Strategic communication: a freelance journalist-editor game*

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Abstract

We model strategic communication as a two-period game between an advisor and a decision maker, in which the advisor has private information about a policy-relevant state of the world but does not know the motives of the decision maker. If the advisor has the desire to please the decision maker and there is a positive probability that the decision maker values information, we identify different modes of communication that lead to information disclosure. We discuss our results in the context of a freelance journalist-editor game. Among the results is that if the journalist sufficiently values second period payoff, no information is transmitted in period one and the only equilibria implies information manipulation. Additionally, we show that the quality of the communication process does not depend on who manipulates the information although welfare does.

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1 Introduction

Communication is a very complex activity which is affected by numerous variables. One of them being the desire of the sender to please the receiver with her behavior. There are may examples where this search of esteem is present: a worker who wishes to be hired by an employer, a child who wants the approvement of her parents, a referee who wishes her report to be useful to the editor, etc. In all these cases, it is not surprising that the sender biases her information in the direction that is preferred by the receiver. The point is what to say when, at the communication stage, the sender is not sure about the motives of the receiver. This uncertainty about which information the receiver likes may affect which and when information is transmitted.

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To clarify this point, consider a game between a freelance journalist and an editor. Freelance journalist are independent contractors that may be hired by media outlets to inform about specific events.[1] Suppose that the journalist has relevant information about some event and that the editor is interested in that information. In this case, information transmission may not occurred in equilibrium even if both, the journalist and the editor, prefer to reveal the information, if the journalist is not sure about the motives of the editor and wants to please the editor with her report. In particular, if the freelance worker considers that there is a positive probability that the editor likes biased reports, manipulation of information may occur in equilibrium. Additionally, if we further consider that the journalist and the editor meet more than once, the problem of information manipulation attaches a special relevance: The freelance worker may find it profitable to manipulate her report in the first meeting so as to learn the motives of the editor and behave optimally afterwards.

This paper presents a model of strategic communication that captures the specifics of this situation. It identifies different modes of communication that lead to information disclosure and analyze its welfare implications.

The model has the following structure. A decision maker (editor) asks an advisor (freelance journalist) to help him choose between two alternatives. The game consists of two periods and the same freelance journalist is consulted in both periods. The journalist has private information about a policy-relevant state of the world. For example, whether interest rates will go down in near future, which political party will better deal with the economic situation, etc. On the contrary, the editor has private information about his own motives: whether he prefers to publish valuable -truthful- information to the citizens, or he has state independent preferences and always wants to stand on a particular position. At the beginning of each period, the journalist writes a report (advise) saying which state prevails. Upon receiving the report, the editor takes an action: he chooses whether to publish the report (or, equivalently, to support the inherent policy in the newspaper/editorial), or to publish another report saying that the prevailing state of the nature is a different one (then prescribing in a different direction). The editor is thus free to stand on any policy. We consider, however, that the editor meets a certain cost if he disregards the report of the journalist and does not stand on that position. This cost is meant to represent the losses of a delay in publication, the time that the editor devotes to ask for a second report or to rewrite it, etc. The editor can be either of two types: honest, who prefers to publish relevant -truthful- information; and biased, who always wants to publish the very same information, independently of the state of the nature. The freelance journalist wants her report to appear in the newspaper (or, equivalently, wants

[1] This type of temporary work arrangement has greatly increased in importance in the media industry over the last two decades. Saundy et al. (2007) observe that : *"The UK audio-visual industry has entirely transformed over the last 20 years, from a market characterized by stable-regulated employment into one in which around half of the available labor pool is made up of freelance workers"*.

the media outlet to stand on her advise). This assumption represents the idea that the journalist wishes to be well perceived by the editor (possibly because her remuneration depends on some subjective performance evaluation), and that the newspaper publishes her report is a signal of it. We assume, however, that the freelance worker incurs in a cost for lying, meaning that the journalist is honest in nature and, ceteris paribus, values revealing her information. Both, the journalist's report and the editor's action, directly affect the advisor and the decision maker's payoffs. We analyze the two-period version of this game. We study the incentives of the journalist to report truthfully, as well as her incentives to fool the editor in period one so as to find out his motives and behave optimally in period two. We also analyze under which conditions the editor finds it profitable to reveal his preferences at period one so as to guarantee his maximal payoff in period two.

As the paper focuses on the problem of eliciting information, we restrict our attention to a subset of equilibria where information is transmitted in period two. Our results for the first period show that full information transmission is possible in equilibrium and that it is more likely to occur the higher the prior probability that the editor is honest, the higher the ethic of the journalist and/or the higher the journalist's weight of period one relative to her weight of period two. Interestingly, if the second period is sufficiently important to the journalist, no information is transmitted in equilibrium in period one. This opens the possibility that players manipulate information in period one so as to learn how to behave to maximize their second period payoff. We then focus on these situations in which one of the players strategically use information to her own purposes in period one. We obtain that an unmasking equilibrium (in which the freelance journalist tricks the editor so as to learn his motives) exists and that it is more likely to hold the higher the cost of a delay in publication and the higher the players' weights of period two relative to their weights of period one. Interestingly, we also obtain that the journalist finds it more profitable to manipulate information and fool the editor, the higher her belief that the editor is honest! Finally, we obtain that a revealing equilibrium (in which the editor *announces* his motives) exists and is more likely to occur the higher the ethic of the journalist, the higher the editor's weight of period two relative to his weight of period one, and the smaller the cost of a delay in publication.

We then analyze the quality of the communication process and the welfare implications of these three modes of communication. We obtain that if we considered citizens that value relevant information, they would be indifferent between the two types of information manipulation, as both yield the same probability that wrong information is published. However, from the point of view of the media sector (journalist and editor), the revealing scenario is generally preferred to the unmasking scenario. Last, we obtain that although the informative scenario is the best from the citizens' point of view; it is not necessarily the case from the media sector's point of view. In particular, it is so when second period payoffs are sufficiently high, in which case information manipulation may dominate information transmission.

Formally, our paper builds on the literature on strategic information transmission between two parties in a decision making process. We consider a signaling game, which links our paper to the literature on signaling (Spence (1973) and Cho and Kreps (1987)). However, we assume that the agent whose motives are unknown is the second mover, which introduces a slightly difference to the classical signaling games. Additionally, in the present paper messages directly affect payoffs, which distinguishes the model from the cheap talk games, pioneered by Crawford and Sobel (1982). Most similar to our paper is the literature on conformity. In particular, the exogenous desire of the the advisor to conform to the opinion of the decision maker, links our paper to this literature, and more specifically to Prendergast (1993) and Bernheim (1994). Prendergast (1993) studies how to provide a subordinate with the incentives to collect costly information, and shows that in the absence of reliable measures of performances, an endogenous incentive arises for the worker to conform to the opinion of the superior. Bernheim (1994) considers agents that care about social status to build a theory of social conformity, and shows that when status is sufficiently important, agents conform to an homogeneous standard of behavior. The spirit of our paper is, however, different to Prendergast and Bernheim's, as we consider a decision making process and intend to analyze different modes of communication that may lead to information transmission, as well as their welfare implications.

Topically, our paper contributes to the blooming literature on the mass media and the content of news. Recent contributions to this literature identifies a number of variables that affect the content of information. Using a demand-side argument, Mullainathan and Shleifer (2005) study how the preferences of the viewers affect the accuracy of news. More numerous are the papers that consider a supply-side argument. Among them, Gentzkow and Shapiro (2006), Stromberg (2004), **?** Anderson and McLaren (2005), Balan et al. (2005) or Gabszewicz et al. (2001), who point to different factors that affect the information transmitted, such as reputation, technology, degree of competition, ownership structure or revenues. None of these papers, however, consider in detail the transmission of information between the source of the news and its outlet, and how uncertainty may affect this transmission. Only Baron (2006) explicitly model the relationship between a journalist and an editor. His focus and ours is, however, totally different: while he builds a model of media bias and shows that this bias may persist even in the presence of media competition; media bias, or equivalently, information manipulation is, in our model, just another mode of communication that may drive to information disclosure in the future. Another two important differences between his paper and ours are the following. First, he considers a one shot game and so, there are no learning opportunities in his model. Second, in his model media outlets tolerate bias because it allows them to hire journalists at a lower wage; while in the present paper, information manipulation is meant to uncover the uncertainty surrounding the preferences of the decision maker, an ingredient that is not in Baron (2006)'s.

The rest of the paper is organized as follows. In Section 2 we present the model. In Section 3 we focus on three modes of communication and analyze the conditions under which such communication structures occur in equilibrium. In Section 4 we analyze the welfare of the agents involved in the production of news and then study the quality of the communication process, or equivalently, the welfare of the news consumers. Finally, Section 6 concludes.

2 The model

Consider a game between a freelance journalist (advisor) J and an editor (decision maker) E, in which the journalist has private information about a policy-relevant state of the world but lacks information about the motives of the editor. The game consists of two periods, and the same freelance journalist is consulted in both periods. In each period $t \in \{1, 2\}$, the state of the world is $w_t \in \{0, 1\}$, and the prior probability on the true state being 0 is $\theta \in (0, 1)$. The states w_1 and w_2 are drawn independently.

At the beginning of each period, the journalist observes the true state of the world with certainty. Upon observing the state, she chooses a message (writes a report) $m_t \in \{0, 1\}$ to send to the editor. The editor receives the message and takes an action $a_t \in \{0, 1\}$. The editor is free to stand on any position: he can publish the report of the journalist or disregard it and publish a report that stands on the other position. We assume, however, that the editor meets a positive cost c if his action does not correspond to the advise of the journalist. We consider that the editor can be either of two types: honest or biased, and that this is private information of the editor. With probability $\beta \in (0, 1)$, the editor is honest and wants to publish relevant -truthful- information; with probability $1 - \beta$, he is biased and always wants to publish the very same information, independently of the state of the world. Without loss of generality, we assume that the biased editor preferred state is 0. The freelance journalist wants her report to be published by the editor. This assumption represents the idea that the freelance journalist receives a monetary transfer when her reports are published or that she values status or popularity and so wants to be well perceived by the editor. Hence, there is in the model an exogenous incentive to the journalist to find out the editor's motives and to conform to them. We nevertheless consider that the journalist encounters disutility d for lying and so that, ceteris paribus, she prefers to be truthful.

After the editor takes his choice, the first-period payoffs are realized. Then, a new state w_2 is drawn, with the journalist observing it and sending a new message m_2, and the editor choosing the report a_2 to publish.

The payoff function of the freelance journalist in this two-period game is given by

$$-\lambda_1^J \left[d\,(w_1 - m_1)^2 + (m_1 - a_1)^2 \right] - \lambda_2^J \left[d\,(w_2 - m_2)^2 + (m_2 - a_2)^2 \right]$$

where $\lambda_1^J > 0$ and $\lambda_2^J > 0$ are the journalist's weight of period one and two, respectively, and $d \in (0, 1)$. The assumed payoff function says that the journalist receives maximal utility (disutility) when she sends an informative (uninformative) report and it gets (does not get) published. When these two events cannot occur at the same time, $d < 1$ implies that the freelance journalist prefers being approved to being truthful.[2]

The total utility of the honest editor is given by

$$-\lambda_1^E \left[(w_1 - a_1)^2 + c\,(m_1 - a_1)^2 \right] - \lambda_2^E \left[(w_2 - a_2)^2 + c\,(m_2 - a_2)^2 \right]$$

where $\lambda_1^E > 0$ and $\lambda_2^E > 0$ are the editor's weigh of period one and two, respectively, and $c \in (0, 1)$. This payoff function says that the honest editor wants to synchronize the position adopted with the state of the world, and that he pays cost c when he does not use the report of the journalist and chooses to stand on the other direction instead. Hence, he obtains maximal utility (disutility) when the journalist sends the right report and he publishes (does not publish) it. When the two events cannot occur at the same time, $c < 1$ implies that the honest editor prefers to correctly match the position adopted with the state of the world, even thought it implies a delay in publication.[3]

Finally, we assume that the total utility of the biased editor is

$$-\lambda_1^E \left[a_1 + c\,(m_1 - a_1)^2 \right] - \lambda_2^E \left[a_2 + c\,(m_2 - a_2)^2 \right]$$

which reads that the biased editor gains from reporting in favor of (his preferred) state 0, and that he pays cost c when he does not publish the journalist's report and stands on the other position instead.

3 Equilibrium analysis

In this section we analyze the conditions under which there is an equilibrium in period two in which the journalist truthfully reveals her information as long as she does not learn that the editor is biased, in which case she conforms to the motives of the latter and reports 0. Assuming that information is transmitted in the second period of the game whenever part of an equilibrium strategy, we then analyze three highly intuitive modes of communication that may take place in period one when the journalist wants to please the editor and the latter benefits from the conformity of the journalist. We obtain that, despite the desire of the journalist to conform to the editor's motives, there is an equilibrium in which the journalist fully reveals her information in period one. Additionally, and precisely because of this interest of the journalist to please the superior, we observe that if players sufficiently value second period payoffs, there is an equilibrium in which the journalist manipulates her information in period one so as to learn the motives of the editor. Last, and because the editor also benefits from the conformity of the journalist, we show that

[2] If we were to assume $d > 1$, in equilibrium, we would obtain full disclosure of state-relevant information. See footnote 4 for an extended discussion on this matter.

[3] If we were to assume $c > 1$, in equilibrium, we would obtain that the editor (either honest or biased) would always follow the prescription of the journalist. See footnote 4.

if the editor is patiently enough, there is an equilibrium in which it is the editor who sacrifices his first period payoff so as to reveal his intentions.

We solve the two-period game by backward induction. Our equilibrium concept is the perfect Bayesian equilibrium. We focus on pure strategy equilibria.

Second period of the game

The journalist enters the second period of the game with an updated belief of the type of the editor. Given the editor's behavior in the first period, we have three cases: (i) the journalist learns that she is playing with a biased editor; (ii) the journalist learns that she is playing with an honest editor; and (iii) the journalist does not learn the type of the editor. We consider each of the cases separately and analyze, for each of them, the equilibria of the second period of the game.

(i) The journalist learns that she is playing with a biased editor. In other words, the posterior belief that the editor is honest is zero. In this case, the journalist knows that the (biased) editor will always publish $a_2 = 0$. To see it, note that for all $m_2 \in \{0,1\}$ and $c \in (0,1)$, the biased editor's utility if he chooses 0 is $-\lambda_2^E \left[c\,(m_2)^2\right]$, which is always greater than his utility if he chooses 1, which is $-\lambda_2^E \left[1 + c\,(m_2-1)^2\right]$. The journalist anticipates the editor's behavior and, given that she prefers being approved to being truthful, sends message $m_2 = 0$, independently of the state of the world. Hence, if the journalist knows that she is playing with a biased editor, in the unique equilibrium of the second period of the game, $\forall w_2 \in \{0,1\}$, $m_2^* = 0$ and, $\forall m_2 \in \{0,1\}$, $a_2^* = 0$.[4]

(ii) The journalist learns that she is playing with an honest editor. It means that the posterior belief that the editor is honest is one. In this case, there always exists an equilibrium in which the journalist truthfully reveals the state of the world. To see it, consider that, $\forall w_2 \in \{0,1\}$, the journalist's strategy is $m_2 = w_2$. By Bayes' rule, the editor assigns probability one to the true state being 0 (1) when he observes message 0 (1). This implies that, $\forall m_2 \in \{0,1\}$, the (honest)

[4]In the paper we assume that: (i) the journalist prefers being approved to being truthful ($d \in (0,1)$) and (ii), the editor prefers to match the position adopted with his motives to save the cost of a delay in publication ($c \in (0,1)$). To see that this is the most interesting scenario for our results, let us focus on the second period of the game and consider $d > 1$. Suppose the extreme case in which the journalist knows that she is playing with a biased editor who will always publish 0. Note that this is the scenario where the journalist has the strongest incentives to manipulate her information. The reader can easily see that, even in the most pro-manipulation scenario, the journalist prefers to reveal her information (which implies a payoff of $-\lambda_2^J[m_2]$), to conform to the editor's motives (which implies a payoff of $-\lambda_2^J[dw_2]$). As a result, if $d > 1$, the journalist never finds it profitable to manipulate her information and, in equilibrium, we observe full disclosure of state-relevant information. Now consider $c > 1$. Let us focus on the second period of the game and on the behavior of the biased editor. In this case, we observe that the biased type prefers to follow the prescription of the journalist and avoid a delay in publication (which implies a payoff of $-\lambda_2^E[a_2]$), to stand on his preferred policy (which implies a payoff of $-\lambda_2^E[cm_2]$). In words, the biased editor does no longer behave as biased. This results in a less interesting scenario in which the editor basically mimics the behavior of the journalist.

editor's best response is $a_2 = m_2$, which gives him utility 0; whereas his utility if he chooses $a_2 \neq m_2$ is $-\lambda_2^E [1 + c]$. The journalist anticipates that the editor will always publish her advise and so, finds it optimal to reveal the true state of the world, which gives her utility 0. Hence, if the journalist knows that she is playing with an honest editor, there is an equilibrium in the second period of the game in which, $\forall w_2 \in \{0, 1\}$, $m_2^* = w_2$ and, $\forall m_2 \in \{0, 1\}$, $a_2^* = m_2$.

(iii) The journalist does not learn the type of the editor. In this case, there is an equilibrium in which the journalist truthfully reveals the state of the world, the biased editor always publishes 0 and the honest editor publishes the journalist's prescription. For this strategy profile to constitute an equilibrium, $\widehat{\beta} \geq 1 - d$ must hold, where $\widehat{\beta}$ is the posterior belief that the editor is honest. To show it, note that the biased editor always finds it optimal to publish 0, and that the honest editor, in an informative set-up, maximizes his payoff when he follows the journalist's advise. Given this, when the state is 0, the journalist finds it optimal to report 0. In contrast, when the state is 1, the journalist's payoff if she reports truthfully is $-\lambda_2^J(1 - \widehat{\beta})$, as with probability $(1 - \widehat{\beta})$ she meets a biased editor who does not publish her advise; whereas her payoff if she sends 0 is $-\lambda_2^J d$, as her report will always be published but she incurs in cost d for lying. Hence, $\widehat{\beta} \geq 1 - d$ guarantees that $\forall w_2 \in \{0, 1\}$, $m_2 = w_2$. If the journalist does not learn the type of the editor, there is therefore an equilibrium in the second period of the game in which $\forall w_2 \in \{0, 1\}$, $m_2^* = w_2$ and, $\forall m_2 \in \{0, 1\}$, $a_2^* = m_2$ for the honest editor and $a_2^* = 0$ for the biased editor; if and only if $\widehat{\beta} \geq 1 - d$.

In the analysis that follows, we assume that the journalist reveals her information in the second period of the game when it is part of an equilibrium strategy. In other words, we consider that the journalist reveals the true state of the world when either she learns that the editor is honest or she does not learn the type of the editor (this requires that condition $\widehat{\beta} \geq 1 - d$ holds in this case); and sends 0, independently of the state, when she learns that the editor is biased. We call this kind of equilibrium a *partially informative equilibrium*.

First period of the game

Consider that the partially informative equilibrium is played in the second period of the game. We now focus on three highly intuitive modes of communication that may take place in period one when the journalist is not sure about the motives of the editor and wants to please the latter with her behavior. These modes of communication are the following. First, the journalist reveals all her information (informative scenario). Second, the journalist manipulates her information so as to uncover the intentions of the editor and learn what to report in period two (unmasking scenario). Third, the editor reveals his motives in period one so as to guarantee the desired report in the second period of the game (revealing scenario). Note that in both, the unmasking and the revealing scenario, there is one player that sacrifices her first period payoff for increasing future rents; whereas in the informative equilibrium there is no such loss.

Informative scenario

Here we show that there is an equilibrium in the first period of the game where the journalist reveals the true state of the world, the honest editor publishes the journalist's report and the biased editor publishes 0, independently of the advice. We call this kind of equilibrium an *informative equilibrium*.

Let us consider that such an equilibrium exists. In this equilibrium, the journalist perfectly learns the type of the editor when she sends 1 in the first stage. In particular, for $m_1 = 1$, the posterior belief that the journalist has on the editor being honest is 0 when the editor chooses $a_1 = 0$, and it is 1 when he chooses $a_1 = 1$. In contrast, the journalist does not learn the type of the editor when she sends $m_1 = 0$ in the first stage. In this case, the posterior belief that the journalist has on the editor being honest is the prior probability β when the editor publishes 0 (hence $\widehat{\beta} = \beta$ in this case, with $\beta \geq 1 - d$, as we consider that a partially informative equilibrium is played in period two), and it is y when he deviates and publishes 1 (hence $\widehat{\beta} = y$ in this case, with $y \in [1 - d, 1]$).[5]

With these posteriors at hand, we now analyze under which conditions the above specification constitutes an equilibrium. Let us therefore suppose that the journalist reports truthfully in the first period of the game. Bayes' rule determines the posterior beliefs on the state of the world. We start analyzing the behavior of the editor.

Consider the case of the biased editor and let us suppose that the journalist sends $m_1 = 0$. Remember that in this case the journalist does not learn the type of the editor; then she plays a separating strategy in the second period. This determines a payoff of $-\lambda_2^E(1-\theta)c$ to the editor in period two, independently of his action in period one.[6] Hence, the biased editor's best response to a journalist sending $m_1 = 0$ is $a_1 = 0$, which guarantees him a payoff of 0 in the first period (action 1 implies a first period payoff of $-\lambda_1^E(1+c)$). Let us now suppose that the journalist sends $m_1 = 1$ in period one. In this case, the editor has the ability to *signal* his type to the journalist, which gives him the possibility to obtain his highest payoff in period two. Hence, the biased editor chooses $a_1 = 0$, which implies a total payoff of $-\lambda_1^E c$, as compared to $a_1 = 1$ that implies a first period payoff of $-\lambda_1^E$. Then, for all $m_1 \in \{0, 1\}$, $a_1^* = 0$ for the biased editor.

Consider now the case of the honest editor. Note that, for all $m_1 \in \{0, 1\}$, if the editor chooses $a_1 = m_1$, the journalist then plays a separating strategy in period two, which guarantees the former a total payoff of 0. In contrast, if the editor does $a_1 \neq m_1$, he obtains a payoff of $-\lambda_1^E(1+c)$ in period one. Hence, for all $m_1 \in \{0, 1\}$, $a_1^* = m_1$ for the honest editor.

Finally, we have to analyze whether the journalist, who anticipates the editor's

[5]Note that $y > 0$, as $d \in (0, 1)$. In words, out of the equilibrium path, the journalist assigns positive probability to the editor being honest.

[6]If the biased editor deviates in period one, his optimal response in period two is $a_2 = 0$, which guarantees him this payoff.

behavior, finds it optimal to be truthful in period one. To this aim, let us start considering the case $w_1 = 0$, and suppose that the journalist plays her equilibrium strategy $m_1 = w_1$. Then, $\widehat{\beta} = \beta$. Here, her total payoff is $-\lambda_2^J(1-\theta)(1-\beta)$, as only in the case the state is 1 in period two and the editor is biased, the journalist's report is not published. Now consider the case that the journalist deviates and sends $m_1 = 1$ for state $w_1 = 0$.[7] In this case, her total payoff is $-\lambda_1^J[d + (1-\beta)] - \lambda_2^J(1-\theta)(1-\beta)d$, as the journalist now pays the moral cost d in period one and she also pays such a cost in period two when the state is 1 and she sends 0 because she learns that the editor is biased. Hence, if $w_1 = 0$, $m_1^* = 0$ if and only if $\lambda_1^J \geq \frac{(1-\theta)(1-\beta)(1-d)}{d+(1-\beta)}\lambda_2^J$. That is to say, if $w_1 = 0$, to report truthfully is more likely the smaller λ_2^J, and the higher λ_1^J, θ, β and/or d.

Last, consider the case $w_1 = 1$. Suppose the journalist sends $m_1 = 1$. This implies that with probability $1-\beta$ her advise is not published in period one, but sending 1 allows her to learn the type of the editor and so, to behave optimally and maximize her payoff in period two. In particular, if $m_1 = 1$, the journalist's total payoff is $-\lambda_1^J(1-\beta) - \lambda_2^J(1-\theta)(1-\beta)d$. On the other hand, if the journalist deviates and sends $m_1 = 0$, she pays cost d for lying but her report is published for sure in period one. Additionally, she cannot learn the type of the editor (hence $\widehat{\beta} = \beta$) and cannot do better than separating in period two. It implies a total payoff of $-\lambda_1^J d - \lambda_2^J(1-\theta)(1-\beta)$, which is always smaller than the previous one, given the restriction $\beta \geq 1-d$. Hence, if $w_1 = 1$, $m_1^* = 1$.

Summarizing, there is an equilibrium in which the journalist fully disclose her information in period one, the honest editor publishes the journalist's report and the biased editor always publishes 0 if and only if $\lambda_1^J \geq \frac{(1-\theta)(1-\beta)(1-d)}{d+(1-\beta)}\lambda_2^J$ and $\lambda_2^J \geq \frac{(1-\beta)-d}{(1-\theta)(1-\beta)(1-d)}\lambda_1^J$ hold (a sufficient condition for the second inequality to hold is $\beta \geq 1-d$). The following proposition formalizes this result.

Proposition 1. *An informative equilibrium in period one followed by a partially informative equilibrium in period two exists if and only if $\beta \geq 1-d$ and $\lambda_1^J \geq \frac{(1-\theta)(1-\beta)(1-d)}{d+(1-\beta)}\lambda_2^J$.*

Corollary 1. *An informative equilibrium in period one, followed by a partially informative equilibrium in period two, is more likely to exist the higher is the prior probability that the state is zero, θ; the higher is the prior probability that the editor is honest, β; the higher is the ethic of the journalist, d; and the higher is the journalist's weight of period one, λ_1^J, relative to the weight of period two, λ_2^J.*

This result presents a comparative static analysis. The last part of Corollary 1 says that if the second period is sufficiently important to the journalist, no information transmission occurs in equilibrium in period one. The idea is that if the journalist assigns high importance to the second period payoff, learning the type of the editor becomes of special relevance. This raises the question of under

[7] If the journalist deviates in period one, her optimal response in period two is, $\forall w_2 \in \{0,1\}$, $m_2 = w_2$ if $a_1 = 1$ and $m_2 = 0$ if $a_1 = 0$.

which conditions the journalist finds it profitable to pump the editor for his motives in the first period and so, learn how to behave in period two. But similarly, we may wonder whether the editor himself has incentives to facilitate the journalist's job by revealing his type so as to guarantee that the journalist conforms to his motives in period two. In the remaining of the section, we analyze these two types of behavior.

Unmasking scenario

This section deals with the analysis of the incentives of a journalist to fool the editor in period one so as to uncover his motives and learn how to behave to maximize her second period payoff. In this case, it is the journalist who sacrifice her first period payoff in order to increase future rents.

We next fix the behavior of the editor (as previously, we consider that the honest editor follows the journalist's advise and the biased editor stands on policy 0, independently of the report) and study the conditions under which there is an equilibrium in period one in which the journalist pools at message 1. Note that, by so doing, the journalist learns the motives of the editor. We thus call this kind of equilibrium an *unmasking equilibrium.*

Let us consider that such an equilibrium exists. In the equilibrium path, the journalist learns the motives of the editor. Hence, for $m_1 = 1$, the posterior belief that the journalist has on the editor being honest is 0 when the latter publishes $a_1 = 0$, and it is 1 when he publishes $a_1 = 1$. Out of the equilibrium path (when $m_1 = 0$), the posterior belief that the journalist has on the editor being honest is y when the latter publishes $a_1 = 0$ (hence $\widehat{\beta} = y$ in this case, with $y \in [1-d, 1]$), and it is z when the editor publishes 1 (hence $\widehat{\beta} = z \in [1-d, 1]$ in this case). Note that $d \in (0, 1)$. Thus, out of the equilibrium path, the journalist assigns positive probability to the editor being honest and so, she will always reveal her information in period two.

Regarding the posterior belief that the editor has on the state being 0, it is the prior θ when the journalist sends the equilibrium message 1; and it is $x \in (0, 1)$ when she sends the out of the equilibrium message 0. With these posteriors at hand, we now analyze the behavior of the players.

Consider the case of the biased editor. Note that his decision problem is the same as previously (the posterior probability on the state of the world that is now different does not affect his decision), and so, for all $m_1 \in \{0, 1\}$, $a_1^* = 0$ for the biased editor.

Consider now the case of the honest editor and suppose that the journalist sends the equilibrium message $m_1 = 1$. Choosing action $a_1 = 1$ guarantees the editor that the journalist will play a separating strategy in period two, which gives him a payoff of 0 in the last period. However, the editor is now unsure about the state of the world, and so, publishing $a_1 = 1$ implies a payoff of $-\lambda_1^E \theta$ in period one. On the other hand, publishing $a_1 = 0$ implies a first period payoff of $-\lambda_1^E[c + (1-\theta)]$, as the editor incurs in cost c for disregarding the journalist's report, with the new action corresponding to the true state just with probability θ.

Additionally, publishing $a_1 = 0$ implies a second period payoff of either $-\lambda_2^E(1-\theta)$ or $-\lambda_2^E(c+\theta)$, that correspond to the cases where the editor chooses either $a_2 = 0$ or $a_2 = 1$, respectively.[8] Hence, for $a_1 = 1$ to be the best response of the honest editor to $m_1 = 1$, condition $\lambda_2^E \geq \max\{\frac{2\theta-1-c}{1-\theta}, \frac{2\theta-1-c}{c+\theta}\}\lambda_1^E$ must hold. Note that if $2\theta < 1+c$, the former inequality holds; then, $a_1^* = 1$ in this case. Note, additionally, that if $2\theta > 1+c$, $\max\{\frac{2\theta-1-c}{1-\theta}, \frac{2\theta-1-c}{c+\theta}\} = \frac{2\theta-1-c}{1-\theta}$. To summarize, if $m_1 = 1$, $a_1^* = 1$ for the honest editor if and only if $\lambda_2^E \geq \frac{2\theta-1-c}{1-\theta}\lambda_1^E$. Let us now consider that the journalist deviates and sends $m_1 = 0$. In this case, the journalist will always play a separating strategy in the second stage, which guarantees the editor a payoff of 0 in period two.[9] Regarding the first period payoff, it is $-\lambda_1^E(1-x)$ if the editor publishes $a_1 = 0$, and it is $-\lambda_1^E[c+x]$ if he publishes $a_1 = 1$. Hence, if $m_1 = 0$, $a_1^* = 0$ for the honest editor if and only if $x \geq \frac{1-c}{2}$.

Finally, let us analyze under which parameter configuration the journalist finds it optimal to pool at $m_1 = 1$ in period one. To this aim, note that if the journalist sends $m_1 = 1$, her second period payoff is $-\lambda_2^J(1-\theta)(1-\beta)d$; whereas if she deviates and sends $m_1 = 0$, it is $-\lambda_2^J(1-\theta)(1-y)$.[10] Regarding the first period payoff, if $w_1 = 0$, it is optimal to send $m_1 = 0$, which implies a payoff of 0; whereas sending $m_1 = 1$ implies a payoff of $-\lambda_1^J[d+(1-\beta)]$. Hence, if $w_1 = 0$, $m_1^* = 1$ if and only if $\lambda_2^J(1-\theta)((1-y)-(1-\beta)d) \geq \lambda_1^J((1-\beta)+d)$. On the other hand, if $w_1 = 1$ (and regarding the first period payoff), it is optimal to send $m_1 = 1$, which implies a payoff of $-\lambda_1^J(1-\beta)$; whereas sending $m_1 = 0$ implies a payoff of $-\lambda_1^J d$. Hence, if $w_1 = 1$, $m_1^* = 1$ if and only if $\lambda_2^J(1-\theta)((1-y)-(1-\beta)d) \geq \lambda_1^J((1-\beta)-d)$. Summarizing, for all $w_1 \in \{0,1\}$, $m_1^* = 1$ if and only if $\lambda_2^J(1-\theta)((1-y)-(1-\beta)d) \geq max\{(1-\beta)+d, (1-\beta)-d\}\lambda_1^J$. As $d > 0$, the aforementioned condition simplifies to $\lambda_1^J \leq \frac{(1-\theta)((1-y)-(1-\beta)d)}{(1-\beta)+d}\lambda_2^J$. Proposition 2 below formalizes this result.

Proposition 2. *An unmasking equilibrium in period one followed by a partially informative equilibrium in period two exists if and only if parameters satisfy* $\lambda_2^E \geq \frac{2\theta-1-c}{1-\theta}\lambda_1^E$ *and* $\lambda_1^J \leq \frac{(1-\theta)((1-y)-(1-\beta)d)}{(1-\beta)+d}\lambda_2^J$*; and beliefs out of the equilibrium path satisfy* $x \geq \frac{1-c}{2}$*,* $y \geq 1-d$ *and* $z \geq 1-d$*.*

The next result presents a comparative statics analysis.

Corollary 2. *An unmasking equilibrium in period one, followed by a partially informative equilibrium in period two, is more likely to exist the smaller is the prior probability that the state is zero, θ; the higher is the cost of a delay in publication,*

[8] The optimal policy in period two depends on the value of θ as compared to c.

[9] After a deviation to $m_1 = 0$, the posterior belief that the journalist has on the editor being honest (either y or z) must be greater or equal than $1-d$. As $d < 1$, the posterior belongs to the interval $(1-d, 1]$. In words, out of the equilibrium path, the journalist either thinks that the editor is honest or she is unsure about the motives of the editor. As we consider that a partially informative equilibrium is played in the second period of the game, it implies that, if the journalist deviates to $m_1 = 0$ in period one, she will always play a separating strategy in period two.

[10] If the journalist deviates in period one, her optimal response in period two is, $\forall w_2 \in \{0,1\}$, $m_2 = w_2$.

c; the higher is the prior probability that the editor is honest, β; and the higher are the journalist and the editor's weights of period two, λ_2^J and λ_2^E, relative to their weight of period one, λ_1^J and λ_1^E respectively.

Note that there is no clear-cut prediction when it is parameter d that varies. The reason is that an increase in the ethic of the journalist makes more likely that a partially informative equilibrium exists in period two; but at the same time, an increase in d raises the cost of manipulating information and so makes less likely that an unmasking equilibrium exists in period one. The final effect thus depends on the particular value of d as compared to the rest of parameter values.

From Corollary 2 we observe that the higher the weights that both players attach to period two, the higher is the probability that an unmasking equilibrium exists. The reason is straightforward. The higher the importance of period two, the more utility the players are willing to sacrifice in period one in order to increase their second period payoff. Corollary 2 also concludes that the journalist sends message 1 more often the higher is the prior probability that the editor is honest. Or to say it differently, the journalist finds it more profitable to manipulate information and fool the editor the higher her belief that he is honest! The reason is that, as we consider that the honest type trusts the journalist and publishes her report, the payoff-loss associated to pool at $m_1 = 1$ is smaller when the editor is honest than when he is biased.

The journalist has, nevertheless, another way of manipulating information: reporting 0 under any state of the world. There is, however, no equilibrium in which the journalist finds it profitable to pool at message $m_1 = 0$ in period one (and the editor behaves as previously), if we assume that a partially informative equilibrium is played in period two. To see it, consider $w_1 = 1$. The payoff to the journalist when she sends $m_1 = 0$ is $-\lambda_1^A d - \lambda_2^J(1-\theta)(1-\beta)$; whereas her payoff if she deviates and sends $m_1 = 1$ is $-\lambda_1^J(1-\beta) - \lambda_2^J(1-\theta)(1-\beta)d$. As the condition for the existence of a partially informative equilibrium in period two is $\widehat{\beta} \geq 1-d$, and $\widehat{\beta} = \beta$ in this case; it is easy to see that if $w_1 = 1$, $m_1 = 0$ is not optimal. Hence the impossibility.[11]

To summarize, *ceteris paribus* the behavior of the editor, if we consider that a partially informative equilibrium is played in period two, manipulation of information in period one necessarily translates into an unconditional support for policy 1. Furthermore, the probability that this kind of manipulation of information occurs in equilibrium increases with the belief that the editor is honest.

Revealing scenario

Last, this section intends to analyze the incentives of the editor to facilitate the journalist's job by *revealing* his type in period one so as to make sure that the

[11] In words, the idea is that for a partially informative equilibrium to exist in period two, it is necessary that the journalist believes that her superior is biased with a low probability; whereas for a pooling equilibrium at $m_1 = 0$ to exist in period one, it is necessary that the journalist believes that the editor is very likely to be biased. This implies a contradiction.

journalist conforms to his motives in period two. In this case, it is the editor who sacrifices his first period payoff so as to increase future rents.

We next consider that the journalist truthfully reveals her information in period one and that the honest editor publishes $a_1 = 1$ for any advice. In such a case, for all $m_1 \in \{0,1\}$, the biased editor finds it optimal to choose $a_1 = 0$, which guarantees him a total payoff of, at worst, $-\lambda_1^E c - \lambda_2^E(1-\theta)c$; whereas choosing $a_1 = 1$ implies a total payoff of, at most, $-\lambda_1^E - \lambda_2^E(1-\theta)c$. Then, for all $m_1 \in \{0,1\}$, $a_1^* = 0$ for the biased editor.

We thus analyze the conditions under which there is an equilibrium in period one in which the journalist truthfully reveals her information, the honest editor publishes 1 and the biased editor publishes 0. We call this kind of equilibrium a *revealing equilibrium*.

Let us consider that such an equilibrium exists. In the equilibrium path, the journalist perfectly learns the motives of the editor. Hence, for all $m_1 \in \{0,1\}$, the posterior belief that the journalist has on the editor being honest is 0 when the latter publishes $a_1 = 0$, and it is 1 when he publishes $a_1 = 1$. The posterior beliefs on the state of the world are determined by Bayes' rule. With these posteriors at hand, we now analyze the behavior of the players.

Consider the case of the honest editor and suppose that the journalist sends message $m_1 = 1$. In this case, the total payoff to the editor if he publishes $a_1 = 1$ is 0, as the report published corresponds to the true state in period one and additionally, he signals the journalist his type and guarantees the highest payoff in period two; whereas publishing $a_1 = 0$ implies a first period payoff of $-\lambda_1^E(1+c)$. Hence, if $m_1 = 1$, $a_1^* = 1$ for the honest editor. Now consider the case that the journalist sends message $m_1 = 0$. Here, publishing $a_1 = 1$ implies a total payoff of $-\lambda_1^E(1+c)$, as there is a delay in publication and the position adopted does not correspond to the state of the world, although it guarantees a payoff of zero in period two. On the other had, deviating and publishing $a_1 = 0$ implies a first period payoff of 0 but a second period payoff of either $-\lambda_2^E(1-\theta)$ or $-\lambda_2^E(c+\theta)$, that correspond to the cases where the editor chooses either $a_2 = 0$ or $a_2 = 1$, respectively.[12] Hence, if $m_1 = 0$, $a_1^* = 1$ for the honest editor if and only if $\lambda_2^E \geq \max\{\frac{1+c}{1-\theta}, \frac{1+c}{c+\theta}\}\lambda_1^E$.

Finally, we analyze under which parameter configuration the journalist finds it optimal to truthfully reveal her information in period one. To this aim, note that for any message in period one, the journalist learns the type of the editor. Hence, she guarantees a second period payoff of $-\lambda_2^J(1-\beta)(1-\theta)d$. Now suppose that $w_1 = 0$. In this case, sending $m_1 = 0$ implies a first period payoff of $-\lambda_1^J\beta$; whereas sending $m_1 = 1$ implies a payoff of $-\lambda_1^J(d+(1-\beta))$ in period one. Hence, if $w_1 = 0$, $m_1^* = 0$ if and only if $\beta \leq \frac{1+d}{2}$. Suppose now that $w_1 = 1$. Then, sending $m_1 = 1$ implies a first period payoff of $-\lambda_1^J(1-\beta)$; whereas reporting $m_1 = 0$ determines a first period payoff of $-\lambda_1^J(d+\beta)$. Hence, if $w_1 = 1$, $m_1^* = 1$

[12] If the editor deviates to $a_1 = 0$ in period one, $m_2 = 0$ in period two. Then $a_2^* = 0$ or $a_2^* = 1$ depending on the value of θ as compared to c.

if and only if $\beta \geq \frac{1-d}{2}$. Therefore, for all $w_1 \in \{0,1\}$, $m_1^* = w_1$ if and only if $\frac{1-d}{2} \leq \beta \leq \frac{1+d}{2}$. Proposition 3 formalizes this result.

Proposition 3. *A revealing equilibrium in period one followed by a partially informative equilibrium in period two exists if and only if* $\lambda_2^E \geq \max\{\frac{1+c}{1-\theta}, \frac{1+c}{c+\theta}\}\lambda_1^E$ *and* $\frac{1-d}{2} \leq \beta \leq \frac{1+d}{2}$.

The next result presents a comparative statics analysis.

Corollary 3. *A revealing equilibrium in period one, followed by a partially informative equilibrium in period two, is more likely to exist the more ethic the journalist is, d; and the higher is the editor's weight of period two, λ_2^E, relative to his weight of period one, λ_1^E. Additionally, if θ is high (specifically, $\theta > \frac{1-c}{2}$), the smaller the prior probability that the state is zero, θ, and/or the smaller the cost of a delay in publication, c; the more likely that a revealing equilibrium, followed by a partially informative equilibrium, exists. In contrast, if θ is low (specifically, $\theta < \frac{1-c}{2}$), an increase in either θ or c increases the likelihood that a revealing equilibrium, followed by a partially informative equilibrium, exists.*

From Corollary 3 we learn that there is not a monotonic relationship between parameters θ and c, and the existence of a revealing equilibrium. To see it, note that for the honest editor to be willing to publish $a_1 = 1$ when he knows that the true state is zero, it has to be the case that second period payoff is sufficiently important and furthermore, that the cost of publishing $a_1 = 0$ (to which the journalist responds with $m_2 = 0$), in terms of second period payoff-loss, is important enough. This is the case when θ is low, in which case the editor's best response to $m_2 = 0$ is $a_2 = 1$, and either θ or c increase. It is also the case when θ is high, in which case the editor's best response to $m_2 = 0$ is $a_2 = 0$, and either θ or c decrease.

Regions of existence

The fact that we consider that a partially informative equilibrium is played in the second period of the game imposes a restriction on posterior probability $\widehat{\beta}$, that must satisfy condition $\widehat{\beta} \geq 1 - d$, in case the uncertainty about the motives of the editor does not disappear after first period. In Figure 1 bellow we illustrate the regions where, according to posterior $\widehat{\beta}$ and parameter d, there might exist equilibria of the types we have analyzed.

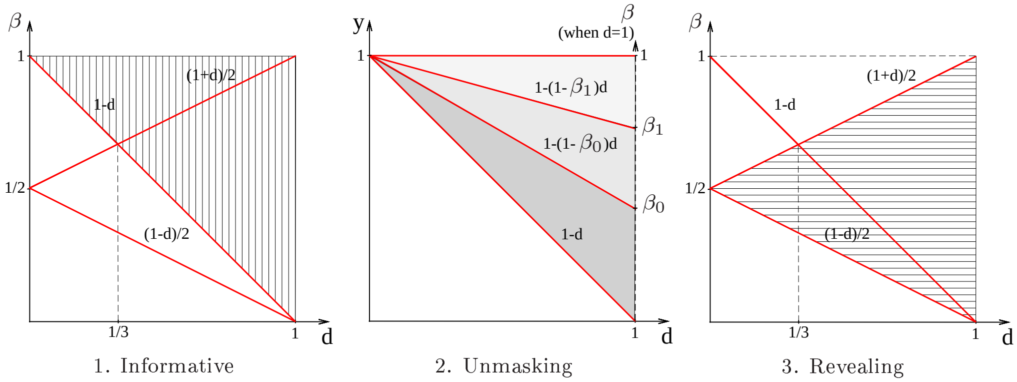

Figure 1: regions of existence of equilibria

Note that in an informative equilibrium, the journalist perfectly learns the motives of the editor when the state is 1 in period one, but does not when the state is 0. Hence, in the relevant case, $\widehat{\beta} = \beta$ and thus, $\beta \geq 1 - d$ determines the region where an informative equilibrium may exist. In a similar vein, in an unmasking equilibrium, the journalist does not learn the preferences of the editor when she reports 0 in period one; hence, in the relevant case, $\widehat{\beta} = y$. In the unmasking scenario, there is, additionally, another condition involving posterior probability y that must hold. It is $(1-y) - (1-\beta)d \geq 0$. Then, $1 - d \leq y \leq 1 - (1-\beta)d$ determines the region where un unmasking equilibrium may exist. Note that the bigger the β, the flatter the upper bound $1-(1-\beta)d$ and so, the greater the region where the unmasking equilibrium may exist. Finally, in a revealing equilibrium, the uncertainty about the motives of the editor is always solved in period one. However, condition $\frac{1-d}{2} \leq \beta \leq \frac{1+d}{2}$ determines the region where a revealing equilibrium may exist.

From Figure 1 above we observe that the region where an informative and a revealing equilibrium may coexist satisfies condition $1-d \leq \beta \leq \frac{1+d}{2}$. Straightforward calculations show us that this is also the region where the two aforemention equilibria may coexist with the unmasking equilibrium.

Proposition 4. *The region where the informative, the unmasking and the revealing equilibrium (followed, in all the cases, by a partially informative equilibrium) may coexist, satisfies conditions: (i)* $1 - d \leq \beta \leq \frac{1+d}{2}$ *and; (ii) either* $\lambda_2^E \geq \frac{1+c}{1-\theta}\lambda_1^E$ *or* $\lambda_2^E \geq \frac{1+c}{c+\theta}\lambda_1^E$*, depending on whether* $\theta > \frac{1-c}{2}$ *or* $\theta < \frac{1-c}{2}$*, respectively.*

Proof. First, in the region where the unmasking and the informative equilibrium may coexist: $\frac{(1-\theta)(1-\beta)(1-d)}{d+(1-\beta)}\lambda_2^J \leq \lambda_1^J \leq \frac{(1-\theta)((1-y)-(1-\beta)d)}{d+(1-\beta)}\lambda_2^J$. A necessary condition for this inequality to hold is $(1-\beta)(1-d) \leq (1-y)-(1-\beta)d$, which simplifies to $y \leq \beta$. As $1-d \leq y$ in an unmasking equilibrium, we obtain $1-d \leq \beta$. Second, in the region where the unmasking and the revealing equilibrium may coexist: $\lambda_2^E \geq max\{\frac{1+c}{1-\theta}, \frac{1+c}{c+\theta}, \frac{2\theta-1-c}{1-\theta}\}\lambda_1^E$. There are two cases: (i) If $\theta > \frac{1-c}{2}$, $\frac{1+c}{1-\theta} > \frac{1+c}{c+\theta}$. Additionally, in this case, $\frac{1+c}{1-\theta} > \frac{2\theta-1-c}{1-\theta}$, as $\theta < 1$. (ii) If $\theta < \frac{1-c}{2}$, $\frac{1+c}{c+\theta} > \frac{1+c}{1-\theta}$.

Additionally, in this case, $2\theta - 1 + c < 0$, then $2\theta - 1 - c < 0$. This completes the proof. $\square$

4 Welfare analysis

In the paper we consider a game between an advisor and a decision maker whose behaviors affect not only their own welfare but the welfare of the citizens who, for some reason, rely on the output of the communication process. In the context of a freelance journalist-editor game, these citizens are the readers or viewers of the media outlet. In this section we analyze the welfare implications of the previously considered modes of communication. Depending on which is the role of the player, we talk of *news suppliers* (journalist and editor), or *news consumers* (readers). The way to compute welfare depends on whether the player participates in the production of news. We thus analyze the two cases separately.

Welfare analysis of news suppliers

Let us focus on the region in which the three aforementioned equilibria may coexist. Let us refer to welfare as the payoff of a player in a particular scenario.

Lemma 1. *If $\lambda_1^J \geq \frac{(1-\theta)(1-\beta)(1-d)}{\beta}\lambda_2^J$, the journalist maximizes her welfare under the informative scenario. Otherwise, she prefers the revealing scenario. Additionally, in the two cases, the journalist obtains her smallest payoff in the unmasking scenario.*

Proof. The welfare of the journalist is: (i) in the informative equilibrium, $\theta(-\lambda_2^J(1-\theta)(1-\beta)) + (1-\theta)(-\lambda_1^J(1-\beta) - \lambda_2^J(1-\theta)(1-\beta)d)$; (ii) in the unmasking equilibrium, $\theta(-\lambda_1^J(d+(1-\beta))) + (1-\theta)(-\lambda_1^J(1-\beta)) - \lambda_2^J(1-\theta)(1-\beta)d$ and; (iii) in the revealing equilibrium, $\theta(-\lambda_1^J\beta) + (1-\theta)(-\lambda_1^J(1-\beta)) - \lambda_2^J(1-\theta)(1-\beta)d$.

Comparing (i) and (ii), we obtain that the journalist prefers the informative to the unmasking equilibrium. In particular, she prefers (i) to (ii) if and only if $\lambda_1^J \geq \frac{(1-\theta)(1-\beta)(1-d)}{d+(1-\beta)}\lambda_2^J$, which is a necessary condition for the existence of the informative equilibrium. Comparing (i) and (iii), we obtain that the journalist prefers the informative to the revealing equilibrium if and only if $\lambda_1^J \geq \frac{(1-\theta)(1-\beta)(1-d)}{\beta}\lambda_2^J$. Last, comparing (ii) and (iii), we obtain that the journalist prefers the revealing to the unmasking equilibrium. In particular, she prefers (iii) to (ii) if and only if $\beta \leq \frac{1-d}{2}$, which is a necessary condition for the existence of the revealing equilibrium. $\square$

From Lemma 1 we learn that, unless second period payoff is sufficiently important, the journalist prefers the informative scenario to the revealing scenario. We also observe that when the journalist believes that the editor is very likely to be biased, she then prefers the revealing to the informative scenario. The reason is that if the editor is very likely to be biased, second period payoffs associated with an informative equilibrium in period one are not high enough. In this case, the revealing equilibrium has the advantage of maximizing second period payoffs, although it decreases first period rents. Last, regarding information manipulation, we observe that the journalist prefers the editor to sacrifice his first period payoff to her incurring in such a cost.

Lemma 2. *The honest editor maximizes his welfare under the informative scenario and obtains his smallest payoff under the revealing scenario.*

Proof. The welfare of the honest editor is: (i) in the informative equilibrium, 0; (ii) in the unmasking equilibrium, $\theta(-\lambda_1^E)$ and; (iii) in the revealing equilibrium, $\theta(-\lambda_1^E(1+c))$. As $c > 0$, the proof follows. □

Lemma 2 says that the honest editor prefers that the journalist conforms to his opinion to him risking his first period payoff so as to reveal his motives. As expected, we obtain opposite results for the biased editor. The reason is that, giving that the biased editor always publishes the same policy, any intend from the journalist to learn the motives of the editor must be focused on altering the behavior of the honest type. Similarly, if it is the editor who moves, it has to be the honest type who *announces* his motives.

Lemma 3. *The biased editor maximizes his welfare under the revealing scenario. Additionally, if $\lambda_1^E \geq (1-\theta)\lambda_2^E$, he prefers the informative scenario to the unmasking scenario. Otherwise, he prefers the unmasking scenario.*

Proof. The welfare of the biased editor is: (i) in the informative equilibrium, $\theta(-\lambda_2^E(1-\theta)c) + (1-\theta)(-\lambda_1^E c)$; (ii) in the unmasking equilibrium, $-\lambda_1^E c$ and; (iii) in the revealing equilibrium, $(1-\theta)(-\lambda_1^E c)$. Simple algebra completes the proof. □

We now rank the three communication structures based on total welfare of news suppliers. Here, for all $t \in \{1, 2\}$, per period welfare is

$$-\lambda_t^J \left[d(w_t - m_t)^2 + (m_t - a_t)^2\right] - \beta \left[\lambda_t^E \left[(w_t - a_t)^2 + c(m_t - a_t)^2\right]\right] - (1 - \beta) \left[\lambda_t^E \left[a_t + c(m_t - a_t)^2\right]\right]$$

Proposition 5. *News suppliers (jointly) prefer the revealing equilibrium to the unmasking equilibrium if either $max\{\frac{1}{2}, 1-d\} < \beta \leq \frac{1+d}{2}$ and $\lambda_1^E \leq \frac{1+d-2\beta}{(2\beta-1)c}\lambda_1^J$, or $1 - d \leq \beta \leq \frac{1}{2}$.*

Proof. In an unmasking equilibrium, total welfare of news suppliers is $\theta[-\lambda_1^J(d + (1-\beta))] + (1-\theta)[-\lambda_1^J(1-\beta)] + (1-\theta)[-\lambda_2^J(1-\beta)d] + \beta\theta[-\lambda_1^E] + (1-\beta)[-\lambda_1^D c]$, whereas in a revealing equilibrium it is $\theta[-\lambda_1^J\beta] + (1-\theta)[-\lambda_1^J(1-\beta)] + (1-\theta)[-\lambda_2^J(1-\beta)d] + \beta\theta[-\lambda_1^E(1+c)] + (1-\beta)(1-\theta)[-\lambda_1^D c]$. Hence, news suppliers prefer the revealing scenario to the unmasking scenario if and only if $\lambda_1^J(1 + d - 2\beta) \geq \lambda_1^E(2\beta - 1)c$. There are two cases: (i) $\beta \leq \frac{1}{2}$. In this case, $2\beta - 1 \leq 0$ and $1 + d - 2\beta > 0$. (ii) $\frac{1}{2} < \beta$. In this case, $2\beta - 1 > 0$ and $1 + d - 2\beta \geq 0$, as $\beta \leq \frac{1+d}{2}$. □

Proposition 5 says that if the editor is likely to be biased, $\beta < \frac{1}{2}$, the best scenario is that the (honest) editor reveals his private information. This result is independent of c. Hence, even when there is a high cost for a delay in publication, news suppliers (jointly) prefer that the editor incurs this cost to announce his motives. However, if the editor is likely to be honest, $\beta > \frac{1}{2}$, there is not a clear-cut prediction and the best scenario depends on the weights that players use to ponder period one. Roughly speaking, revealing is best when the editor is the player less interested in period one. Finally, note that the higher the value of parameter d and/or the smaller the value of parameter c, the broader the region where news suppliers (jointly) prefer the revealing scenario to the unmasking one.

To complete the analysis, we compare the welfare of news suppliers under information transmission with their welfare under information manipulation. The analysis determines that for an informative equilibrium to maximize their jointly welfare, condition $\lambda_2^J(1-\theta)(1-\beta)(1-d) + \lambda_2^E(1-\theta)(1-\beta)c \leq min\{\lambda_1^J\beta + \lambda_1^E\beta(1+c), \lambda_1^J(d+(1-\beta)) + \lambda_1^E(\beta+(1-\beta)c)\}$ must hold. Roughly speaking, information transmission is better the higher the probability that the editor is honest. Additionally, high valuations of period one, relative to those of period two, are conductive to information revelation being welfare maximizer. Likewise, high valuations of period two are conductive to information manipulation being best. In this case, Proposition 5 above determines the regions where news suppliers (jointly) prefer revealing to unmasking and viceversa.

Welfare analysis of news consumers: quality of the communication process

Here we analyze welfare from the news consumers point of view. To this aim, we assume that readers value information, more precisely true information. In this case, there is a simple an intuitive way to compute the welfare of news consumers: a communication process is better than another when it implies more accurate information. Following Austen-Smith and Wright (1992), we measure the quality of a communication process, or equivalently, the welfare of news consumers, as the ex ante probability that the "wrong" report is published. In our two period game, it is

$$\sum_{t\in\{1,2\}} \left[P(w_t=0)P(a_t=1) + P(w_t=1)P(a_t=0)\right]$$

as states w_1 and w_2 are drawn independently and a_2 does not depend on any first period variable.

Straightforward calculations show that the probability that the wrong report is published in the unmasking equilibrium, followed by a partially informative equilibrium, is $\theta\beta + 2(1-\theta)(1-\beta)$. Note that $\theta\beta + 2(1-\theta)(1-\beta)$ is also the probability that the wrong report is published under a revealing equilibrium, followed by a partially informative equilibrium. The reason is that the biased editor always publishes 0, which implies that the wrong position is adopted with probability $(1-\theta)(1-\beta)$ in each period; and the honest editor publishes 1 in period one when the right report is 0, either because he follows the journalist's advice (unmasking scenario) or because he publishes 1 as a way of signaling his motives (revealing scenario). Unmasking is thus equivalent to revealing in terms of quality of the communication process.

Proposition 6. *News consumers are indifferent between the two types of information manipulation: unmasking and revealing. They both yield the same quality of the communication process.*

To say it differently, both types of information manipulation yield the same probability of publishing the wrong report. Hence, citizens would be indifferent between the two types of information manipulation, as both yield the same welfare. As we should expect, this probability (of an error) is higher than in the informative equilibrium (followed by a partially informative equilibrium). In this case, the quality of the communication process is $2(1-\theta)(1-\beta)$, *i.e.*, two times the probability that the state is one and the editor is biased. Last, the quality of the communication process is always higher when there is a journalist, even if there is information manipulation, than where this player is not involved in the game. In the latter case, the probability of an error is $2(\theta\beta P(\theta < \frac{1}{2}) + (1-\theta)(1-\beta+\beta P(\theta > \frac{1}{2})))$, which simplifies to $\beta+2(1-\theta)(1-\beta)$ if we assume that θ is uniformly distributed in $[0,1]$. To summarize, information manipulation increases the quality of the communication process as compared to an scenario without advising; and decreases the quality as compared to a situation of informative advising.

5 Conclusion

We model strategic communication as a game between an advisor and a decision maker, in which the advisor has private information about a policy-relevant state of the world but lacks information about the motives of the decision maker. This scenario allows us to explore the incentives of the players to strategically use information to their own purposes, as well as to analyze under which conditions full information disclosure is possible in equilibrium.

We discuss our results in terms of a freelance journalist-editor game. We show that if period two is sufficiently important to the journalist, no information is conveyed in equilibrium in period one. In this case, players prefer to use first period information to learn how to behave in the future. As a result, information manipulation appears in equilibrium. We then analyze the welfare implications of the three previously studied modes of communication and observe that which communication structure is best depends on which side of the market for news, supply or demand, we prioritize.

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