium.

[61] See proposition 2.

very informative. Therefore a rightist media outlet will have high incentives to disregard such signal and choose a pooling strategy. Hence, despite having the same *ex-ante* bias, a media outlet on the opposite side of the lobby may appear relatively more biased than the one on same side of the lobby, since it is more likely to slant its reports. This result has an immediate implication for empirical studies aiming at measuring media bias. In presence of asymmetries between lobbies, a reliable measure of the bias of a media outlet should take into account the equilibrium difference between the *ex-post* slant in a media outlet's reports and the *ex-ante* bias of the media outlet itself.

8 Conclusions

Voters, parties, news media and lobbies are important actors involved in every democratic political process. These actors are intrinsically related to each other and the final political outcome will be the result of the mutual interactions among all of them. We have developed a simple model to analyze some of these interactions that have been overlooked in the literature. Lobbies spend hundreds of millions of dollars every year to advocate their positions. This is especially true on issues where the cost of choosing a policy different from the median voter's one would be too high for any politician (ideological/single issue 527 groups). In such cases lobbies' main channel of influence is through voters. Given that voters decide on the optimal policy based on their idiosyncratic preferences and their beliefs on the expected benefits and costs of alternative policies, lobbies will succeed in altering the implemented policy as long as they manage to alter such beliefs. In our setting the role of a media outlet is to collect information on the costs and benefits of a given policy and then filter this information according to its idiosyncratic preferences. Even though voters and the media outlet are rational and they account for the presence of lobbies' influence activities, the *ex-ante* slant of information (signals) by lobbies will result in a distortion of the equilibrium policy. The policy will be sub-optimal in the sense that it will not be exactly shaped on the true state of the world.

The bias of the media outlet and lobbies' efforts show a quite interesting relationship. The higher the possible bias of the media outlet the lower lobbies' efforts. This result derives from the fact that lobbies' efforts are less "productive" the more likely the media outlet is to slant its reports. Indeed a very biased media outlet on the same side of the lobby will make the lobby's effort unnecessary. Instead, a very biased media outlet on the opposite side will simply make lobby's effort unproductive. Either way, the greater the likelihood that the media outlet will slant its reports the lower the incentives of lobbies to influence the information that the media outlet collects. On the other hand, the lower the lobbies' efforts the less likely, *ceteris paribus*, is the media outlet to slant its reports. Despite the fact that the media outlet does not incur any cost in manipulating the information it collects (i.e., the media outlet is a cheap-talker), it still has lower incentives to slant its reports upon

receiving a very informative signal (i.e., when lobbies exert a low level of effort).

From an *ex-ante* welfare point of view, this influence game negatively affects all players but lobbies. All voters and every media outlet type face a net expected loss from the policy distortion generated by media bias and/or lobbies' influence activities. More specifically, the more voters care about receiving accurate information, the more noisy will be the information that they end up receiving and so the higher will be their expected utility loss. Lobbies instead expect to benefit from this game as long as the policy distortion induced by their influence activities is large enough with respect to the cost of effort. At the same time, our analysis shows that in presence of lobbies' influence activities, a higher idiosyncratic bias of the media outlet is not necessarily associated with a higher policy distortion and a lower voters' welfare. On the other hand, the comparative statics results on the State Contingent Contest-Success Function (SCCSF) show that public policy measures aimed at increasing the cost of lobbies' efforts would reduce lobbies' influence activities and/or reduce "news-slanting" by the media (in a probabilistic sense). Thus, the introduction of a proportional tax on lobbying would reduce the distortion in the policy outcome and increase voters' welfare.

We have also shown that our main results are robust to different assumptions on the bias of the media outlet. That is assuming that every player knows the direction of the media outlet's bias or that there is no uncertainty on such bias or even that there are multiple media outlets, does not generate asymmetric incentives for lobbies to engage in influence activities. At the same time, we have also pointed out that a (not too much) biased media outlet may affect the policy outcome even in presence of rational, bayesian consumers who know its bias.

On the other hand, we have shown that asymmetries between lobbies (e.g., the presence of only one lobby) induces asymmetries in the behavior of different media outlet types. When only the leftist lobby is engaging in influence activities, for a given *ex-ante* bias, a rightist media outlet will be more likely to slant its reports than a leftist one. As a consequence, by just observing the news reports, the rightist media outlet may appear more biased than the leftist one. This suggests that empirical studies aimed at measuring media bias that just focus on the slant in media reports, may be misleading. In other words, such measurements may capture the *ex-post* slant in a media outlet' reports rather than the *ex-ante* bias of the media outlet itself.

This analysis was intended to shed light on some of the relationships between lobbies, media and voters. Future research should probably consider a more active role of media. Nevertheless, the message of the paper remains. Lobbies can distort the political outcome even when they do not interact directly with politicians. Rational voters discount the reports they receive from the media outlet by taking into account the presence of "news-slants" arising from lobbies' influence activities and media bias. However, the final policy outcome is still suboptimal and a distortion is present in the political platform that the

winning party implements. This suggests that the recent lobbying reform laws in the US, just focused on tackling the distortions deriving from the interactions between lobbyists and politicians, have overlooked a potentially large source of "news-slant" and, ultimately, of policy inefficiency.

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Appendix

Proof of Lemma 1
Let us first introduce the following notation:

Let the posterior beliefs of voters upon having received message m_a and m_b respectively be: $\mu(s = A|m_a) = r$ and $\mu(s = A|m_b) = t$.

Assume without loss of generality that $r > t$. Then in any informative equilibrium it must be the case that $\sigma^*(\varphi_0|z_a) = m_a$ and $\sigma^*(\varphi_0|z_b) = m_b$. We prove this by contradiction. That is assume that upon receiving signal z_a the unbiased media outlet sends message m_b. The posterior beliefs of voters would be $\mu(s = A|m_b) = t$ and the policy implemented in equilibrium would be $P_m^*(m_b) = x_m + \gamma(1 - 2t)$. *Viceversa*, if media outlet were to send message m_a, the policy outcome would be $P_m^*(m_a) = x_m + \gamma(1 - 2r)$. Notice that since by assumption $r > t$, then $P_m^*(m_a) < P_m^*(m_b)$. Hence, the unbiased media outlet would send message m_b instead of m_a as long as:

$$\left|P_m^*(m_b) - P_{\varphi_0}^*(z_a)\right| < \left|P_m^*(m_a) - P_{\varphi_0}^*(z_a)\right|$$

where $P_{\varphi_0}^*(z_a) = \varphi_0 + \gamma[1 - 2\Pr(s = A|z_a)]$. Given that $P_m^*(m_a) < P_m^*(m_b)$ by monotonicity the above inequality is equivalent to:

$$P_m^*(m_b) + P_m^*(m_a) - 2P_{\varphi_0}^*(z_a) < 0$$

and since by definition $\varphi_0 = x_m$, this reduces to $2\Pr(s = A|z_a) < r + t$. Moreover from *Condition 1*, $\Pr(s = A|z_a) > \Pr(s = A|z_b)$. Thus, since r is a convex combination of $\Pr(s = A|z_a)$ and $\Pr(s = A|z_b)$ then $r \in [0, \Pr(s = A|z_a)]$. However since by assumption $t < r$ then $(r + t) \in [0, 2\Pr(s = A|z_a))$, which contradicts the above condition.[62] Let's now focus on the leftist and rightist media outlet. It must be the case that in any informative equilibrium $\sigma^*(\varphi_l|z_a) = m_a$ and $\sigma^*(\varphi_r|z_b) = m_b$. We prove this for the leftist media outlet (by contradiction). Suppose that upon receiving z_a, the leftist media outlet sends message m_b. For such strategy to be optimal it must be the case that:

$$\left|P_m^*(m_b) - P_{\varphi_l}^*(z_a)\right| < \left|P_m^*(m_a) - P_{\varphi_l}^*(z_a)\right|.$$

Where $P_{\varphi_l}^*(z_a) = \varphi_l + \gamma[1 - 2\Pr(s = A|z_a)]$. Given that $P_m^*(m_a) < P_m^*(m_b)$ by monotonicity this condition is equivalent to:

$$P_m^*(m_b) + P_m^*(m_a) - 2P_{\varphi_l}^*(z_a) < 0$$

That is $2(x_m - \varphi_l) + 2\gamma + 2\gamma(2\Pr(s = A|z_a)) - (t + r)) < 0$ and we know from *Condition 1* that $\Pr(s = A|z_a) > \Pr(s = A|z_b)$. Thus since r is going to be a convex combination of $\Pr(s = A|z_a)$ and $\Pr(s = A|z_b)$ then $r \in [0, \Pr(s = A|z_a)]$. However since by assumption $t < r$ then $(r + t) \in [0, 2\Pr(s = A|z_a))$, and given that $x_m > \varphi_l$ the condition will never hold. A similar proof applies to the rightist media outlet. **Q.E.D.**

Proof of Lemma 2
We show here that $e^{MI} < e^{SS}$, a similar proof applies to show that $e^{SS} < e^{PI}$. In a symmetric equilibrium since $e_a = e_b = e^*$ then $h_a(e^*, e^*, \Delta) = h_b(e^*, e^*, \Delta) = h^*$, where h^* denote the probability of receiving the "correct" signal given that both lobbies exert effort e^*. Moreover, by rational expectations, in any equilibrium $\hat{e}_a = \hat{e}_b = e^*$. Therefore, given that the posterior beliefs of voters in a symmetric *maximally informative* equilibrium are such that $\mu^{MI}(s = A|m_a, \hat{e}_a^{MI}, \hat{e}_b^{MI}) - \mu^{MI}(s = A|m_b, \hat{e}_a^{MI}, \hat{e}_b^{MI}) = 2h^{MI} - 1$. Similarly in a *semi-separating*

[62] A similar proof applies to show that the unbiased media outlet is never indifferent between sending out the two messages.

equilibrium $\mu^{SS}(s=A|m_a,\hat{e}_a^{SS},\hat{e}_b^{SS})-\mu^{SS}(s=A|m_b,\hat{e}_a^{SS},\hat{e}_b^{SS})=(1-2qy)\left(2h^{SS}-1\right)$. Thus the equilibrium conditions become:

$$V_a^{MI}=\gamma\left(\frac{\partial h_a}{\partial e_a}-\frac{\partial h_b}{\partial e_a}\right)\left(2h^{MI}-1\right)-c=0$$

$$V_a^{SS}=\gamma(1-2yq)^2\left(\frac{\partial h_a}{\partial e_a}-\frac{\partial h_b}{\partial e_a}\right)\left(2h^{SS}-1\right)-c=0$$

Now we can prove that $e^{MI}>e^{SS}$. Suppose not, that is $e^{MI}<e^{SS}$. We denote

$$L_a(e^{MI})=\left(\frac{\partial h_a(e^{MI},e^{MI},\Delta)}{\partial e_a}-\frac{\partial h_b(e^{MI},e^{MI},\Delta)}{\partial e_a}\right)\left(2h^{MI}-1\right)$$

and

$$L_a(e^{SS})=\left(\frac{\partial h_a(e^{SS},e^{SS},\Delta)}{\partial e_a}-\frac{\partial h_b(e^{SS},e^{SS},\Delta)}{\partial e_a}\right)\left(2h^{SS}-1\right)$$

In an interior equilibrium we must have that $V_a^{MI}=V_a^{SS}=0$. Thus given that the marginal cost of effort is constant and that $(1-2yq)<1$ it must be the case that $L_a(e^{MI})<L_a(e^{SS})$.[63] Moreover, by (14) $\frac{d\left(\frac{\partial h_i(e,e,\Delta)}{\partial e_i}-\frac{\partial h_j((e,e,\Delta)}{\partial e_i}\right)}{de}<0$. Thus since $e^{MI}<e^{SS}$:

$$\left(\frac{\partial h_a(e^{MI},e^{MI},\Delta)}{\partial e_a}-\frac{\partial h_b(e^{MI},e^{MI},\Delta)}{\partial e_a}\right)>\left(\frac{\partial h_a(e^{SS},e^{SS},\Delta)}{\partial e_a}-\frac{\partial h_b(e^{SS},e^{SS},\Delta)}{\partial e_a}\right)$$

therefore it must be the case that $\left(2h^{MI}-1\right)<\left(2h^{SS}-1\right)$. Thus, a necessary condition to have $e^{MI}<e^{SS}$ is $h^{SS}>h^{MI}$, but this contradicts (14). A similar proof applies to show that $e^{SS}>e^{PI}$. Moreover, $\lim_{q\to 0}L_a(e^{SS})=L_a(e^{MI})$, and $\frac{\partial V_a^{SS}}{\partial q}<0$, thus it must be the case that $\frac{\partial e^{SS}}{\partial q}<0$. **Q.E.D.**

Proof of Lemma 3
Consider:

$$\tilde{\varphi}_l=x_m-\gamma\left(\mu^{PI}(s=A|m_a)+\mu^{PI}(s=A|m_b)-2\Pr\left(s=A|z_b\right)\right)$$

Now let's focus on the term inside the brackets. Since in a symmetric PI equilibrium $h_a(\hat{e}_a^{PI},\hat{e}_b^{PI},\Delta)=h_b(\hat{e}_a^{PI},\hat{e}_b^{PI},\Delta)=h(\hat{e}^{PI},\hat{e}^{PI},\Delta)$, with a slight abuse of notation we denote $h(\hat{e}^{PI},\Delta)=h^{PI}$. Hence by the symmetry of the equilibrium $\mu^{PI}(s=A|m_a)+\mu^{PI}(s=A|m_b)=1$ and:

$$\Pr\left(s=A|z_b\right)=\frac{(1-h_a(\hat{e}_a^{PI},\hat{e}_b^{PI},\Delta))}{\left((1-h_a(\hat{e}_a^{PI},\hat{e}_b^{PI},\Delta))\right)+(h_b(\hat{e}_a^{PI},\hat{e}_b^{PI},\Delta))}=(1-h^{PI})$$

Thus:

$$\tilde{\varphi}_l=x_m-\gamma\left[1-2(1-h(\hat{e}^{PI},\hat{e}^{PI},\Delta))\right]$$

Similarly:

$$\begin{aligned}\check{\varphi}_l &= x_m-\gamma\left[1-2(1-h(\hat{e}^{SS},\hat{e}^{SS},\Delta))\right]\\ \bar{\varphi}_l &= x_m-\gamma\left[1-2(1-h(\hat{e}^{MI},\hat{e}^{MI},\Delta))\right]\end{aligned}$$

In other words, the equilibrium no-deviation thresholds of the media outlet depends on the parameters of the model and on the expected effort exerted by lobbies. It is straightforward to see that by (14): $\frac{\partial\bar{\varphi}_l}{\partial\hat{e}}>0$, $\frac{\partial\check{\varphi}_l}{\partial\hat{e}}>0$, $\frac{\partial\bar{\varphi}_l}{\partial\hat{e}}>0$. Now we want to show that $\forall q\in(0,1)$ $\bar{\varphi}_l>\check{\varphi}_l$ and $\check{\varphi}_l>$

[63] Notice that a similar proof would apply with a convex cost function, that is $c''(e)>0$

$\tilde{\varphi}_l$. Suppose not. Then $\forall q \in (0,1)$ $\bar{\varphi}_l < \check{\varphi}_l$ which implies that $h^{MI} > h^{SS}$. Moreover, by rational expectations, in equilibrium $\hat{e}^{MI} = e^{MI}$ and $\hat{e}^{SS} = e^{SS}$. Therefore since from lemma 2, $e^{MI} > e^{SS}$ and from (14) we know that in a symmetric equilibrium for $e_a = e_b = e$ it must be the case that $\frac{dh(e,e,\Delta)}{de} < 0$. Thus $e^{MI} > e^{SS} \Rightarrow h^{MI} < h^{SS}$ which contradicts our initial assumption. A similar proof applies to the other cases. **Q.E.D.**

Proof of Proposition 1
It follows directly from lemma 1, 2 and 3. **Q.E.D.**

Proof of Proposition 2.
The expected policy outcome in an equilibrium $J = MI, PI, SS$ given by:

$$P_m^J = \Pr(s = A)E(P_m^J|s = A) + \Pr(s = B)E(P_m^J|s = B)$$

where $E(P_m^J|s = A)$ represents the expected median voter policy when the state is A and $E(P_m^J|s = B)$ is the expected median voter policy when the state is B. That is:

$$E(P_m^J|s = A) = \mu^J(m_a|s = A)P_m^J(m_a) + \mu^J(m_b|s = A)P_m^J(m_b)$$

Then by the symmetry of the equilibrium:

$$\mu^J(m_a|s = A) + \mu^J(m_a|s = B) = \mu^J(m_b|s = B) + \mu^J(m_b|s = A) = 1$$

Thus $P_m^J = \frac{1}{2}\left(P_m^J(m_a) + P_m^J(m_b)\right) = x_m$, $\forall J$. The *ex-ante* policy distortion is given by:

$$Dist = \Pr(s = A)\left|P_m^{FR}(s = A) - E(P_m^J|s = A)\right| + \Pr(s = B)\left|P_m^{FR}(s = B) - E(P_m^J|s = B)\right|$$

where $P_m^{FR}(s = A) = x_m - \gamma$ and $P_m^{FR}(s = B) = x_m + \gamma$. Now let's consider the expected policy distortion in a semi-separating equilibrium. Then, since in a symmetric equilibrium $h_a^{SS} = h_b^{SS} = h^{SS}$:

$$\mu^{SS}(m_a|s = A) - \mu^{SS}(m_a|s = B) = \mu^{SS}(m_b|s = B) - \mu^{SS}(m_b|s = A) = (1 - 2qy)(2h^{SS} - 1)$$

moreover

$$\begin{aligned} P_m^{SS}(m_a) &= x_m + \gamma\left[1 - 2\left(h^{SS}(1 - 2qy) + qy\right)\right] \\ P_m^{SS}(m_b) &= x_m + \gamma\left[1 - 2\left((1 - h^{SS})(1 - 2qy) + qy\right)\right] \end{aligned}$$

Hence:

$$\begin{aligned} Dist^{SS} &= \gamma\left[1 - (1 - 2qy)^2(2h^{SS} - 1)^2\right] \\ Dist^{MI} &= \gamma\left[1 - (2h^{MI} - 1)^2\right] \\ Dist^{PI} &= \gamma\left[1 - (1 - 2y)^2(2h^{PI} - 1)^2\right] \end{aligned}$$

Thus:

$$\frac{\partial Dist^{SS}}{\partial \gamma} > 0, \frac{\partial Dist^{SS}}{\partial q} > 0, \frac{\partial Dist^{SS}}{\partial y} > 0, \frac{\partial Dist^{SS}}{\partial h^{SS}} < 0 \qquad \textbf{Q.E.D.}$$

Proof of Proposition 3
In a *fully revealing* equilibrium the expected utility of voter i is $U_i(x_i) = -(x_m - x_i)^2$; the expected utility of media outlet is $U_n(\varphi_n) = -(x_m - \varphi_n)^2$; the expected utility of lobby a is $W_a(\phi_a) = -\left(x_m^2 + \gamma^2\right)$. In a *semi-separating* type of equilibrium:

a) Expected utility of voter i is:

$$U_i^{SS}(x_i) = -(\frac{1}{2} - x_i)^2 - 4\gamma^2 \left(qy + h^{SS}(1-2qy)\right)\left(1 - \left[qy + h^{SS}(1-2qy)\right]\right)$$

Hence, the expected loss from voter i perspective is:

$$\left|(DU_i)^{SS}\right| = \gamma^2 \left[1 - (1-2qy)^2(2h^{SS}-1)^2\right]$$

Thus from the proof of proposition 2:

$$\left|(DU_i)^{SS}\right| = \gamma(Dist^{SS})$$

Hence $\left|(DU_i)^{SS}\right|$ is positively related to γ, y and q and negatively related with h^{SS}. The same reasoning applies to the media outlet.
b) The expected utility of lobby a in a *semi-separating* equilibrium is:

$$W_a^{SS}(\phi_a) = -(\frac{1}{4} + \gamma^2) + 4\gamma^2 \left(qy + h^{SS}(1-2qy)\right)\left(1 - \left[qy + h^{SS}(1-2qy)\right]\right) - c(e_a^{SS})$$

thus from lobbies' perspective the expected benefit\loss from this game with respect to a fully revealing equilibrium is:

$$(DW_j)^{SS} = \gamma^2 \left[1 - (1-2qy)^2(2h^{SS}-1)^2\right] - c(e_j^{SS}),\ \forall j = a, b$$

thus it is immediate to see that the expected gain of each lobby from engaging in influence activities is directly related with the expected loss of voters.

$$\begin{aligned}(DW_a)^{SS} &= \left|(DU_i)^{SS}\right| - c(e_a^{SS}) \\ (DW_b)^{SS} &= \left|(DU_i)^{SS}\right| - c(e_b^{SS})\end{aligned}$$

Thus the higher the expected loss of voters, the higher the expected gain on lobbies. **Q.E.D.**

Proof of Lemma 4
Let the state of nature be A. In a fully revealing equilibrium, voter i receives perfectly informative message, i.e., $\Pr(s = A|m_a) = 1$. Thus the preferred policy of voter i in such equilibrium will be $P_i^{FR} = x_i - \gamma$. Let P_m^J be the median voter policy in an equilibrium J (where $J = MI, SS, PI$). Then voter i prefers a fully revealing equilibrium if and only if:

$$\left|P_m^{FR} - P_i^{FR}\right| < \left|P_m^J - P_i^{FR}\right|$$

thus since for $x_i < x_m$, it is obviously always the case that voter i prefers the FR policy outcome we have 2 cases to analyze:

1)$P_m^J < P_i^{FR}$ (that is $x_i > P_m^J + \gamma = \bar{x}_i$) which implies that the above condition becomes: $P_m^J < x_m - \gamma$, which is clearly impossible since $P_m^J \in [x_m - \gamma, x_m + \gamma]$

2) $P_m^J > P_i^{FR}$ (that is $x_i < P_m^J + \gamma = \bar{x}_i$), thus $x_i - x_m < P_m^J - x_i + \gamma \Rightarrow$

$$x_i < \frac{1}{2}\left(P_m^J + \gamma + x_m\right) = x_B$$

Moreover notice that $x_B < \bar{x}_i$. A similar reasoning applies when the state of nature be B. **Q.E.D.**

Proof of Proposition 4
The result on the expected policy distortion follows immediately from the proof of proposition 2**.** Moreover, it follows immediately from the proof of proposition 3 that:

$$U_i^{MI}(x_i) < U_i^{PI}(x_i) \text{ if and only if } y < \frac{h^{PI} - h^{MI}}{2h^{PI} - 1}$$

and

$$W_a^{PI} > W_a^{MI} \text{ if and only if } y > \frac{1}{2}\left(1 - \frac{\sqrt{\gamma^2 \left(2h^{MI} - 1\right)^2 - [c(e^{PI}) - c(e^{MI})]}}{\gamma\left(2h^{PI} - 1\right)}\right)$$

Q.E.D.

Proof of Proposition 5
In a MI type of equilibrium $e^{MI} = \frac{1}{2}\Delta\left(\sqrt[2]{\frac{\gamma}{\Delta c}} - 1\right)$ and $\bar{\varphi}_l = \frac{1}{2} - \sqrt{c\gamma\Delta}$. An increase in γ leads to a lower $\bar{\varphi}_l$, thus for any φ_l, the equilibrium would remain a MI one. Thus since $\frac{\partial e^{MI}}{\partial \gamma} > 0$, the result follows. Let's focus now on the SS type of equilibrium. Then $e^{SS} = \frac{1}{2}\Delta\left(\frac{\gamma}{\left(\frac{1}{2} - \varphi_l\right)} - 1\right)$, where $\varphi_l \in (\tilde{\varphi}_l, \bar{\varphi}_l)$ and $q = \frac{1}{2y}\left(1 - \frac{\sqrt[2]{c\gamma\Delta}}{\left(\frac{1}{2} - \varphi_l\right)}\right)$. Thus since $\frac{\partial q}{\partial \gamma} < 0$ and $\frac{\partial e^{SS}}{\partial \gamma} > 0$, the result follows. Let's focus now on the PI type of equilibrium. Then $e^{PI} = \frac{1}{2}\Delta\left(\sqrt[2]{\frac{\gamma(1-2y)^2}{\Delta c}} - 1\right)$ and $\tilde{\varphi}_l = \frac{1}{2} - \frac{\sqrt{c\gamma\Delta}}{(1-2y)}$. Thus an increase in γ leads to a lower $\tilde{\varphi}_l$. There are two possible cases. Either φ_l is still lower than the new $\tilde{\varphi}_l$, in which case the equilibrium is still a PI one and thus the net effect of an increase in γ would be just an increase in lobbies' efforts (since $\frac{\partial e^{PI}}{\partial \gamma} > 0$). On the other hand, if φ_l becomes higher than $\tilde{\varphi}_l$, the equilibrium switches to a SS one. Nevertheless, from the above reasoning we know that in a SS equilibrium $\frac{\partial e^{SS}}{\partial \gamma} > 0$ and $\frac{\partial q}{\partial \gamma} < 0$. Thus in this second case we have that the net effect of an increase in γ would be to increase lobbies' efforts and to decrease the probability of "news-slanting" by the media outlet. **Q.E.D.**

Proof of Proposition 6
In a MI type of equilibrium $e^{MI} = \frac{1}{2}\Delta\left(\sqrt[2]{\frac{\gamma}{\Delta c}} - 1\right)$ and $\bar{\varphi}_l = \frac{1}{2} - \sqrt{c\gamma\Delta}$. An increase in c leads to a lower $\bar{\varphi}_l$, thus for any φ_l, the equilibrium remains a MI one. Thus since $\frac{\partial e^{MI}}{\partial c} < 0$ the result follows. Let's focus now on a SS type of equilibrium. Then $e^{SS} = \frac{1}{2}\Delta\left(\frac{\gamma}{\left(\frac{1}{2} - \varphi_l\right)} - 1\right)$, where $\varphi_l \in (\tilde{\varphi}_l, \bar{\varphi}_l)$. Then obviously $\frac{\partial e^{SS}}{\partial c} = 0$. On the other hand, $q = \frac{1}{2y}\left(1 - \frac{\sqrt[2]{c\gamma\Delta}}{\left(\frac{1}{2} - \varphi_l\right)}\right)$ thus $\frac{\partial q}{\partial c} < 0$. Thus the net effect of an increase in c in a SS equilibrium is a lower probability of "news-slanting" by the media outlet. Let's focus now on a PI type of equilibrium. Then $e^{PI} = \frac{1}{2}\Delta\left(\sqrt[2]{\frac{\gamma(1-2y)^2}{\Delta c}} - 1\right)$ and $\tilde{\varphi}_l = \frac{1}{2} - \frac{\sqrt{c\gamma\Delta}}{(1-2y)}$. Thus an increase in c leads to a lower $\tilde{\varphi}_l$. There are two possible cases. Either φ_l is still lower than the new $\tilde{\varphi}_l$, in which case the equilibrium is still a PI one and thus the net effect of an increase in γ would be just a decrease in lobbies' efforts (since $\frac{\partial e^{PI}}{\partial c} < 0$). On the other hand, if the φ_l becomes higher than $\tilde{\varphi}_l$, the equilibrium switches to a SS one. Nevertheless, from the above reasoning we know that in a SS equilibrium $\frac{\partial e^{SS}}{\partial c} = 0$ and $\frac{\partial q}{\partial c} < 0$. Thus in this second case we have that the net effect of an increase in c is to decrease lobbies' efforts (up to the bound where $e^{PI} = e^{SS}$) and a decrease the probability of "news-slanting" by the media outlet. The same reasoning applies to the comparative statics for y. **Q.E.D.**