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Reputation and news suppression in the media industry*

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Abstract

This paper proposes a new argument to explain why media firms silence information that may be relevant to consumers and why this behavior varies across firms. We build on the literature of career concerns and consider firms that seek to maximize their reputation for high quality. Crucial to our results is the idea that media firms can affect, with their reporting strategy, the probability that consumers learn the true state. Reputational concerns dictate that a monopoly firm suppresses scoops, even when evidence is strong. With competition, precise private information is published but weaker though informative signals are silenced. We obtain that silence is higher in media firms with high levels of initial reputation and/or great social influence. We draw predictions on a firm's optimal choice of an editorial standard, the persistence of news suppression when consumers believe one state to be more likely than another and the possibility that silence may be socially beneficial.

Keywords: Reputation; news suppression; feedback power; competition; editorial standards; herding; efficiency
JEL: C72; D82; D83

1 Introduction

In the last decade, scholars have devoted much attention to the issue of media bias.[1] Not that much to the question of media silence. Though more difficult to measure than other classes of media bias, anecdotal evidence suggests that whereas some media firms are extremely careful about printing scoops, others do not hesitate a second and run almost every piece of news that arrives to the newsroom. The Lewinsky scandal and the story of bin Laden's death present two good examples to show these differences in media behavior.

The first story goes back to January 1998, when Mark Whitaker, the *Newsweek*'s editor at that time, decided not to run the Lewinsky Story that his reporter, Michael Isikoff, had been pursuing for nearly a year. In reference to why he did not publish the story, Mark Whitaker admitted in an interview to *CNN* in November, 2011: "*We didn't feel that we were on firm enough ground to report a story that would be about accusing the president [...]. If we had gotten that wrong could have been [...] a mortal blow to Newsweek's*

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[1] The term media bias is used in the literature to refer to situations where media firms either selectively omit part of their information or frame their information with an ideological context. The latter case is also referred to as media slant. See the surveys by Andina-Díaz (2011), Gentzkow et al. (2016) and Puglisi and Snyder (2015).

reputation." The story that belonged to *Newsweek* was finally published in the Internet by *Drudge Report*, a far less influential outlet than the prestigious magazine *Newsweek*. Despite it, the news hit Internet new groups and the *Drudge Report* web site had thousands of visits. Three days after, *The Washington Post* broke the story.[2]

The second story is about the investigative reporter Seymour M. Hersh and his article "The Killing of Osama bin Laden". Hersh, who in the seventies won the Pulitzer Prize for exposing the My Lai Massacre during the Vietnam War and has written several other influential articles, started to investigate the official story of bin Landen's death just a couple of months after the US operation, in May, 2011. More than three years later, he sent a draft of his report to *The New Yorker*. Despite Hersh's strong ties to the magazine, where he is a regular contributor, the *The New Yorker*'s editor, David Remnick, told Hersh that he didn't think he had "the story nailed down" and suggested him to continue his investigation. Instead, Hersh gave the story to *The London Review of Books*, where it was published in May 2015. According to Jonathan Mahler: "*The bin Laden report wasn't the first one by Hersh that Remnick rejected because he considered the sourcing too thin [...] In 2013 and 2014, he passed on two Hersh articles [...] Those articles also landed in The London Review of Books.*"[3]

This paper studies why media firms suppress information that may be relevant to consumers and why this behavior varies across firms. We show that media silence can be explained by reputational concerns. This is new in the literature, as previous research explains media silence by means of institutional features. Two arguments have been used so far to explain the decision of a media firm to withhold information: Media captured, either by the government or by advertisers (see the works by Vaidya (2005), Besley and Prat (2006) and Ellman and Germano (2009)); and the existence of defamation lawsuits and/or physical threats to journalists (see Garoupa (1999), Stanig (2015) and Gratton (2015)). Beyond these arguments, whose importance is entirely justified, we propose a new reason to explain media silence. The novelty of our approach is that we argue at the firm level, and this allows us to explain variations in media silence between firms that compete under the same rules. In this sense, we talk of media *self-silence*.

At the core of our model is the idea that media firms have the power to raise public concern and so affect the probability that there is ex-post verification of the true state of the world. It means that media firms will have in our model, as in the real world, the capacity to affect *feedback*, that is, the power to influence the probability that consumers learn the true state. The argument is that a firm that turns the spotlight on, let us say, a possible corruption scandal, may raise public concern about the consequences of the fraud, may eventually induce a citizen or institution to denounce the facts and take the case to court, which may result in the judge passing sentence and thus, indirectly determining whether the media firm's story was true or just another example of a "Jimmy's World" fabrication.[4] On the contrary, a country in which media firms give no room to scoops on their front pages, but rather exclusively print news items on the usual events of a society (economy, politics, sports, etc.), silences citizens and precludes learning.

Our argument helps explain why both *Newsweek* and *The New Yorker* decided to hold the Lewinsky and the bin Laden's death stories, respectively, whereas *Drudge Report* and *The London Review of Books*

[2]See "Scandalous scoop breaks online", *BBC News* January 30, 1998; and "Former Newsweek Editor on Why He didn't Run Lewinsky Story: 'We Didn't Feel We Were on Firm Enough Ground"', *NewsBuster*, November 6, 2011.

[3]See "What Do We Really Know About Osama bin Laden's Death?", written by Jonathan Mahler, in *The New York Times*, October 18, 2015.

[4]In reference to a false story written by Janet Cooke, that was front-page in the *Washington Post* on September 29, 1980. Cooke, who was even given the Pulitzer Prize for this article, subsequently confessed the story was false. The confession was printed in the *Post* on April 16, 1981. This malpractice obliged the *Washington Post* to offer numerous explanations and apologies, as well as to publicly return the Pulitzer, to make personnel changes in the media firm and, naturally, to fire Cooke. More recently, *The New York Magazine* printed on the December 15, 2014, the story of Mohammed Islam, who claimed had won $72 million trading on the stock market. This story turned into a major international news item. However, just one day after, *The New York Observer* published an interview with Islam, who admitted he had previously lied. *The New York Magazine* retracted the story and apologized, concluding: "We were duped. Our fact-checking process was obviously inadequate; we take full responsibility and we should have known better. New York apologizes to our readers."

ran them. More generally, it provides a logic to explain why renown media firms such as *The New York Times*, *The Washington Post* or *The Guardian*, have stringent editorial standards; whereas smaller firms, lacking the power to influence public opinion, are less strict with the quality of their sources, which makes them more prone to print scandals.

The model is as follows. We consider K risk neutral media firms that seek to build a reputation for quality. Each firm receives an informative signal on the existence (or not) of a corruption scandal in the economy and takes on one of two actions: either to report that there is a scandal, or to print any other piece of news that we refer to as easy-to-cover stories (e.g. political or economic news, sports, entertainment and such). We assume that consumers value information and want a media firm to publish a scandal only when it really exists. Otherwise, they would like a firm to print easy-to-cover stories. The key assumption is that actions are different in terms of consequences. In particular, we consider that to print a scandal activates the probability of feedback and that this probability is increasing in the number of firms covering the scandal. Additionally, we consider that if all firms choose to print easy-to-cover stories, then consumers do never receive ex-post verification of the state.[5] Thus, monitoring the ability of a media firm is endogenous in our model, because whether additional information is available to the consumers depends on the firm's particular action.

We start considering the case of a monopoly. Our results for this scenario show that reputational concerns dictate the media firm to suppress scoops and to print too often easy-to-cover stories. We obtain that the higher the prior reputation of the firm and/or the probability of feedback, the greater the media self-silence will be. These effects are so strong that they even induce firms with high quality private signals or strong evidence to silence scoops.

Then, we move to the case with competition. Here we propose two approaches: A sequential game between one scoop-firm and K followers, and a simultaneous game between two strategic scoop-firms. The idea is to understand to what extend the decision of a firm to suppress a story varies with the information the firm may have on the actions taken by the other firms. Our results for both scenarios show that with competition any media firm receiving a scoop always chooses to publish it provided that the source is sufficiently precise. However, when the source is informative though of lower quality, the equilibrium behavior varies with the type of competition we consider. One important difference is that whereas in the model with a scoop-firm and K followers complete silence can be an equilibrium, it can never be when competition is simultaneous. For the case of a scoop-firm and K followers we also obtain that media self-silence is increasing in the initial reputation of the firm and/or in the capacity of the firm to affect the probability that consumers learn the state (the latter is also a result when competition is simultaneous). We refer to this measure of social power as the *feedback power* of a firm, and to a firm with either a high feedback power and/or a high level of initial reputation as a *renown firm*. Our model predicts more news suppression by firms with high levels of feedback power and more revelation of information by firms with a reduced capacity to affect the probability that consumers learn the truth, say firms that operate in more competitive environments. This result is robust to the consideration of different market and information structures.

Finally, we consider extensions of our model to draw predictions on three relevant questions: i) A firm's optimal choice of an editorial standard, ii) the persistence of news suppression when consumers believe one state to be more likely than the other and iii) the possibility that silence may be socially beneficial. On

[5] The idea behind this modelling approach is to capture the power of the media to ignite cascades of accusations and responses and to stimulate coverage by other social spheres, which may lead to depuration of responsibilities and thus learning. A recent example can be found in the investigation of Cristiano Ronaldo, José Mourinho, Karim Benzema or Neymar, among others, by the Spanish Tax Office, after the documents released by Football Leaks and featured in the Spanish influential newspaper *El Mundo* alleging that some important football players and managers have diverted income to offshore tax havens. At the same time, it also illustrates the hard time for consumers to learn the truth of a story that never received the attention of the media industry, possibly because in that case consumers even ignore that such a story ever occurred.

question i), our model shows that reputational concerns help explain why renown firms choose to set higher editorial standards and so be more stringent in the vetting process of their stories. On question ii), our model shows that news suppression persists the consideration of an unbalanced prior except for the case in which the prior probability that the state is corrupted is too strong. In this case, the classical herding effect drives the results as it pushes media firms towards the fabrication of scandals. On question iii), our model shows that whether news suppression is detrimental or beneficial to consumers depends on how costly the mistakes of the media are to consumers. More precisely, we obtain that when the cost function is symmetric then media silence is always detrimental to consumers. Because media silence decreases with competition, the policy implication is clear in this case: Political authorities should foster competition in the media sector. However, when the cost for publishing a false piece of news is superior to the cost of silencing a true story, then media silence is socially beneficial. To this case, our model poses an argument in favor of renown firms, as they are the ones whose behavior can better accommodate what the desire of the society is in this case.

The rest of the paper is organized as follows. In Section 2 we revise the related literature. Section 3 presents the general model. In Section 4 we present the results for the monopoly case and in Section 5 the results for the case with competition. Here we study two approaches: One in which there is one scoop-firm and K followers, and another one in which there are two strategic scoop-firms. Section 6 discusses a number of extensions and finally Section 7 concludes. All the proofs are relegated to the Appendix.

2 Related literature

The closest paper to ours is Gentzkow and Shapiro (2006). They propose a model in which a media firm seeks to build a reputation for quality and the consumers' prior expectations are in favor of one state of the world. This drives media bias which, in their model, originates in the incentive of the media firm to slant its reports towards the consumers' prior. In contrast to Gentzkow and Shapiro (2006), the type of media bias we identify in this work does not require one state to be more likely than the other and so persists when they are equiprobable. In fact, the class of media bias we characterize originates in the power of the media industry to set what consumers get to know, which indirectly gives firms in this industry the capacity to affect the consumers' monitoring ability of media firms. This is a more subtle effect that so far has not been studied.

Formally, our paper is related to Levy (2005), Leaver (2009) and Camara and Dupuis (2015), who consider models of career-concerns with endogenous feedback.[6] While these papers share some features with ours, there are important differences. The most relevant one is that none of these papers consider competition between experts. This is an important aspect, as for the best of our knowledge our work is the first one to consider together the strategic effects derived from the endogenous feedback with the strategic effects derived from the competition between experts. Additionally, our model differs from the existing ones in that we consider the feedback as being a continuous random variable, whereas Levy (2005), Leaver (2009) and Camara and Dupuis (2015) consider it as a dichotomous variable.

An important question in our work is the effect of consumers receiving ex-post verification of the state on the incentives of media firms to reveal their private information. In this sense, our work is related Prat (2005), who first showed that an increase in the transparency of actions can have detrimental effects. In his model, however, increasing the transparency of consequences (the kind of transparency we talk about in our paper) can only be beneficial, as it is also the case in Gentzkow and Shapiro (2006). The present work

[6]The literature on experts and effort choice has also considered situations in which the probability of ex-post verification of the true state may depend on the action chosen by the agent. See Hirshleifer and Thakor (1992), Holmström (1999) and more recently Milbourn et al. (2001) or Suurmond et al. (2004). The idea behind these papers is the implementation of a *de novo* project, where success or failure can only be observed if the project is implemented (in which case, ex-post verification of the state always occurs with probability one).

challenges this view, showing that an increase in the probability that consumers learn the state of the world unambiguously drives less accurate messages. In a different context, Andina-Díaz and García-Martínez (2016) also show that when experts have two concerns, there are conditions under which transparency can be detrimental to the principal. A result that is also in Fox and Van Weelden (2012), who consider costs of mistakes that are asymmetric and obtain that when the prior on the state is too unbalanced, transparency of consequences increases the incentive of the expert to stick more often to the prior, which can decrease the principal's expected welfare. Last, our paper also relates to the works by Levy (1997), Morris (2001), Ottaviani and Sørensen (2001) or Hörner (2002) among others, who in different contexts show that reputation can have perverse effects.

Topically, our paper belongs to the blooming literature on media economics, and more particularly, it contributes to the analysis of the sources of media bias.[7] Much has been said in this respect. The numerous explanations to date have been grouped into two categories. On the one hand, the supply-side arguments, that account for reasons such as media ownership (Bovitz et al. (2002), Djankov et al. (2003), Anderson and McLaren (2012)), cost structure (Strömberg (2004*a*)), advertisers and interest groups (Corneo (2006), Ellman and Germano (2009), Petrova (2008, 2012) or Sobbrio (2011)), journalists and editors (Baron (2006), Sobbrio (2014), Andina-Díaz (2015)) or government capture (Besley and Prat (2006)). On the other hand, there are demand driven forces, that consider reasons that originate in the consumers' preferences for certain stories (Mullainathan and Shleifer (2005)), the consumers' prior beliefs (Gentzkow and Shapiro (2006)) or the existence of consumers exhibiting the "bias blind spot" (Stone (2011)). The present paper contributes to this literature by pointing out that the media's ability to determine what consumers get to know can also result in media bias and, more precisely, in media silence, which is different from distortion of news and other types of bias already analyzed in the literature.

3 The model

We consider a model between K risk-neutral media firms and a mass of consumers. Section 4 analyzes the case of $K = 1$ and Section 5 the case of $K \geq 2$. At date 0 the state of the world is $\omega \in \{N, C\}$, where C corresponds to a situation in which there is a *corruption scandal* in the economy and N to one in which *no corruption scandal* exists. Let θ denote the prior probability that the state is C. We consider that the two states are equally likely.[8]

Each media firm $i \in \{1, 2, ...\}$ receives a private signal $s_i \in \{n_i, c_i\}$ on the state of the world of quality γ, with $P_i(n_i \mid N) = P_i(c_i \mid C) = \gamma \in (\frac{1}{2}, 1]$ for all i. Signals are independent conditional on the state. The quality of the private signal depends on each media firm's ability, which can be high or normal. A high type firm obtains a signal of quality $\gamma = 1$, whereas a normal type firm receives an imperfect but informative signal of quality $\gamma \in (\frac{1}{2}, 1)$. Types are i.i.d. Note that γ can be arbitrarily close to 1, that is normal firms can receive signals of arbitrarily excellent quality. Each media firm knows its type but neither consumers nor the rest of the firms know it. They attach a probability $\alpha_0 \in (0, 1)$ to a firm being high type at date 0 (consequently $1 - \alpha_0$ is the probability that a firm is normal). We refer to this probability as a firm's initial reputation.

[7]The phenomenon of media bias has been empirically documented by Groseclose and Milyo (2005), Egorov et al. (2009), Larcinese et al. (2011), Tella and Franceschelli (2011), Durante and Knight (2012) and Latham (2015), among others. Another important branch of the literature of media economics focuses on the effects of the media on voting and policies. See Besley and Burgess (2001), Strömberg (2004*b*), Chan and Suen (2008), Gerber et al. (2009), Ashworth and Shotts (2010), Chiang and Knight (2011), Duggan and Martinelli (2011), Cagé (2014), Drago et al. (2014), Piolatto and Schuett (2015), Schroeder and Stone (2015) and Casas et al. (2016).

[8]The assumption that both states are equiprobable means that media firms have no incentives to go for the consumers' prior beliefs. This differentiates our analysis from Gentzkow and Shapiro (2006) and ensures that herding effects play no role in generating our conclusions. In Section 6.2 we explore the effect of relaxing this assumption and analyze the game with $\theta \in (0, 1)$ for the case of a monopoly.

Upon receiving the signal, each media firm publishes a report $r_i \in \{\hat{n}_i, \hat{c}_i\}$, where $\hat{c}$ denotes the action of printing a scandal and $\hat{n}$ the action of printing any other piece of news, i.e. economic and political news, entertainment, sports and such, that we refer to as easy-to-cover stories. Each media firm chooses which report to publish at date 0 so as to maximize reputation at date 1. As most papers in the literature, we assume that reputation is captured by the probability that consumers place on the media firm being of high type, that is the probability of being a firm with perfect accurate signals.[9] This assumption should be taken as a reduced form of a more complex game in which the media firms seek to appear high quality because circulation and profits at date 1 are increasing in reputation.[10]

For expositional purposes, we assume that a high type media firm always reports its signal honestly. This assumption is relaxed in Section A.2 of the Appendix, where for the case of a monopoly we show that playing truthful is the unique equilibrium strategy of the high type. As for a normal firm, we consider it has discretion to report either $\hat{n}$ or $\hat{c}$, and denote by $\sigma^i_{s_i}(r_i) \in [0,1]$ the probability that, conditioned on its signal s_i, the normal firm i takes action r_i. This freedom to publish any report captures two types of media bias that we want to explore: A normal firm that having observed factual (though inconclusive) evidence of a corruption scandal chooses to silence it, i.e., $\sigma^i_{c_i}(\hat{n}_i) > 0$; and a normal firm that having received no evidence of a scandal chooses to fabricate it, i.e., $\sigma^i_{n_i}(\hat{c}_i) > 0$. Our results will show that it is the former class of bias that occurs in our context. We will refer to this class of bias as media self-silence.

Let $\mu \in [0,1]$ denote the probability that consumers receive ex-post verification of the state of the world. A key ingredient in the model is to consider that this probability depends on the reports of the media firms in the following way. We will consider that when all the firms report $\hat{n}$ consumers will never know the true state (or, at least, not at the time they assign a reputation). In contrast, when some of the firms report $\hat{c}$ then there is a positive probability that consumers learn the state. This probability will be different depending on the number of firms taking action $\hat{c}$. Because this number may vary from one scenario to another, a more detailed exposition of the functioning of the feedback probability is given in each of the market structures that we consider. We denote by $X \in \{N, C, 0\}$ the feedback received by the consumers, with $X = 0$ indicating that there is no feedback and $X = N$ indicating that consumers learn that the state is N (analogously for $X = C$).

Consumers observe all the media firms' reports $(r_1, r_2, ...)$ and feedback X and, based on this information, update their beliefs on each of the media firm's type. Let $\alpha^i_1(r_1, r_2, ..., X)$ denote the consumers' posterior probability that media firm i is high type at date 1, given the vector of reports $(r_1, r_2, ...)$, with $r_i \in \{\hat{n}_i, \hat{c}_i\}$, and $X \in \{N, C, 0\}$. As already described, media firms have career concerns and each seeks to maximize its future reputation α^i_1.

We next obtain the efficient strategy of a media firm, that corresponds to the strategy of a firm that seeks to maximize the consumers' welfare. To this, we consider that consumers receive a payoff of $\pi > 0$ when the firm correctly informs on the state of the world and suffer a cost of $\varphi > 0$ when it sends an erroneous report. This assumption is done for simplification and will be relaxed in Section 6.3, where we explore the efficient strategy of a media firm when consumers have a more general utility function that allows for different costs of the errors. For now, note that when costs are symmetric, and since the signal of the firm is informative, the expected payoff to a consumer is maximized when the firm follows its signal.[11] Thus, from the point of view of the consumers, the efficient strategy of a media firm is to always stick to its signal, i.e., $\sigma^i_{n_i}(\hat{n}_i) = \sigma^i_{c_i}(\hat{c}_i) = 1$ for all $i \in \{1, 2, ...\}$. Now, if we define media bias as any deviation of the information a media firm transmits from the informative signal it receives, the conclusion

[9] See Ottaviani and Sørensen (2001), Prat (2005), Gentzkow and Shapiro (2006) and Fox and Van Weelden (2012).

[10] This is in line with empirical evidence. Logan and Sutter (2004), using a cross-section of US media firms, find that newspapers that have recently won Pulitzer Prizes have higher circulations, and Kovach and Rosenstiel (2001) observe that media firms with higher standards have higher audiences. Also related, Anderson (2004) obtains that market forces penalize media firms whose quality of journalism falls.

[11] This is shown in Proposition 5.

is straightforward: Media bias, then media silence, has detrimental effects on consumers.

We next go into the analysis of the game. Our equilibrium concept is perfect Bayesian equilibrium. In the following we will say that $\{(\sigma^i_{n_i}(\hat{n}_i)^*, \sigma^i_{c_i}(\hat{c}_i)^*)\}_{i\in\{1,2,...\}}$ is an *equilibrium strategy* if given consistent beliefs and the equilibrium strategies of the other media firms, $\sigma^i_{n_i}(\hat{n}_i)$ maximizes the expected payoff to firm i after observing signal n, and $\sigma^i_{c_i}(\hat{c}_i)$ does it after signal c. We will denote an equilibrium strategy by $\{(\sigma^i_{n_i}(\hat{n}_i)^*, \sigma^i_{c_i}(\hat{c}_i)^*)\}_{i\in\{1,2,...\}}$.

4 Monopoly

Let us start considering the case of a monopoly media industry. Here $K = 1$ so we skip the subindex for the firm. Note that when there is an only firm in the industry, the firm knows that if it takes action $\hat{n}$ then consumers will never know the true state. As a result, only $\alpha_1(\hat{n}, 0)$ follows a report of $\hat{n}$. In contrast, if it reports $\hat{c}$ there is probability $\mu \in [0, 1]$ that the consumers learn the state. Hence, reporting $\hat{c}$ means playing a lottery with outcomes $\alpha_1(\hat{c}, 0)$, $\alpha_1(\hat{c}, N)$ and $\alpha_1(\hat{c}, C)$.

The consistent beliefs that consumers place on the firm being of high type $\alpha_1(\hat{n}, X)$ are:

$$\alpha_1(\hat{n}, 0) = \frac{\alpha_0}{\alpha_0 + (1 - \alpha_0)(\sigma_c(\hat{n}) + \sigma_n(\hat{n}))}, \tag{1}$$

$$\alpha_1(\hat{c}, N) = 0, \tag{2}$$

$$\alpha_1(\hat{c}, C) = \frac{\alpha_0}{\alpha_0 + (1 - \alpha_0)(\gamma\sigma_c(\hat{c}) + (1 - \gamma)\sigma_n(\hat{c}))}, \tag{3}$$

$$\alpha_1(\hat{c}, 0) = \frac{\alpha_0}{\alpha_0 + (1 - \alpha_0)(\sigma_c(\hat{c}) + \sigma_n(\hat{c}))}, \tag{4}$$

with $\alpha_1(\hat{c}, C) > \alpha_1(\hat{c}, 0) > \alpha_1(\hat{c}, N)$.

Before presenting the results, we need to define some important concepts. Let $E\{\alpha_1(r, X) \mid s\}$ denote the expected payoff to the normal firm when it observes signal $s \in \{n, c\}$ and publishes $r \in \{\hat{n}, \hat{c}\}$, over the possible realizations of $X \in \{N, C, 0\}$.

$$\begin{aligned} E\{\alpha_1(\hat{n}, X) \mid s\} &= \alpha_1(\hat{n}, 0) \ \forall s \in \{n, c\}, \\ E\{\alpha_1(\hat{c}, X) \mid n\} &= (1 - \mu)\alpha_1(\hat{c}, 0) + \mu[P(N \mid n)\alpha_1(\hat{c}, N) + P(C \mid n)\alpha_1(\hat{c}, C)], \\ E\{\alpha_1(\hat{c}, X) \mid c\} &= (1 - \mu)\alpha_1(\hat{c}, 0) + \mu[P(C \mid c)\alpha_1(\hat{c}, C) + P(N \mid c)\alpha_1(\hat{c}, N)], \end{aligned}$$

where, given $\alpha_1(\hat{c}, N) = 0$ and $\theta = 1/2$, the last two expressions reduce to:

$$\begin{aligned} E\{\alpha_1(\hat{c}, X) \mid n\} &= (1 - \mu)\alpha_1(\hat{c}, 0) + \mu(1 - \gamma)\alpha_1(\hat{c}, C), \\ E\{\alpha_1(\hat{c}, X) \mid c\} &= (1 - \mu)\alpha_1(\hat{c}, 0) + \mu\gamma\alpha_1(\hat{c}, C). \end{aligned}$$

Now, we can define the expected gain to reporting $\hat{n}$ rather than $\hat{c}$, after observing signal $s \in \{n, c\}$:

$$\Delta_n = E\{\alpha_1(\hat{n}, X) \mid n\} - E\{\alpha_1(\hat{c}, X) \mid n\} = \alpha_1(\hat{n}, 0) - ((1 - \mu)\alpha_1(\hat{c}, 0) + \mu(1 - \gamma)\alpha_1(\hat{c}, C)), \tag{5}$$

$$\Delta_c = E\{\alpha_1(\hat{n}, X) \mid c\} - E\{\alpha_1(\hat{c}, X) \mid c\} = \alpha_1(\hat{n}, 0) - ((1 - \mu)\alpha_1(\hat{c}, 0) + \mu\gamma\alpha_1(\hat{c}, C)). \tag{6}$$

We are now in position to derive the results. The next proposition characterizes the unique equilibrium of the monopoly game, where $x_0(\gamma, \alpha_0, \mu)$ is such that $\Delta_c[\sigma_n(\hat{n}) = 1, \sigma_c(\hat{n}) = x_0] = 0$.[12]

Proposition 1. *Suppose $\mu > 0$. There exist $\hat{\gamma} < 1$ and $\hat{\alpha}_0 \in (0, 1)$ such that in the unique equilibrium of the game, $\sigma_n(\hat{n})^* = 1$ and:*

[12] The expression for x_0, as well as those for thresholds $\hat{\gamma} = 1 - \frac{2}{\mu}\frac{1-\alpha_0}{2-\alpha_0}$ and $\hat{\alpha}_0 = \frac{2(2-\mu)}{4-\mu}$ below, are derived in the proof of Proposition 1, in the Appendix.

1. *If* $\gamma > \hat{\gamma}$*, then* $\sigma_c(\hat{n})^* = x_0 \in (0,1)$.

2. *If* $\gamma < \hat{\gamma}$*, then:*

   (a) *If* $\alpha_0 < \hat{\alpha}_0$*, then* $\sigma_c(\hat{n})^* = x_0 \in (0,1)$*,*

   (b) *If* $\alpha_0 > \hat{\alpha}_0$*, then* $\sigma_c(\hat{n})^* = 1$.

Proposition 1 proves a number of results. First, it shows that a normal firm that receives signal n always reports $\hat{n}$. To have an intuition for this result, note that since $\gamma > \frac{1}{2}$, a firm that receives signal n recognizes state N as the most likely state, and so the strategy of reporting $\hat{c}$ as providing a payoff of zero with probability higher than $\frac{1}{2}$. In contrast, publishing $\hat{n}$ guarantees a positive payoff of $\alpha_1(\hat{n}, 0)$. Second, it shows that a normal firm that receives signal c always silences scandals with positive probability, independently of the value of parameters α_0, γ and μ. This is rather surprising, as although we may expect a monopoly with low quality signals to misreport facts, it was not so clear a priori that a firm with reliable signals ($\gamma \sim 1$) would find it optimal to silence (with positive probability) a story that would quite likely bring public recognize. To have an intuition for this result, consider $\sigma_n(\hat{n}) = 1$ and $\sigma_c(\hat{c}) = 1$. Note that in this case $\alpha_1(\hat{c}, 0) = \alpha_0$ and $\gamma\alpha_1(\hat{c}, C) < \alpha_0$; hence the expected payoff to a firm that reports $\hat{c}$ after signal c, $E\{\alpha_1(\hat{c}, X)|c\}$, is smaller than α_0. In contrast, the expected payoff to the firm for reporting $\hat{n}$, $E\{\alpha_1(\hat{n}, X)|c\}$, is α_0. Consequently, $\sigma_c(\hat{c}) = 1$ cannot be an equilibrium strategy. Third, Proposition 1 shows that media self-silence can be even complete, which occurs when the firm enjoys a high initial reputation and its signal is not precise enough. In any case, as shown next, the results also say that the higher the quality of a signal the higher the incentive of the normal firm to follow it. In the limit, when the quality of the signal is arbitrarily close to 1, the behavior of the normal firm approaches that of the high type and so it tends to reveal all its private information. The next corollary presents the results of the comparative static analysis with respect to parameters γ, α_0 and μ.

Corollary 1. *Media self-silence is decreasing in the signal's quality, i.e.* $\frac{\partial \sigma_c(\hat{n})^*}{\partial \gamma} < 0$*, and increasing in both the reputation level at date* 0 *and the probability of feedback, i.e.,* $\frac{\partial \sigma_c(\hat{n})^*}{\partial \alpha_0} > 0$ *and* $\frac{\partial \sigma_c(\hat{n})^*}{\partial \mu} > 0$.

We next try to gain an intuition for the results for parameters α_0 and μ, that we find more counter-intuitive. Regarding α_0, note that the reputation of a normal firm that takes action $\hat{n}$ is increasing in α_0 and, in the limit as α_0 tends to 1, $\alpha_1(\hat{n}, 0) \to 1$. Hence, a media firm enjoying a high initial reputation has no need to print a scandal to prove its quality. As a result, the firm optimally chooses to hold scandals with positive probability, with suppression of scoops being complete for sufficiently high levels of initial reputation.

Now, regarding μ, note that the payoff to a normal firm for sending $\hat{n}$ does not depend on μ. However, its payoff for sending $\hat{c}$ does. In fact, it turns out that when $\sigma_n(\hat{n}) = 1$, $\gamma\alpha_1(\hat{c}, C) < \alpha_1(\hat{c}, 0)$. Now, because increasing μ increases the probability of receiving the expected payoff $\gamma\alpha_1(\hat{c}, C)$, we obtain that the higher the probability of feedback, the higher the probability that the media firm holds a scandal. In the limit, when μ tends to one, silence can be complete provided that γ is sufficiently small and α_0 sufficiently high.[13] This is in contrast to Gentzkow and Shapiro (2006), where an increase in the probability of feedback unambiguously induce the media firm to stick more often to its signal.

5 Competition

In this section we consider $K \geq 2$. We take two approaches to the study of competition. The first approach considers a sequential game in an industry with $K+1$ firms, where one of the $K+1$ firms receives a scoop (the scoop-firm) and the remaining K firms are followers. This approach is reminiscent of Gentzkow and

[13]When $\mu \to 1$, the limit of $\sigma_c(\hat{n})^*$ is $\frac{1}{2}\frac{\alpha_0(1-\gamma)}{\gamma(1-\alpha_0)} > 0$. It is easy to show that $\frac{1}{2}\frac{\alpha_0(1-\gamma)}{\gamma(1-\alpha_0)} > 1 \Leftrightarrow \gamma < \frac{\alpha_0}{2-\alpha_0}$ and $\alpha_0 > \frac{2\gamma}{1+\gamma}$.

Shapiro (2006). The second approach considers a simultaneous game between two strategic scoop-firms. The idea of considering the two approaches is to study to what extend the decision of a firm to suppress a story varies with the information the firm may have on the actions taken by the other firms. Interestingly, most of the insights maintain when we move from one scenario to the other, specifically the results on the effect of γ and μ. There is one important distinction between the two scenarios, and it is that complete silence is never an equilibrium when competition is simultaneous, whereas it can be an equilibrium when we have a sequential game. We provide an intuition for this result in the text.

5.1 A model of a leader and K followers

This section considers a sequential game between a leader (scoop-firm) a K followers. Firms are as described in Section 3 but for some important details. First, actions are taken in a sequential order. In particular, we consider that (at date 0) the scoop-firm is the first player to move and that the follower-firms choose what report to publish only after the scoop-firm has played. Second, follower-firms have access to better information. In particular, we consider that a (normal) scoop-firm receives an imperfect signal of quality γ, whereas the follower-firms have access to perfectly informative signals. The argument is that the sequential order of moves grants the follower-firms with additional time to investigate and come up with more evidence that makes the signals more informative. We also consider that all consumers read the scoop-firm's report.

Note that since the follower-firms observe the true state and they have career concerns, in the equilibrium of this game the follower-firms will always report their signals truthfully. It means that any consumer reading a follower-firm's report will learn the true state. Let us assume that the probability that a consumer reads a follower-firm's report is increasing in K. Thus, the higher the number of firms in the industry, the higher the probability that a consumer reads a follower-firm's report and the higher the probability that consumers learn the state. We denote by μ_K the probability that consumers learn the state of the world after the report of the K follower-firms.

Now, we analyze the behavior of the scoop-firm. The scoop-firm knows that even if it reports $\hat{n}$, there is now a probability that consumers learn the state, denoted by μ_K. In addition, let μ_{K+1} denote the probability that consumers receive ex-post verification of the state of the world when the scoop-firm first reports $\hat{c}$. We assume $0 < \mu_K < \mu_{K+1} < 1$. The idea we want to capture is that when a scoop-firm prints a scandal the public awareness of the facts increases, which makes also increase the probability that consumers learn the true state.[14] Accordingly, we can define $\frac{\mu_{K+1}}{\mu_K+\mu_{K+1}}$ as the relative impact of the scoop-firm's report on the probability that consumers learn the state. We will refer to this measure of social impact as the *feedback power* of the scoop-firm.[15]

Note that $\frac{\mu_{K+1}}{\mu_K+\mu_{K+1}} \in (\frac{1}{2}, 1)$ is increasing in μ_{K+1} and decreasing in μ_K. In the case $\frac{\mu_{K+1}}{\mu_K+\mu_{K+1}} \sim \frac{1}{2}$ we have a situation in which $\mu_{K+1} \to \mu_K$, which corresponds to a scoop-firm with no capacity to affect the probability that consumers receive ex-post verification of the state of the world. This situation would correspond to a competitive media industry, in which the scoop-firm takes the feedback power as something exogenous it cannot affect. In contrast, when $\frac{\mu_{K+1}}{\mu_K+\mu_{K+1}} \sim 1$ we have a situation in which $\mu_K \to 0$, which corresponds to a scoop-firm being the only firm in the industry with social influence and so, with the capacity to affect the probability that consumers learn the state. Note that this situation is equivalent to the monopoly scenario.

We now go into the analysis of the scoop-firm game. Given a report $r \in \{\hat{n}, \hat{c}\}$ and feedback $X \in$

[14] In the present scenario, there are at least two reasons for this: (i) The probability that a consumer reads a follower-firm's report is higher when the scoop-firm first publishes a scandal and/or (ii) the scoop-firm's report activates other institutional mechanisms (for example the judicial system) that increases the probability that a consumer learns the true state.

[15] Entman (2012) presents extensive evidence supporting the idea that feedback power differs across media firms. For example, he classifies *New York Times* and *Washington Post* as highly influential; *Time* and *Newsweek* as influential; and *Boston Globe*, *Chicago Tribune* and other major regional papers as occasionally influential.

$\{N, C, 0\}$, the posterior probability $\alpha_1(r, X)$ that consumers assign to the scoop-firm being of high type at day 1 is given by beliefs (1)-(4) and the new beliefs:

$$\alpha_1(\hat{n}, C) = 0, \tag{7}$$

$$\alpha_1(\hat{n}, N) = \frac{\alpha_0}{\alpha_0 + (1-\alpha_0)(\gamma\sigma_n(\hat{n}) + (1-\gamma)\sigma_c(\hat{n}))}. \tag{8}$$

Proceeding as previously, we obtain the expected gain to reporting $\hat{n}$ rather than $\hat{c}$ after signal $s \in \{n, c\}$:

$$\Delta_n = (1-\mu_K)\alpha_1(\hat{n}, 0) + \mu_K\gamma\alpha_1(\hat{n}, N) - ((1-\mu_{K+1})\alpha_1(\hat{c}, 0) + \mu_{K+1}(1-\gamma)\alpha_1(\hat{c}, C)), \tag{9}$$

$$\Delta_c = (1-\mu_K)\alpha_1(\hat{n}, 0) + \mu_K(1-\gamma)\alpha_1(\hat{n}, N) - ((1-\mu_{K+1})\alpha_1(\hat{c}, 0) + \mu_{K+1}\gamma\alpha_1(\hat{c}, C)). \tag{10}$$

We next characterize the unique equilibrium of the scoop-firm game, where $x_3(\gamma, \alpha_0, \mu_K, \mu_{K+1})$ is such that $\Delta_c[\sigma_n(\hat{n}) = 1, \sigma_c(\hat{n}) = x_3] = 0$.[16]

Proposition 2. *Suppose $0 < \mu_K < \mu_{K+1} < 1$. There exist $\overline{\gamma} \in (\frac{1}{2}, 1)$ and $\overline{\alpha}_0 \in (0, 1)$, such that in the unique equilibrium of the scoop-firm game, $\sigma_n(\hat{n})^* = 1$ and:*

1. *If $\gamma > \overline{\gamma}$, then $\sigma_c(\hat{c})^* = 1$.*
2. *If $\gamma < \overline{\gamma}$, then we have the following situations:*
   - *(a) If $\alpha_0 < \overline{\alpha}_0$, $\sigma_c(\hat{n})^* = x_3 \in (0, 1)$.*
   - *(b) If $\alpha_0 > \overline{\alpha}_0$, it exists $\underline{\gamma} \in (\frac{1}{2}, \overline{\gamma})$ such that:*
     - *i. If $\gamma < \underline{\gamma}$, then $\sigma_c(\hat{n})^* = 1$,*
     - *ii. If $\underline{\gamma} < \gamma < \overline{\gamma}$, then $\sigma_c(\hat{n})^* = x_3 \in (0, 1)$.*

Proposition 2 presents the probability that the normal scoop-firm reveals its private information as a function of the quality of the signal. A first look at the results shows that with competition there are situations in which the scoop-firm sticks to its signals and reveals all its private information. It occurs when the signal of the firm is of sufficiently high quality. Additionally, since $\overline{\gamma} = \frac{\mu_K + \alpha_0(\mu_{K+1} - \mu_K)}{2\mu_K + \alpha_0(\mu_{K+1} - \mu_K)}$ with $\overline{\gamma} < \frac{\mu_{K+1}}{\mu_K + \mu_{K+1}}$, full revelation is always an equilibrium when the scoop-firm has a signal of a quality higher than its feedback power. To this case, Proposition 2 says that in equilibrium the firm will never silence a scoop. Accordingly, our model predicts media firms with a limited social influence to often reveal their private information. Note that this result is in contrast to the monopoly scenario, where full disclosure of private information was never an equilibrium. In fact, the limit of $\overline{\gamma}$ as $\mu_K \to 0$ is 1, which explains why in the monopoly scenario there is no full revelation. In this sense, our results suggest that introducing competition can be beneficial to consumers, as it reduces media self-silence which increases consumers' welfare.

However, as already noted, the watchdog role of competition is not at work on firms of lower quality sources, namely $\gamma < \overline{\gamma}$, which even in the presence of competition continue silencing evidence of corruption. The analysis of this case is a bit more complex and depends on the firm's reputation at date 0. Here we obtain that when the firm's initial reputation is lower than $\overline{\alpha}_0$, then in equilibrium the scoop-firm uses a mixed strategy that silences scoops with positive probability. However, when the firm's initial reputation is higher than $\overline{\alpha}_0$, the firm publishes scoops with positive probability provided that the quality of the source is not too low, and silence all scoops of quality lower than $\underline{\gamma}$. To better understand the implications of this case, it is useful to consider the limiting cases. As shown in the proof of Proposition 2, the limit of $\underline{\gamma}$ and $\overline{\gamma}$ when $\alpha_0 \to 1$ is the firm's feedback power $\frac{\mu_{K+1}}{\mu_K + \mu_{K+1}}$. That is, when the initial reputation of a

[16] The value for x_3, as well as those for thresholds $\overline{\gamma} = \frac{\mu_K + \alpha_0(\mu_{K+1} - \mu_K)}{2\mu_K + \alpha_0(\mu_{K+1} - \mu_K)}$ and $\overline{\alpha}_0 = \frac{4 - \mu_{K+1} - \sqrt{(\mu_{K+1} - 4)^2 + 8(\mu_{K+1} - 2)\mu_K}}{2\mu_K}$ below, are derived in the proof of Proposition 2, in the Appendix.

scoop-firm increases, the range of values in which the firm uses a mixed strategy decreases. In the limit, when the firm's reputation at date 0 tends to 1, the scoop-firm uses a pure strategy that dictates that any scoop of a quality higher than the firm's feedback power must be published and silenced otherwise. We obtain that this is only the case for scoop-firms with high levels of initial reputation, and never holds for firms with lower reputation levels, whose behavior is never so extreme, which guarantees less suppression of relevant information. In fact, it is easy to show that the limit of $\overline{\gamma}$ when $\alpha_0 \to 0$ is $1/2$. Hence, as the initial reputation of a scoop-firm decreases, our model predicts less and less news suppression. In this sense, media self-silence seems to be a feature of renown media firms, namely firms with high values of α_0, which is in line with the anecdotes discussed in the Introduction.

Next, Figure 1 represents the probability that the scoop-firm suppresses a scoop as a function of parameters γ, α_0 and μ_{K+1}. The results are along the lines discussed in the previous paragraph.

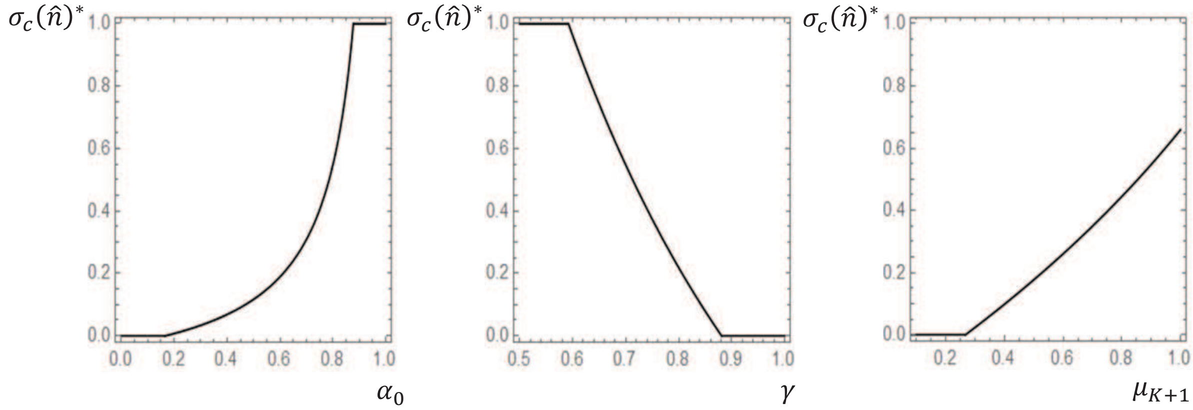

Figure 1: We represent the probability $\sigma_c(\hat{n})^*$ that the scoop-firm suppresses a scoop as a function of α_0, γ and μ_{K+1} in the left, center and right panel, respectively. The values of the (corresponding) parameters are $\gamma = 0.7$, $\alpha_0 = 0.8$, $\mu_K = 0.1$ and $\mu_{K+1} = 0.9$.

The next result presents the comparative static analysis.

Corollary 2. *Media self-silence is increasing in μ_{K+1} and α_0 and decreasing in μ_K and γ, i.e.* $\frac{\partial \sigma_c(\hat{n})^*}{\partial \mu_{K+1}} > 0$, $\frac{\partial \sigma_c(\hat{n})^*}{\partial \alpha_0} > 0$, $\frac{\partial \sigma_c(\hat{n})^*}{\partial \mu_K} < 0$ *and* $\frac{\partial \sigma_c(\hat{n})^*}{\partial \gamma} < 0$.

Next, we elaborate on the effect of the firm's feedback power on its optimal strategy. Note that because the feedback power of a scoop-firm is increasing in μ_{K+1} and decreasing in μ_K, the result in Corollary 2 shows that media self-silence is increasing in the firm's social influence. This result is also implicit in Proposition 2. To see it, note that from Proposition 2 we know that only the scoops of quality $\gamma > \overline{\gamma}$ are always published. Now, suppose we are in an extreme scenario in which the scoop-firm is the only firm in the industry with the capacity to generate feedback, i.e, $\mu_K \to 0$. As already argued, this limit case is equivalent to the monopoly scenario. Here, we obtain $\overline{\gamma} \to 1$. That is, in equilibrium, a monopoly firm (in terms of feedback power) will always suppress news with positive probability, even when signals are very precise. On the contrary, suppose a scoop-firm with no feedback power at all, i.e., $\mu_{K+1} \to \mu_K$. This situation corresponds to a competitive media industry where the scoop-firm takes the probability of feedback as something exogenous it cannot affect. Here, we obtain $\overline{\gamma} \to 1/2$. That is, in equilibrium, a competitive media firm (in terms of feedback power) will optimally choose to publish all its signals of corruption, even when stories are poorly sourced and the firm enjoys a good initial reputation. In this sense, our results suggest that tough competition disciplines media firms and induce them to reveal all their private information which, from the point of view of the consumers, is welfare enhancing.

5.2 A model of two strategic scoop-firms

This section considers a simultaneous game between two strategic scoop-firms, 1 and 2. Scoop-firms are exactly as the firms described in Section 3, so we simply refer to them as firms. There are no follower-firms.

Note that with two firms and two reports, there are three situations in terms of probabilities of feedback. In the first one $(r_1, r_2) = (\hat{c}, \hat{c})$, that is the two firms report on the scandal. In this case we denote by μ_2 the probability that consumers learn the state. In the second case only one firm reports on the scandal. It corresponds to situations $(r_1, r_2) = (\hat{n}, \hat{c})$ and $(r_1, r_2) = (\hat{c}, \hat{n})$. We denote by μ_1 the probability of feedback in this case and assume $0 < \mu_1 \leq \mu_2 < 1$. In the last case no firm covers the scandal, i.e., $(r_1, r_2) = (\hat{n}, \hat{n})$. Here we stick to the formulation in Section 3 and assume there is no feedback.

Before moving to the analysis, note that in the present scenario the report sent by a firm affects not only its own reputation but the reputation of the other firm. On the one hand, because when a firm publishes a scoop the probability of feedback increases. On the other hand, because even if a firm does not publish a scoop, its report contains useful information on the state of the world.

Let us move to the beliefs. We denote by $\alpha_1^i(r_i, r_j, X)$, with $i, j \in \{1, 2\}$ and $i \neq j$, the posterior probability that the consumers place on media firm i being of high type. Note that when there is feedback the statistic X is sufficient, hence $\alpha_1^i(r_i, r_j, X)$ does not depend on $\sigma_{s_j}^j(r_j)$. Accordingly, expressions (1)-(4) and (7)-(8), with the correspondent subindex, define the beliefs in this case. Nevertheless, note that conditioned on firm i having reported $\hat{n}_i$, a necessary condition for $X \neq 0$ is that j reports $\hat{c}_j$ (this is not necessary when i takes $\hat{c}_i$).

For the case without feedback, beliefs are given by:

$$\alpha_1^i(\hat{c}_i, \hat{c}_j, 0) = \frac{\alpha_0}{\alpha_0 + (1-\alpha_0)\left(\gamma\sigma_c^i(\hat{c}) + (1-\gamma)\sigma_n^i(\hat{c}) + (\gamma\sigma_n^i(\hat{c}) + (1-\gamma)\sigma_c^i(\hat{c}))\frac{(1-\alpha_0)(\gamma\sigma_n^j(\hat{c}) + (1-\gamma)\sigma_c^j(\hat{c}))}{\alpha_0 + (1-\alpha_0)(\gamma\sigma_c^j(\hat{c}) + (1-\gamma)\sigma_n^j(\hat{c}))}\right)}, \tag{11}$$

$$\alpha_1^i(\hat{c}_i, \hat{n}_j, 0) = \frac{\alpha_0}{\alpha_0 + (1-\alpha_0)\left(\gamma\sigma_c^i(\hat{c}) + (1-\gamma)\sigma_n^i(\hat{c}) + (\gamma\sigma_n^i(\hat{c}) + (1-\gamma)\sigma_c^i(\hat{c}))\frac{\alpha_0 + (1-\alpha_0)(\gamma\sigma_n^j(\hat{n}) + (1-\gamma)\sigma_c^j(\hat{n}))}{(1-\alpha_0)(\gamma\sigma_c^j(\hat{n}) + (1-\gamma)\sigma_n^j(\hat{n}))}\right)}, \tag{12}$$

$$\alpha_1^i(\hat{n}_i, \hat{n}_j, 0) = \frac{\alpha_0}{\alpha_0 + (1-\alpha_0)\left(\gamma\sigma_n^i(\hat{n}) + (1-\gamma)\sigma_c^i(\hat{n}) + (\gamma\sigma_c^i(\hat{n}) + (1-\gamma)\sigma_n^i(\hat{n}))\frac{(1-\alpha_0)(\gamma\sigma_c^j(\hat{n}) + (1-\gamma)\sigma_n^j(\hat{n}))}{\alpha_0 + (1-\alpha_0)(\gamma\sigma_n^j(\hat{n}) + (1-\gamma)\sigma_c^j(\hat{n}))}\right)}, \tag{13}$$

$$\alpha_1^i(\hat{n}_i, \hat{c}_j, 0) = \frac{\alpha_0}{\alpha_0 + (1-\alpha_0)\left(\gamma\sigma_n^i(\hat{n}) + (1-\gamma)\sigma_c^i(\hat{n}) + (\gamma\sigma_c^i(\hat{n}) + (1-\gamma)\sigma_n^i(\hat{n}))\frac{\alpha_0 + (1-\alpha_0)(\gamma\sigma_c^j(\hat{c}) + (1-\gamma)\sigma_n^j(\hat{c}))}{(1-\alpha_0)(\gamma\sigma_n^j(\hat{c}) + (1-\gamma)\sigma_c^j(\hat{c}))}\right)}, \tag{14}$$

with $\alpha_1^i(\hat{c}_i, \hat{c}_j, 0) > \alpha_1(\hat{c}, 0) > \alpha_1^i(\hat{c}_i, \hat{n}_j, 0)$ and $\alpha_1^i(\hat{n}_i, \hat{n}_j, 0) > \alpha_1(\hat{n}, 0) > \alpha_1^i(\hat{n}_i, \hat{c}_j, 0)$. See Section A.4 in the Appendix for the details.

Let $\Delta_{s_i}[\sigma_n^1(\hat{n}), \sigma_c^1(\hat{c}), \sigma_n^2(\hat{n}), \sigma_c^2(\hat{c})]$ be the expected gain to media firm i from reporting $\hat{n}_i$ rather than $\hat{c}_i$, after observing signal $s_i \in \{n_i, c_i\}$. After some calculation (see Appendix A.4) we obtain:

$$\begin{aligned}
\Delta_{n_i} &= P(\hat{n}_j \mid n_i)(\alpha_1^i(\hat{n}_i, \hat{n}_j, 0) - ((1-\mu_1)\alpha_1^i(\hat{c}_i, \hat{n}_j, 0) + \mu_1 P(C \mid n_i, \hat{n}_j)\alpha_1^i(\hat{c}_i, \hat{n}_j, C))) \\
&+ P(\hat{c}_j \mid n_i)((1-\mu_1)\alpha_1^i(\hat{n}_i, \hat{c}_j, 0) + \mu_1 P(N \mid n_i, \hat{c}_j)\alpha_1^i(\hat{n}_i, \hat{c}_j, N)) \\
&- P(\hat{c}_j \mid n_i)((1-\mu_2)\alpha_1^i(\hat{c}_i, \hat{c}_j, 0) + \mu_2 P(C \mid n_i, \hat{c}_j)\alpha_1^i(\hat{c}_i, \hat{c}_j, C)), \qquad (15) \\
\Delta_{c_i} &= P(\hat{n}_j \mid c_i)(\alpha_1^i(\hat{n}_i, \hat{n}_j, 0) - ((1-\mu_1)\alpha_1^i(\hat{c}_i, \hat{n}_j, 0) + \mu_1 P(C \mid c_i, \hat{n}_j)\alpha_1^i(\hat{c}_i, \hat{n}_j, C))) \\
&+ P(\hat{c}_j \mid c_i)((1-\mu_1)\alpha_1^i(\hat{n}_i, \hat{c}_j, 0) + \mu_1 P(N \mid c_i, \hat{c}_j)\alpha_1^i(\hat{n}_i, \hat{c}_j, N)) \\
&- P(\hat{c}_j \mid c_i)((1-\mu_2)\alpha_1^i(\hat{c}_i, \hat{c}_j, 0) + \mu_2 P(C \mid c_i, \hat{c}_j)\alpha_1^i(\hat{c}_i, \hat{c}_j, C)). \qquad (16)
\end{aligned}$$

We next present the results for this scenario. The next proposition establishes the conditions for full revelation to be an equilibrium, where $\tilde{\gamma}$ is defined in the proof of Proposition 3, in the Appendix.[17]

Proposition 3. *Suppose* $0 < \mu_1 \leq \mu_2 < 1$.

[17] The value of $\tilde{\gamma}(\alpha, \mu_1, \mu_2)$ corresponds to the unique real root of polynomial (20) defined in the proof of Proposition 3, and it makes $\Delta_{c_i}[\sigma_n^1(\hat{n}) = 1, \sigma_c^1(\hat{c}) = 1, \sigma_n^2(\hat{n}) = 1, \sigma_c^2(\hat{c}) = 1] = 0$.

1. *There exists* $\tilde{\gamma} \in (\frac{1}{2}, 1)$ *such that* $(\sigma_n^i(\hat{n})^*, \sigma_c^i(\hat{c})^*) = (1,1)$ *is an equilibrium strategy profile for all* $i \in \{1,2\}$ *if and only if* $\gamma > \tilde{\gamma}$.

2. *The strategy profile* $(\sigma_n^i(\hat{n})^*, \sigma_c^i(\hat{c})^*) = (1,0)$ *is never an equilibrium strategy profile, for any* $i \in \{1,2\}$.

The first result of Proposition 3 shows the existence of threshold $\tilde{\gamma}$ such that full revelation of private information is an equilibrium only when the quality of the scoop is sufficiently high. Otherwise, no full revelation occurs. This result is in line with those previously obtained. It shows the robustness of this conclusion to the consideration of different sorts of competition, suggesting that competition is an effective way to increase the amount of information revealed, provided that scoops are of sufficiently high quality. The second result of Proposition 3 shows that a strategy that silences all the scoops is never an equilibrium strategy. That is, that complete silence is never an equilibrium in the present case. This is a new an interesting result. It shows that previous results saying that a firm can find it optimal to silence all its information, provided that its initial reputation is sufficiently high and the quality of the signal sufficiently low, is no longer true. In this sense, simultaneous competition proves as a good way to prevent firms from silencing information.

Next, we try to build an intuition for the second result. To this, note that from the previous section we know that media silence is increasing in the capacity of a firm to affect the probability that consumers learn the truth. Based on this, one possible reason to explain why complete silence is not an equilibrium in the present case is that firms have here less capacity to affect the probability of feedback than they had before. We believe that because we now consider a simultaneous game where no firm has a first mover advantage, it is the case. Indeed, note that in the present scenario no firm has a nominal and exclusive power to affect the probability of feedback, as either firm 1 or 2 can now activate μ_1, and for μ_2 to be at work we need of the two firms. This is in contrast to the previous scenario, where the scoop-firm had such an exclusive power.

The next two results analyze the effect of the probability of feedback on the equilibrium behavior. Because they are in accordance with previous results, they support the argument above. We first present Corollary 3, that considers threshold $\tilde{\gamma}$ defined in Proposition 3.

Corollary 3. *Let* σ^{i*} *denote the strategy profile* $(\sigma_n^i(\hat{n})^*, \sigma_c^i(\hat{c})^*) = (1,1)$.

1. *If* $\mu_1 = \mu_2 = 0$, *the profile* σ^{i*} *is always an equilibrium strategy profile.*

2. *If* $0 < \mu_1 \leq \mu_2 < 1$, *the set of parameters for which the profile* σ^{i*} *is an equilibrium strategy profile increases in* μ_1 *and decreases in* μ_2, *i.e.,* $\frac{\partial \tilde{\gamma}}{\partial \mu_1} < 0$ *and* $\frac{\partial \tilde{\gamma}}{\partial \mu_2} > 0$. *The maximum value of* $\tilde{\gamma}$ *is* $\tilde{\gamma}^{Max} = \tilde{\gamma}(\alpha, \mu_1 = 0, \mu_2 = 1) < 1$.

Corollary 3 shows that in the extreme case in which there is no feedback, there is always an equilibrium in which the two firms reveal all their information. Mathematically, we have $\tilde{\gamma}(\alpha, \mu_1 = 0, \mu_2 = 0) = \frac{1}{2}$ in this case. According to the first point of Proposition 3, the proof follows. More interestingly, Corollary 3 also shows that the region where full revelation is an equilibrium increases in μ_1 and decreases in μ_2. In other words, media self-silence decreases in μ_1 and increases in μ_2. To gain some intuition for this result, consider a scenario in which the two media firms send report $\hat{c}$ and focus on two limit cases: i) $(\mu_1, \mu_2) = (0, x)$ and ii) $(\mu_1, \mu_2) = (x, x)$, with $x \in (0,1)$. Note that in case i) if a firm deviates and plays $\hat{n}$, consumers will never learn the truth. In contrast, in case ii) no firm has the capacity to unilaterally affect the probability of feedback. Based on this, we can say that the capacity of a firm to affect the probability that consumers learn the truth is higher in the former case than in the latter. Now, suppose the same initial situation with two firms sending $\hat{c}$ and consider the other pair of limit cases: ii) $(\mu_1, \mu_2) = (x, x)$ and iii) $(\mu_1, \mu_2) = (x, 1)$. Note that whereas in case ii) a firm that deviates to $\hat{n}$ cannot affect the probability of feedback, it can do it in case iii). Based on this, we can say that the capacity of a firm to affect this probability is higher in the latter case than in the former. Putting all together, and according to previous results, we may expect more media self-silence in case i) than in case ii), and also more in case iii) than in case ii). This is precisely what the second point of Corollary 3 states.

The idea that media self-silence varies with the probability that consumers learn the truth is reinforced by our last result. It shows that for full revelation to be an equilibrium, μ_1 and μ_2 cannot be very different. Otherwise, that is if μ_1 and μ_2 are very far apart, the profile $(\sigma_n^i(\hat{n})^*, \sigma_c^i(\hat{c})^*) = (1,1)$ is never an equilibrium strategy profile.

Corollary 4. *For any $\gamma < \tilde{\gamma}^{Max}$ there exists $0 < \hat{\mu}_1 < \hat{\mu}_2 < 1$ such that:*

1. *If $\mu_1 < \hat{\mu}_1 < \hat{\mu}_2 < \mu_2$, then the strategy profile $(\sigma_n^i(\hat{n})^*, \sigma_c^i(\hat{c})^*) = (1,1)$ is never an equilibrium strategy profile, for any $i \in \{1,2\}$.*

2. *If $\hat{\mu}_1 < \mu_1 \leq \mu_2 < \hat{\mu}_2$, then the strategy profile $(\sigma_n^i(\hat{n})^*, \sigma_c^i(\hat{c})^*) = (1,1)$ is an equilibrium strategy profile for all $i \in \{1,2\}$.*

To conclude, a comparison of the results in the two models of competition reveals a difference on whether complete silence can be an equilibrium or not. We believe that this difference is due to differences in the capacity of firms to affect the probability of feedback in the two scenarios. Thus, whereas in the scenario of Section 5.1 the scoop-firm can be very influential (in the limit, as much as a monopoly), in the present scenario the capacity of a particular firm to affect this probability is more limited. Apart from that, it is interesting to note that the results on the effects of parameters γ and μ on the equilibrium behavior are similar in the two models of competition, which shows the robustness of these results to the consideration of different market structures and different information scenarios.

6 Extensions

This section considers extensions on the (more simple versions of the) model considered in Sections 4 and 5.1. Our aim is to draw predictions on three relevant questions: i) A firm's optimal choice of an editorial standard, ii) the persistence of news suppression when consumers believe one state to be more likely than the other and iii) the possibility that silence may be socially beneficial.

6.1 Choosing an editorial standard

The analysis in Sections 4 and 5.1 shows that media silence is a feature of renown firms, that is firms with either high levels of initial reputation and/or high feedback power. In this section we focus on the variables that affect the choice of an editorial standard by a media firm. By editorial standard we refer to the minimum quality or amount of evidence that a firm requires from a scoop for the firm to be willing to publish it. We will see that both questions are very related and so that the previous analysis provides an answer to the present question.

To this, note that Propositions 1 and 2 define the existence of two thresholds that determine whether a firm is willing to publish a scoop or not. In the monopoly case the threshold is $\hat{\gamma}$ and in the case of competition it is $\overline{\gamma}$. Note that in the latter case the threshold is such that any scoop with a quality higher than the threshold is always published, whereas in the former case it is published with a positive probability. It is straightforward to prove the following result. For this reason the proof is omitted.

Corollary 5. *In the monopoly and the scoop-firm case, the higher the feedback power of a firm or the higher the firm's initial reputation, the greater the firm's requirement on the quality of a signal for the firm to be willing to publish it.*

The result states that firms with greater social power and/or higher levels of initial reputation will optimally set higher editorial standards, which means they will be stricter in the vetting process of their stories. This result puts forth an argument to explain why renown media firms are more selective with the news they publish and why they choose to silence scoops that other firms will never suppress.[18]

6.2 Unbalanced prior

This section considers a situation in which the two states of the world are not necessarily equiprobable. In particular we now consider $\theta \in (0,1)$, with θ being the probability that the state is C. We perform the analysis for the case of a monopoly firm.

Let us first consider $\theta < \frac{1}{2}$. Note that in this case the firm has a very strong incentive to silence information as on top of the effect due to the endogenous feedback, the new incentive to herd on the prior also pushes the firm towards action $\hat{n}$.[19] In this sense, the results here are clear and show that in equilibrium, $\sigma_n(\hat{n})^* = 1$ and $\sigma_c(\hat{n})^* > 0$.[20] Additionally, they show that the lower θ, the higher the media self-silence will be. Last, we obtain that there exists $\hat{\alpha}_0 \in (0,1)$ such that $\forall \alpha_0 > \hat{\alpha}_0$, $\sigma_c(\hat{n})^* = 1$. Or, to say it differently, if α_0 is sufficiently high, a normal firm suppresses all scoops. This result raises a concern about the silent role of the media in countries with high standards of the press (high α_0) and low levels of perceived corruption (low θ). To these cases, this result suggests that the absence of scandals in the press might be more the consequence of the career concerned industry than a real image of the country's level of corruption.

Next we analyze the case $\theta < \frac{1}{2}$, where the two effects that are not at play push towards opposite directions. Let $x_1(\gamma, \alpha_0, \mu, \theta)$ and $x_2(\gamma, \alpha_0, \mu, \theta)$ be such that $\Delta_c\left[\sigma_n(\hat{n}) = 1, \sigma_c(\hat{n}) = x_1; \theta\right] = 0$ and $\Delta_n\left[\sigma_n(\hat{c}) = x_2, \sigma_c(\hat{c}) = 1; \theta\right] = 0$, respectively.[21] Similarly, the expressions for Δ_n and Δ_c are given by equations (25) and (26), respectively, in the Appendix.

Proposition 4. *Let $\theta \in (1/2, 1)$. There exist $\bar{\theta}_1$, $\bar{\theta}_2$ and $\bar{\theta}_3$, with $\frac{1}{2} < \bar{\theta}_1 < \bar{\theta}_2 < \bar{\theta}_3 < 1$ such that in the unique equilibrium of the game:*

1. *If $\theta \in (1/2, \bar{\theta}_1)$, $\sigma_n(\hat{n})^* = 1$ and $\sigma_c(\hat{n})^* = min\{1, x_1\} > 0$,*
2. *If $\theta \in (\bar{\theta}_1, \bar{\theta}_2)$, $\sigma_n(\hat{n})^* = 1$ and $\sigma_c(\hat{c})^* = 1$,*
3. *If $\theta \in (\bar{\theta}_2, \bar{\theta}_3)$, $\sigma_n(\hat{c})^* = x_2 > 0$ and $\sigma_c(\hat{c})^* = 1$,*
4. *If $\theta \in (\bar{\theta}_3, 1)$, $\sigma_n(\hat{c})^* = 1$ and $\sigma_c(\hat{c})^* = 1$,*

The result shows that an increase in the probability that the state is C increases the incentives to go for the prior. Eventually, this incentive can compensate with the incentive to silence a scoop and so produce an equilibrium in which the media firm truthfully follows its signals. It occurs when $\theta \in (\bar{\theta}_1, \bar{\theta}_2)$. Proposition 4 also shows that increasing probability θ beyond a certain point can drive to an equilibrium in which the media firm always takes action $\hat{c}$, irrespectively of its signal. It results in a different class of bias, that talks about media firms printing too many stories on corruption in the hope for catering to the people and possibly bringing them down.

[18] Note that for the case of simultaneous competition we know that the higher μ_2 and the lower μ_1, the higher the editorial standards of the firms in the market. See Corollary 3.

[19] See Gentzkow and Shapiro (2006) for an explanation of the herding on the prior argument and its consequences in terms of media bias. See also Heidhues and Lagerlöf (2003) and Cummins and Nyman (2005) for models of herding applied to other contexts.

[20] See the results in Section A.5 in the Appendix.

[21] The expressions for $x_1(\gamma, \alpha_0, \mu, \theta)$ and $x_2(\gamma, \alpha_0, \mu, \theta)$ are defined in the proof of Proposition 4, in the Appendix.

6.3 Is silence always bad?

In this section we relax the assumption that the consumers' payoff is π when $r = \omega$ and $-\varphi$ otherwise. In particular, we now consider that the consumers' utility from a media report r is:

$$u(r,\omega) = \begin{cases} \pi \text{ if } r = \omega, \\ -\varphi_{\hat{c}} \text{ if } r = \hat{c}, \omega = N, \\ -\varphi_{\hat{n}} \text{ if } r = \hat{n}, \omega = C, \end{cases}$$

where $\varphi_{\hat{c}}$ is the cost to the consumers when the state of the world is N and the media firm reports $\hat{c}$, and $\varphi_{\hat{n}}$ the cost to the consumers when the state is C and the firm reports $\hat{n}$. Hence, the present section allows for errors to have different associated costs.

In this case, the expected welfare that consumers derive from the report of a media firm is:

$$\frac{1}{2}\left(\alpha_0\pi + (1-\alpha_0)((\gamma\sigma_n(\hat{n}) + (1-\gamma)\left(1-\sigma_c(\hat{c})\right))\pi - \left(\gamma\left(1-\sigma_n(\hat{n})\right) + (1-\gamma)\sigma_c(\hat{c})\right)\varphi_{\hat{c}})\right) +$$
$$\frac{1}{2}\left(\alpha_0\pi + (1-\alpha_0)\left((\gamma\sigma_c(\hat{c}) + (1-\gamma)\left(1-\sigma_n(\hat{n})\right))\pi - \left(\gamma\left(1-\sigma_c(\hat{c})\right) + (1-\gamma)\sigma_n(\hat{n})\right)\varphi_{\hat{n}}\right)\right).$$

Note that under this more general setting, the previous result that any class of media bias is detrimental to the consumers is no longer true.[22] We now obtain that there is a threshold for the quality of the signal such that depending on whether $\varphi_{\hat{c}}$ or $\varphi_{\hat{n}}$ is greater, consumers may prefer either full revelation of low quality scoops or complete silence. More precisely, the result states:

Proposition 5. *Let $\hat{\sigma}_n(\hat{n})$ and $\hat{\sigma}_c(\hat{c})$ be the strategy that maximizes the consumers' expected utility.*

1. *If $\varphi_{\hat{n}} > \varphi_{\hat{c}}$, then $\hat{\sigma}_c(\hat{c}) = 1$. Additionally, there exits $\frac{1}{2} < \tilde{\gamma}_1 < 1$ such that if $\gamma < \tilde{\gamma}_1$, $\hat{\sigma}_n(\hat{c}) = 1$, and if $\gamma > \tilde{\gamma}_1$, $\hat{\sigma}_n(\hat{n}) = 1$.*

2. *If $\varphi_{\hat{n}} < \varphi_{\hat{c}}$, then $\hat{\sigma}_n(\hat{n}) = 1$. Additionally, there exits $\frac{1}{2} < \tilde{\gamma}_2 < 1$ such that if $\gamma < \tilde{\gamma}_2$, $\hat{\sigma}_c(\hat{n}) = 1$, and if $\gamma > \tilde{\gamma}_2$, $\hat{\sigma}_c(\hat{c}) = 1$.*

3. *If $\varphi_{\hat{n}} = \varphi_{\hat{c}}$, then $\hat{\sigma}_n(\hat{n}) = 1$ and $\hat{\sigma}_c(\hat{c}) = 1$.*

Intuitively, the result says that in the case $\varphi_{\hat{n}} > \varphi_{\hat{c}}$, a media firm that seeks to maximize consumers' welfare should never silence a scoop and even more, should report $\hat{c}$ after signal n when the quality of the signal is low enough. Note that our model of career concerned media firms never predict this to occur in equilibrium, except for the case $\theta > 1/2$.

The most interesting situation possibly corresponds to $\varphi_{\hat{n}} < \varphi_{\hat{c}}$. To this case, Proposition 5 says that a media firm that seeks to maximize consumers' welfare should never create a scandal and even more, should silence a scoop whenever the signal is not of sufficiently high quality. Note that both the cases of a monopoly and of competition produce results with media silence, where strongly sourced stories are published but weak stories are silenced. It suggests that both scenarios can fit into the consumers' desired behavior, with one or the other scenario being better depending on the interplay between thresholds γ_2, $\hat{\gamma}$, $\overline{\gamma}$ and $\tilde{\gamma}$. Additionally, note that the pure strategy that embeds the consumer's optimal strategy is very much in line with the optimal behavior of highly reputed firms in the case of competition between a scoop-firm and K followers. In this sense, our model poses an argument in favor of renown firms, an argument that requires $\varphi_{\hat{n}} < \varphi_{\hat{c}}$ to be valid. Otherwise, and in particular when $\varphi_{\hat{n}} = \varphi_{\hat{c}}$, remember that it is tough competition that maximizes social welfare, as it is competition that induces media firms to reveal all their private information.

[22] Remember we define media bias as any deviation in the report of a firm from the firm's signal.

7 Conclusion

We propose a model in which media firms, through their reporting strategies, have the power to affect how much citizens can ever learn about an issue. Our results put forth an important reputational incentive for media firms to suppress information, showing that silence increases in the initial reputation of a firm, the probability of feedback and the political and social influence of the firm. We also show that reputational concerns induce renown firms to have stricter vetting processes for their stories, and that competition reduces media self-silence of strongly sourced stories but cannot avoid the suppression of informative though weaker signals, unless firms feature low levels of feedback power.

The results in our model are much in line with empirical observation. On the one hand, they help explain why neither *Newsweek* nor *The New Yorker* chose to run the Lewinsky and the bin Laden's death stories, respectively, whereas *Drudge Report* and *The London Review of Books* found no repair to print them and break the news. Note that according to our results, it is the renown firms that have more incentives to silence information, and that renown firms are normal type firms (with an informative but imperfect signal) that enjoy either a high initial reputation and/or a high probability of feedback, i.e, firms such as *Newsweek* or *The New Yorker.* On the other hand, our results give a logic to explain why this class of firms have stricter vetting processes for stories and fact-checkers in their staff; whereas smaller firms, lacking the power to influence public opinion, have less thorough review processes. Last, and despite the apparent contradiction, they also have the capacity to accommodate and explain the empirical observation that media firms such as *The New York Times* or *The Washington Post* are far ahead of the rest of firms in terms of number of *Pulitzer Prizes*.[23] We consider that extensions of our model in either of the following two directions would help explain this empirical observation. First, considering that renown media firms have access to better sources, i.e., they receive signals of better quality.[24] Second, considering that renown media firms receive a larger number of scoops, for example because their name and/or influence makes them more attractive to whistle-blowers. In both cases, our prediction is that our model could easily accommodate and explain why media firms with high levels of reputation and/or social influence can end up publishing more scoops than less renown firms.

Regarding the contribution of the paper, it is interesting to note that the kind of media silence that we identify in this paper does not depend on the existence or not of defamation lawsuits or physical threats to journalists (see Garoupa (1999), Stanig (2015) and Gratton (2015)), which we agree are real phenomena and important sources of media silence. It is neither explained by media captured, either by the government or by advertisers (see Vaidya (2005), Besley and Prat (2006) and Ellman and Germano (2009)). Introducing these kind of considerations in a model like ours, where only negative news produce feedback, would just reinforce our results. However, the predictions of our model would be much more different to those resulting from the argument of media capture if the scoop were to involve a weak opposition politician or a small advertising firm, where neither the government nor the advertising firm would probably have incentives to buy or induce the silence of the media. Alternatively, predictions would also differ if we were to consider that feedback originates after good news (for example, a story saying how good a particular governmental policy is). In these cases, we conjecture that news suppression would never occur under the argument of media capture, whereas our model would still predict media silence.

[23] Since 1918, *The New York Times* has been awarded 117 *Pulitzer Prizes*, more than any other media firm. *The Washington Post* has won 47. Because many of these honors are in the categories of Breaking News Reporting and Investigative Reporting, it presents clear evidence that media firms with high social influence do also cover scandals.

[24] To this case, preliminary results are in the desired direction. To see it, suppose we compare two scenarios, each with one scoop-firm with different feedback power and different signal's quality, such that the firm with the highest social influence receives a better signal. Now, from the analysis of competition we know that: (i) An increase in the quality of a signal reduces media self-silence, and (ii) an increase in the feedback power of a firm increases media self-silence. Now, suppose the two firms are similar in terms of feedback power but very different in terms of signals' quality. Then, it is possible to have an equilibrium in which the firm with the higher social influence (and better signals) publishes more scoops.

Last, note that our analysis considers risk-neutral media firms. Again, extending the analysis to account for risk-averse media firms or journalists would just magnify the result of news suppression. In this sense, our contribution is to point out to a more subtle source of media silence that exclusively originates in the power of the media to raise public concern and so affect the probability that there is ex-post verification of the true state of the world.

A Appendix

The Appendix is divided into six subsections: A.1) Monopoly; A.2) Monopoly with a strategic high type; A.3) Competition: A model of a leader and K followers; A.4) Competition: A model of two strategic scoop-firms; A.5) Extension: Monopoly with unbalanced prior; and A.6) Extension: Is silence always bad?

A.1 Monopoly

Proof of Proposition 1

It is a limit case of Proposition 2, with $\mu_K = 0$ and $\mu_{K+1} = \mu$. From Table 1, in the proof of Proposition 2, we have:

$\lim\limits_{\mu_K \to 0} \overline{\alpha}_0 = \frac{2(2-\mu_{K+1})}{4-\mu_{K+1}} = \frac{2(2-\mu)}{4-\mu} = \hat{\alpha}_0,$

$\lim\limits_{\mu_K \to 0} \underline{\gamma} = 1 - \frac{2}{\mu_{K+1}} \frac{1-\alpha_0}{2-\alpha_0} = 1 - \frac{2}{\mu} \frac{1-\alpha_0}{2-\alpha_0} = \hat{\gamma}$, and

$\lim\limits_{\mu_K \to 0} \overline{\gamma} = 1.$

In addition, when $\mu_K = 0$ and $\mu_{K+1} = \mu$, expression (18) simplifies to:

$\Delta_c[\sigma_n(\hat{n})^* = 1, \sigma_c(\hat{n})] = \frac{\alpha_0}{\alpha_0 + (1-\alpha_0)(\sigma_c(\hat{n})+1)} - (\frac{(1-\mu)\alpha_0}{\alpha_0+(1-\alpha_0)\sigma_c(\hat{c})} + \frac{\mu\gamma\alpha_0}{\alpha_0+(1-\alpha_0)\gamma\sigma_c(\hat{c})}),$

where $\Delta_c[\sigma_n(\hat{n})^* = 1, \sigma_c^*(\hat{n}) = x_0] = 0$ for

$$x_0(\gamma, \alpha_0, \mu) = \frac{2\gamma + \alpha_0(1-\alpha_0)(2-\mu) - \sqrt{(2\gamma + \alpha_0(1-\gamma)(2-\mu))^2 - 8\alpha_0(1-\gamma)\gamma\mu}}{4(1-\alpha_0)\gamma}. \quad \blacksquare \tag{17}$$

Proof of Corollary 1

The proof of this corollary is a particular case of Corollary 2, with $\mu_K = 0$ and $\mu_{K+1} = \mu$.

From Proposition 1 and expression (17), it is straightforward to show that:

$$\lim_{\mu \to 0} \sigma_c^*(\hat{n}) = 0 \qquad \lim_{\mu \to 1} \sigma_c^*(\hat{n}) = \min\{1, \frac{\alpha_0(1-\gamma)}{2\gamma(1-\alpha_0)}\},$$

$$\lim_{\gamma \to \frac{1}{2}} \sigma_c^*(\hat{n}) = \min\{1, x_0|_{\gamma=\frac{1}{2}}\} \qquad \lim_{\gamma \to 1} \sigma_c^*(\hat{n}) = 0,$$

$$\lim_{\alpha_0 \to 0} \sigma_c^*(\hat{n}) = 0 \qquad \lim_{\alpha_0 \to 1} \sigma_c^*(\hat{n}) = 1. \quad \blacksquare$$

A.2 Monopoly with an strategic high type

In this section we show that in the case of a monopoly there is always an equilibrium in which the high type reveals all its information. Let H denote the high type and L denote the normal type (remember that N denotes one of the states of the world). We consider $\theta \in (0, 1)$. First, we show that if the high type is strategic, then it is an equilibrium strategy for this type to always report its signal honestly. This is Proposition 6. Then, we show that under assumption $\frac{P(\hat{c}|L,C)}{P(\hat{c}|H,C)} < \frac{P(\hat{c}|L,N)}{P(\hat{c}|H,N)}$, i.e., the high type H matches the state of the world more often than the normal type L, the equilibrium described in Proposition 6 is unique. This is Corollary 6.

We denote by $\sigma_s^H(r) \in [0, 1]$ the probability that, conditioned on its signal s, a high type firm takes action r. In addition, $\sigma_s(r)$ will continue to denote this probability for the normal type.

Proposition 6. *Let $\theta \in (0,1)$. There exist $\bar{\theta}_1$, $\bar{\theta}_2$ and $\bar{\theta}_3$, with $0 < \bar{\theta}_1 < \bar{\theta}_2 < \bar{\theta}_3 < 1$. For each $\theta \in (0,1)$ there is a unique equilibrium for the normal type. In the equilibrium:*

1. *If $\theta \in (0, \bar{\theta}_1)$, $\sigma_n(\hat{n})^* = 1$ and $\sigma_c(\hat{n})^* = min\{1, x_1\} > 0$,*

2. *If $\theta \in (\bar{\theta}_1, \bar{\theta}_2)$, $\sigma_n(\hat{n})^* = 1$ and $\sigma_c(\hat{c})^* = 1$,*

3. *If $\theta \in (\bar{\theta}_2, \bar{\theta}_3)$, $\sigma_n(\hat{c})^* = x_2 > 0$ and $\sigma_c(\hat{c})^* = 1$,*

4. *If $\theta \in (\bar{\theta}_3, 1)$, $\sigma_n(\hat{c})^* = 1$ and $\sigma_c(\hat{c})^* = 1$*

Where x_1 is such that $\Delta_c [\sigma_n(\hat{n}) = 1, \sigma_c(\hat{c}) = 1 - x_1; \theta] = 0$, and x_2 is such that $\Delta_n [\sigma_n(\hat{n}) = 1 - x_2, \sigma_c(\hat{c}) = 1; \theta] = 0$

In addition, if the high type H plays strategically, the truthful strategy $\left(\sigma_c^H(\hat{c})^* = 1 \text{ and } \sigma_n^H(\hat{n})^* = 1\right)$ is an equilibrium strategy for the high type.

Proof.

Proposition 7 shows that if the high type plays the truthful strategy $\left(\sigma_c^H(\hat{c})^* = 1 \text{ and } \sigma_n^H(\hat{n})^* = 1\right)$, the normal type's strategy described above is an equilibrium strategy. Therefore, we only have to show that if the normal type plays such a strategy, the truthful strategy is an equilibrium strategy for the high type. To this aim, we will assume that the high type plays the truthful strategy, $\left(\sigma_c^H(\hat{c})^* = 1 \text{ and } \sigma_n^H(\hat{n})^* = 1\right)$, and then show that this is indeed an equilibrium strategy.

First, we derive the payoff functions for the high type. As for the normal type, they are defined in equations (25) and (26).

Let $E^H\{\alpha_1(r, X) \mid s\}$ denote the expected payoff to the high type media firm when it observes signal $s \in \{n, c\}$ and publishes $r \in \{\hat{n}, \hat{c}\}$.

$E^H\{\alpha_1(\hat{n}, X) \mid s\} = \alpha_1(\hat{n}, 0)$

$E^H\{\alpha_1(\hat{c}, X) \mid n\} = (1-\mu)\alpha_1(\hat{c}, 0) + \mu[\alpha_1(\hat{c}, N)] = (1-\mu)\alpha_1(\hat{c}, 0)$

$E^H\{\alpha_1(\hat{c}, X) \mid c\} = (1-\mu)\alpha_1(\hat{c}, 0) + \mu[\alpha_1(\hat{c}, C)]$

Now, we define the expected gain to the high type to reporting $\hat{n}$ rather than $\hat{c}$, after observing signal s, as $\Delta_s^H = E^H\{\alpha_1(\hat{n}, X) \mid s\} - E^H\{\alpha_1(\hat{c}, X) \mid s\}$.

Substituting, we obtain:

$$\Delta_n^H = \alpha_1(\hat{n}, 0) - (1-\mu)\alpha_1(\hat{c}, 0)$$
$$\Delta_c^H = \alpha_1(\hat{n}, 0) - ((1-\mu)\alpha_1(\hat{c}, 0) + \mu\alpha_1(\hat{c}, C))$$

Claim 1. $\Delta_n^H > \Delta_n > \Delta_c > \Delta_c^H$.

Proof.

First, note that from Lemma 3, $\Delta_n > \Delta_c$.

Additionally,

$\Delta_n^H = \alpha_1(\hat{n}, 0) - (1-\mu)\alpha_1(\hat{c}, 0) > \Delta_n = \alpha_1(\hat{n}, 0) - ((1-\mu)\alpha_1(\hat{c}, 0) + \mu P(C \mid n)\alpha_1(\hat{c}, C))$, and

$\Delta_c^H = \alpha_1(\hat{n}, 0) - ((1-\mu)\alpha_1(\hat{c}, 0) + \mu\alpha_1(\hat{c}, C)) < \Delta_c = \alpha_1(\hat{n}, 0) - ((1-\mu)\alpha_1(\hat{c}, 0) + \mu P(C \mid c)\alpha_1(\hat{c}, C))$.

Consequently, $\Delta_n^H > \Delta_n > \Delta_c > \Delta_c^H$. ♦

Next, we go into the analysis of the nine possible equilibrium configurations for the normal type, enumerated in the proof of Proposition 7. There, we showed that configurations 5, 6, 8 and 9 could not be in equilibrium (as $\Delta_n > \Delta_c$). This is also the case now. Then, we next analyze the equilibrium configurations that are left: 1, 2, 3, 4 and 7; and show that for none of them, the high type has an incentive to deviate from the truthful strategy.

Configuration 1: In this case, $\Delta_c \leq 0$. Then, from Claim 1, $\Delta_c^H < 0$, and thus $\sigma_{Hc}(\hat{c})^* = 1$. In addition, $\Delta_n \geq 0$, consequently, $\Delta_n^H > 0$, and thus $\sigma_n^H(\hat{n})^* = 1$.

Configuration 2: This case is analogous to the previous one.

Configuration 3: Since $\Delta_n \geq 0$, then $\Delta_n^H > 0$ and thus $\sigma_n^H(\hat{n})^* = 1$. Because under this configuration, the normal type never sends $\hat{c}$, if $\hat{c}$ were to be reported, the media firm would assigned a probability one of being the high type. Consequently, $\Delta_c^H = \alpha_1(\hat{n}, 0) - ((1-\mu)\alpha_1(\hat{c}, 0) + \mu\alpha_1(\hat{c}, C)) = \alpha_1(\hat{n}, 0) - 1 < 0$, which implies $\sigma_c^H(\hat{c})^* = 1$.

Configuration 4: Since $\Delta_c \leq 0$, then $\Delta_c^H < 0$, and thus $\sigma_c^H(\hat{c})^* = 1$. Because under this configuration, the normal type never sends $\hat{n}$, if $\hat{n}$ were to be reported, the media firm would assign a probability one of being the high type. Consequently, $\Delta_n^H = \alpha_1(\hat{n}, 0) - (1-\mu)\alpha_1(\hat{c}, 0) = 1 - (1-\mu)\alpha_1(\hat{c}, 0) > 0$, which implies $\sigma_n^H(\hat{n})^* = 1$.

Configuration 7: This case is analogous to Configuration 1.

Then, the truthful strategy is an equilibrium strategy for the high type. ■

Next, we show that the equilibrium above is unique. To this aim, we make the following assumption: In equilibrium, the high type matches the state of the world more often than the normal type.[25] Formally, it implies $\frac{P(\hat{c}|L,C)}{P(\hat{c}|H,C)} < \frac{P(\hat{c}|L,N)}{P(\hat{c}|H,N)}$, where $P(\hat{c} \mid L, C)$ is the probability that a normal type (L) reports $\hat{c}$ when the state of the world is C. Analogously, $P(\hat{c} \mid H, C)$ is the probability that a high type (H) reports $\hat{c}$ when the state of the world is C and so on, so forth. It is straightforward to prove that if $\frac{P(\hat{c}|L,C)}{P(\hat{c}|H,C)} < \frac{P(\hat{c}|L,N)}{P(\hat{c}|H,N)}$, then $\alpha_1(\hat{c}, C) > \alpha_1(\hat{c}, N)$.

Corollary 6. *If $\frac{P(\hat{c}|L,C)}{P(\hat{c}|H,C)} < \frac{P(\hat{c}|L,N)}{P(\hat{c}|H,N)}$, then the equilibrium described in Proposition 6 is unique.*

Proof.

First, note that from the proof of Proposition 7 we know that if the high type plays the truthful strategy, then the equilibrium strategy of the normal type is unique.

Then, we just have to show that the truthful strategy is the only equilibrium strategy for the high type. To this aim, we first rewrite the functions Δ_n, Δ_c, Δ_n^H and Δ_c^H, to take into account the fact that the high type can now lie and report $\hat{c}$ when its signal indicates n (in which case, the real state is N). They are:

$\Delta_n = \alpha_1(\hat{n}, 0) - ((1-\mu)\alpha_1(\hat{c}, 0) + \mu\,(P(C \mid n)\alpha_1(\hat{c}, C) + P(N \mid n)\alpha_1(\hat{c}, N)))$,
$\Delta_c = \alpha_1(\hat{n}, 0) - ((1-\mu)\alpha_1(\hat{c}, 0) + \mu\,(P(C \mid c)\alpha_1(\hat{c}, C) + P(N \mid c)\alpha_1(\hat{c}, N)))$,
$\Delta_n^H = \alpha_1(\hat{n}, 0) - ((1-\mu)\alpha_1(\hat{c}, 0) + \mu\alpha_1(\hat{c}, N))$, and
$\Delta_c^H = \alpha_1(\hat{n}, 0) - ((1-\mu)\alpha_1(\hat{c}, 0) + \mu\alpha_1(\hat{c}, C))$.

It is straightforward to show that $P(C \mid c) > P(C \mid n)$, with $P(N \mid c) = 1 - P(C \mid c)$ and $P(N \mid n) = 1 - P(C \mid n)$.

As $\frac{P(\hat{c}|L,C)}{P(\hat{c}|H,C)} < \frac{P(\hat{c}|L,N)}{P(\hat{c}|H,N)}$, then $\alpha_1(\hat{c}, C) > \alpha_1(\hat{c}, N)$, which implies:
$\alpha_1(\hat{c}, N) < P(C \mid n)\alpha_1(\hat{c}, C) + P(N \mid n)\alpha_1(\hat{c}, N) < P(C \mid c)\alpha_1(\hat{c}, C) + P(N \mid c)\alpha_1(\hat{c}, N) < \alpha_1(\hat{c}, C)$.

Consequently, $\Delta_n^H > \Delta_n > \Delta_c > \Delta_c^H$. The rest of the proof is analogous to the proof of Proposition 6. ■

A.3 Competition: A model of a leader and K followers

In this section we consider the beliefs in (1)-(4) and (7)-(8) and the functions Δ_n and Δ_c defined in (9) and (10).

[25] Note that this is a quite mild assumption. Nonetheless, if it were not the case, it would not make sense for a consumer to assign a reputational reward to a high type.

Proof of Proposition 2

The Proposition is proven through three Lemmas.

Lemma 1. *If $0 < \mu_K < \mu_{K+1} < 1$, then $\Delta_n > \Delta_c$.*

Proof. $\Delta_n > \Delta_c$

$\iff$

$(1-\mu_K)\alpha_1(\hat{n},0) + \mu_K\gamma\alpha_1(\hat{n},N) - ((1-\mu_{K+1})\alpha_1(\hat{c},0) + \mu_{K+1}(1-\gamma)\alpha_1(\hat{c},C)) >$

$(1-\mu_K)\alpha_1(\hat{n},0) + \mu_K(1-\gamma)\alpha_1(\hat{n},N) - ((1-\mu_{K+1})\alpha_1(\hat{c},0) + \mu_{K+1}\gamma\alpha_1(\hat{c},C))$

$\iff$

$\mu_K\alpha_1(\hat{n},N)(2\gamma-1) > \mu_{K+1}\alpha_1(\hat{c},C)(1-2\gamma)$.

Since $\gamma > 1/2$, the proof follows. ♦

Lemma 2. *If $0 < \mu_K < \mu_{K+1} < 1$ and $\sigma_c(\hat{c}) = 1$, then $\Delta_n > 0$.*

Proof.

$\Delta_n\left[\sigma_c(\hat{c}) = 1\right] = \frac{(1-\mu_K)\alpha_0}{\alpha_0+(1-\alpha_0)\sigma_n(\hat{n})} + \frac{\mu_K\gamma\alpha_0}{\alpha_0+(1-\alpha_0)\gamma\sigma_n(\hat{n})} - \left(\frac{(1-\mu_{K+1})\alpha_0}{\alpha_0+(1-\alpha_0)(1+\sigma_n(\hat{c}))} + \frac{\mu_{K+1}(1-\gamma)\alpha_0}{\alpha_0+(1-\alpha_0)(\gamma+(1-\gamma)\sigma_n(\hat{c}))}\right)$.

Now, we define $T = \frac{(1-\mu_K)\alpha_0}{\alpha_0+(1-\alpha_0)\sigma_n(\hat{n})} + \frac{\mu_K\gamma\alpha_0}{\alpha_0+(1-\alpha_0)\gamma\sigma_n(\hat{n})}$. Note that, as $\frac{\partial T}{\partial \mu_K} < 0$, then $\frac{\partial \Delta_n[\sigma_c(\hat{c})=1]}{\partial \mu_K} < 0$. Consequently, as $\mu_K \in (0, \mu_{K+1})$, to show that $\Delta_n\left[\sigma_c(\hat{c}) = 1\right] > 0$, it is sufficient to prove that $\Delta_n\left[\sigma_c(\hat{c}) = 1; \mu_K = \mu_{K+1}\right] > 0$, where

$\Delta_n\left[\sigma_c(\hat{c}) = 1; \mu_K = \mu_{K+1}\right] = \frac{(1-\mu_{K+1})\alpha_0}{\alpha_0+(1-\alpha_0)\sigma_n(\hat{n})} + \frac{\mu_{K+1}\gamma\alpha_0}{\alpha_0+(1-\alpha_0)\gamma\sigma_n(\hat{n})} - \left(\frac{(1-\mu_{K+1})\alpha_0}{\alpha_0+(1-\alpha_0)(1+\sigma_n(\hat{c}))} + \frac{\mu_{K+1}(1-\gamma)\alpha_0}{\alpha_0+(1-\alpha_0)(\gamma+(1-\gamma)\sigma_n(\hat{c}))}\right)$.

Now, since $\gamma > \frac{1}{2}$ and $\sigma_n(\hat{n}) \in [0,1]$, with $\sigma_n(\hat{c}) = 1-\sigma_n(\hat{n})$, we obtain $\frac{(1-\mu_{K+1})\alpha_0}{\alpha_0+(1-\alpha_0)\sigma_n(\hat{n})} > \frac{(1-\mu_{K+1})\alpha_0}{\alpha_0+(1-\alpha_0)(1+\sigma_n(\hat{c}))}$ and $\frac{\mu_{K+1}\gamma\alpha_0}{\alpha_0+(1-\alpha_0)\gamma\sigma_n(\hat{n})} > \frac{\mu_{K+1}(1-\gamma)\alpha_0}{\alpha_0+(1-\alpha_0)(\gamma+(1-\gamma)\sigma_n(\hat{c}))}$. This completes the proof. ♦

Now, there are nine equilibrium configuration to analyze.

1. $\sigma_c(\hat{c})^* = 1 \quad \sigma_n(\hat{n})^* = 1 \iff \Delta_c \leq 0 \quad \Delta_n \geq 0$.
2. $\sigma_c(\hat{c})^* < 1 \quad \sigma_n(\hat{n})^* = 1 \iff \Delta_c = 0 \quad \Delta_n \geq 0$.
3. $\sigma_c(\hat{c})^* = 0 \quad \sigma_n(\hat{n})^* = 1 \iff \Delta_c \geq 0 \quad \Delta_n \geq 0$.
4. $\sigma_c(\hat{c})^* = 1 \quad \sigma_n(\hat{n})^* = 0 \iff \Delta_c \leq 0 \quad \Delta_n \leq 0$.
5. $\sigma_c(\hat{c})^* < 1 \quad \sigma_n(\hat{n})^* = 0 \iff \Delta_c = 0 \quad \Delta_n \leq 0$.
6. $\sigma_c(\hat{c})^* = 0 \quad \sigma_n(\hat{n})^* = 0 \iff \Delta_c \geq 0 \quad \Delta_n \leq 0$.
7. $\sigma_c(\hat{c})^* = 1 \quad \sigma_n(\hat{n})^* < 1 \iff \Delta_c \leq 0 \quad \Delta_n = 0$.
8. $\sigma_c(\hat{c})^* < 1 \quad \sigma_n(\hat{n})^* < 1 \iff \Delta_c = 0 \quad \Delta_n = 0$.
9. $\sigma_c(\hat{c})^* = 0 \quad \sigma_n(\hat{n})^* < 1 \iff \Delta_c \geq 0 \quad \Delta_n = 0$.

Note that from Lemma 1, configurations 5, 6, 8 and 9 cannot be. Similarly, from Lemma 2, configurations 4 and 7 can neither be. Consequently, $\sigma_n(\hat{n})^* = 1$. Then, taking into account the restriction imposed by Lemma 1, the resulting possible configurations are:

1. $\sigma_c(\hat{c})^* = 1 \quad \sigma_n(\hat{n})^* = 1 \iff \Delta_c \leq 0 \quad \Delta_n \geq 0$.
2. $\sigma_c(\hat{c})^* < 1 \quad \sigma_n(\hat{n})^* = 1 \iff \Delta_c = 0 \quad \Delta_n > 0$.
3. $\sigma_c(\hat{c})^* = 0 \quad \sigma_n(\hat{n})^* = 1 \iff \Delta_c \geq 0 \quad \Delta_n > 0$.

Let us now consider $\sigma_n(\hat{n})^* = 1$ and analyze how the normal firm proceeds when it observes signal c. The function Δ_c defined in (10) with $\sigma_n(\hat{n})^* = 1$ is

$$\Delta_c[\sigma_n(\hat{n})^* = 1] = \frac{(1-\mu_K)\alpha_0}{\alpha_0+(1-\alpha_0)(\sigma_c(\hat{n})+1)} + \frac{\mu_K(1-\gamma)\alpha_0}{\alpha_0+(1-\alpha_0)(\gamma+(1-\gamma)\sigma_c(\hat{n}))} - \left(\frac{(1-\mu_{K+1})\alpha_0}{\alpha_0+(1-\alpha_0)\sigma_c(\hat{c})} + \frac{\mu_{K+1}\gamma\alpha_0}{\alpha_0+(1-\alpha_0)\gamma\sigma_c(\hat{c})}\right). \tag{18}$$

Now, let us suppose $\sigma_c(\hat{n})^* = 0$. In this case,

$\Delta_c[\sigma_n(\hat{n})^* = 1, \sigma_c(\hat{n})^* = 0] = (1-\mu_K)\alpha_0 + \frac{\mu_K(1-\gamma)\alpha_0}{\alpha_0+(1-\alpha_0)\gamma} - ((1-\mu_{K+1})\alpha_0 + \frac{\mu_{K+1}\gamma\alpha_0}{\alpha_0+(1-\alpha_0)\gamma})$

$= \frac{(1-\mu_K)\alpha_0(\alpha_0+(1-\alpha_0)\gamma)+\mu_K(1-\gamma)\alpha_0-(1-\mu_{K+1})\alpha_0(\alpha_0+(1-\alpha_0)\gamma)-\mu_{K+1}\gamma\alpha_0}{\alpha_0+(1-\alpha_0)\gamma}$

$= \frac{\alpha_0^2(\mu_{K+1}-\mu_K)+\alpha_0(1-\alpha_0)\gamma(\mu_{K+1}-\mu_K)+\alpha_0(\mu_K(1-\gamma)-\mu_{K+1}\gamma)}{\alpha_0+(1-\alpha_0)\gamma}$
$= \alpha_0(\mu_{K+1}-\mu_K) + \frac{\alpha_0(\mu_K(1-\gamma)-\mu_{K+1}\gamma)}{\alpha_0+(1-\alpha_0)\gamma} > 0 \Leftrightarrow \gamma < \frac{\mu_K+\alpha_0(\mu_{K+1}-\mu_K)}{2\mu_K+\alpha_0(\mu_{K+1}-\mu_K)}$.

Let $\overline{\gamma}= \frac{\mu_K+\alpha_0(\mu_{K+1}-\mu_K)}{2\mu_K+\alpha_0(\mu_{K+1}-\mu_K)}$, where it is straightforward to show that $\overline{\gamma} \in (0,1)$. Hence, in equilibrium, $\sigma_c(\hat{n})^* > 0$ for $\gamma < \overline{\gamma} \in (0,1)$, and $\sigma_c(\hat{c})^* = 1$ for $\gamma > \overline{\gamma}$.

Now, we obtain the threshold for complete silence, i.e., $\sigma_c(\hat{n})^* = 1$.
To this aim $\Delta_c[\sigma_n(\hat{n})^* = 1, \sigma_c(\hat{n})^* = 1] = \frac{(1-\mu_K)\alpha_0}{\alpha_0+(1-\alpha_0)2} + \frac{\mu_K(1-\gamma)\alpha_0}{\alpha_0+(1-\alpha_0)(\gamma+(1-\gamma))} - ((1-\mu_{K+1})+\mu_{K+1}\gamma) > 0$,
$\iff \gamma < \frac{\alpha_0\mu_K+\mu_{K+1}+\frac{\alpha_0(1-\mu_K)}{2-\alpha_0}-1}{\alpha_0\mu_K+\mu_{K+1}}$
Let $\underline{\gamma}=\frac{\alpha_0\mu_K+\mu_{K+1}+\frac{\alpha_0(1-\mu_K)}{2-\alpha_0}-1}{\alpha_0\mu_K+\mu_{K+1}}$, where it is straightforward to show that:
1) $\underline{\gamma}<\overline{\gamma} < 1$
2) $\frac{1}{2} > \underline{\gamma} \iff \alpha_0 > \frac{4-\mu_{K+1}-\sqrt{(\mu_{K+1}-4)^2+8(\mu_{K+1}-2)\mu_K}}{2\mu_K}$
Let $\overline{\alpha}_0=\frac{4-\mu_{K+1}-\sqrt{(\mu_{K+1}-4)^2+8(\mu_{K+1}-2)\mu_K}}{2\mu_K}$.
To conclude, note that function $\Delta_c[\sigma_n(\hat{n}) = 1, \sigma_c(\hat{c})]$ is strictly increasing in $\sigma_c(\hat{c})$,

$$\frac{\partial\Delta_c[\sigma_c(\hat{c}),\sigma_n(\hat{n})=1]}{\partial\sigma_c(\hat{c})} = \frac{\alpha_0(1-\alpha_0)(1-\mu_K)}{(\alpha_0+(1-\alpha_0)\sigma_c(\hat{c})-2)^2} + \frac{\alpha_0\mu_K(1-\alpha_0)(1-\gamma)^2}{((\alpha_0-1)\sigma_c+(1-\alpha_0)\gamma\sigma_c(\hat{c})+1)^2} + \frac{\alpha_0(1-\mu_{K+1})(1-\alpha_0)}{(\alpha_0+(1-\alpha_0)\sigma_c(\hat{c}))^2} + \frac{\alpha_0\gamma^2(1-\alpha_0)\mu_{K+1}}{(\alpha_0+(1-\alpha_0)\gamma\sigma_c(\hat{c}))^2} > 0. \quad (19)$$

Then, there is only one equilibrium. Now, if $\gamma \geq \overline{\gamma}$, there is only one equilibrium in which $\sigma_c(\hat{c})^* = 1$. On the other hand, if $\gamma < \overline{\gamma}$, in the unique equilibrium $\sigma_c(\hat{c})^*$ is either 0 or the root of equation $\Delta_c[\sigma_c(\hat{c}), \sigma_n(\hat{n}) = 1] = 0$ in the interval (0,1). Let $\tilde{x}_3$ be that root. Then, we have the following situations. First, if $\alpha_0 \leq \overline{\alpha}_0$, then $\underline{\gamma} \leq \frac{1}{2}$, consequently, γ is necessarily always greater than $\underline{\gamma}$, which implies that $\sigma_c^*(\hat{c}) = \tilde{x}_3$ when $\gamma < \overline{\gamma}$. Second, if $\alpha_0 > \hat{\alpha}_0$, then $\frac{1}{2} < \underline{\gamma}$, therefore, when $\gamma \leq \underline{\gamma}$, $\sigma_c^*(\hat{n}) = 1$. However, when $\gamma \in (\underline{\gamma}, \overline{\gamma})$, in equilibrium $\sigma_c^*(\hat{c}) = \tilde{x}_3$. Let $x_3 = 1 - \tilde{x}_3$. Thus, if $\sigma_c^*(\hat{c}) = \tilde{x}_3$, then $\sigma_c^*(\hat{n}) = x_3$.
Last, it is straightforward to derive the following limits for thresholds $\overline{\alpha}_0$, $\underline{\gamma}$ and $\overline{\gamma}$. See Table 1.

lim	$\overline{\alpha}_0$	$\underline{\gamma}$	$\overline{\gamma}$
$\alpha_0 \to 0$	$\overline{\alpha}_0$	$\frac{\mu_{K+1}-1}{\mu_{K+1}} < 0$	$\frac{1}{2}$
$\alpha_0 \to 1$	$\overline{\alpha}_0$	$\frac{\mu_{K+1}+\mu_K}{\mu_{K+1}}$	$\frac{\mu_{K+1}+\mu_K}{\mu_{K+1}}$
$\mu_K \to 0$	$\frac{2(2-\mu)}{4-\mu}$	$1 - \frac{2}{\mu_{K+1}} \frac{1-\alpha}{2-\alpha}$	1
$\mu_K \to \mu_{K+1}$	1	$\bar{\gamma}_1 < \frac{1}{2}$	$\frac{1}{2}$
$\mu_{K+1} \to 1$ $\mu_K \to 0$	$\frac{2}{3}$	$\frac{\alpha}{2-\alpha}$	1

Table 1: Limit cases in competition

■

Proof of Corollary 2
From (18),
$\Delta_c[\sigma_n(\hat{n})^* = 1] = \frac{(1-\mu_K)\alpha_0}{\alpha_0+(1-\alpha_0)(\sigma_c(\hat{n})+1)} + \frac{\mu_K(1-\gamma)\alpha_0}{\alpha_0+(1-\alpha_0)(\gamma+(1-\gamma)\sigma_c(\hat{n}))} - (\frac{(1-\mu_{K+1})\alpha_0}{\alpha_0+(1-\alpha_0)\sigma_c(\hat{c})} + \frac{\mu_{K+1}\gamma\alpha_0}{\alpha_0+(1-\alpha_0)\gamma\sigma_c(\hat{c})})$.
Let us denote

$$F(\sigma_c(\hat{n}), \gamma, \alpha_0, \mu) = \frac{(1-\mu_K)}{\alpha_0+(1-\alpha_0)(\sigma_c(\hat{n})+1)} + \frac{\mu_K(1-\gamma)}{\alpha_0+(1-\alpha_0)(\gamma+(1-\gamma)\sigma_c(\hat{n}))} - (\frac{(1-\mu_{K+1})}{\alpha_0+(1-\alpha_0)\sigma_c(\hat{c})} + \frac{\mu_{K+1}\gamma}{\alpha_0+(1-\alpha_0)\gamma\sigma_c(\hat{c})}).$$

In equilibrium, $\Delta_c[\sigma_n(\hat{n})^* = 1, \sigma_c(\hat{n})^*] = 0 \iff F(\sigma_c(\hat{n})^*, \gamma, \alpha_0, \mu_K, \mu_{K+1}) = 0$.
Now, by the implicit function theorem,

$$\frac{\partial \sigma_c(\hat{n})^*}{\partial \gamma} = -\frac{\frac{\partial F(\sigma_c(\hat{n})^*,\gamma,\alpha_0,\mu)}{\partial \gamma}}{\frac{\partial F(\sigma_c(\hat{n})^*,\gamma,\alpha_0,\mu)}{\partial \sigma_c(\hat{n})^*}}, \quad \frac{\partial \sigma_c(\hat{n})^*}{\partial \alpha_0} = -\frac{\frac{\partial F(\sigma_c(\hat{n})^*,\gamma,\alpha_0,\mu)}{\partial \alpha_0}}{\frac{\partial F(\sigma_c(\hat{n})^*,\gamma,\alpha_0,\mu)}{\partial \sigma_c(\hat{n})^*}}, \quad \frac{\partial \sigma_c(\hat{n})^*}{\partial \mu} = -\frac{\frac{\partial F(\sigma_c(\hat{n})^*,\gamma,\alpha_0,\mu)}{\partial \mu}}{\frac{\partial F(\sigma_c(\hat{n})^*,\gamma,\alpha_0,\mu)}{\partial \sigma_c(\hat{n})^*}},$$

where,

$\frac{\partial F(\cdot)}{\partial \sigma_c(\hat{n})^*} < 0$, since as shown in equation (19), $\frac{\partial \Delta_c[\sigma_n(\hat{n})=1]}{\partial \sigma_c(\hat{c})} > 0$ which implies $\frac{\partial \Delta_c[\sigma_n(\hat{n})^*=1]}{\partial \sigma_c(\hat{n})^*} < 0$ and $\frac{\partial F(\cdot)}{\partial \sigma_c(\hat{n})^*} < 0$.

Additionally,

$\frac{\partial F(\cdot)}{\partial \gamma} = -\frac{\mu_K}{(\alpha_0+(1-\alpha_0)(\gamma+(1-\gamma)\sigma_{cn}))^2} - \frac{\alpha_0 \mu_{K+1}}{(\alpha_0+(1-\alpha_0)\gamma\sigma_{cc})^2} < 0,$

$\frac{\partial F(\cdot)}{\partial \mu_K} = -\frac{1}{\alpha_0+(1-\alpha_0)(\sigma_{cn}+1)} - \frac{\mu_K}{(\alpha_0+(1-\alpha_0)(\gamma+(1-\gamma)\sigma_{cn}))^2} < 0,$

$\frac{\partial F(\cdot)}{\partial \mu_{K+1}} = \frac{1}{\alpha_0+(1-\alpha_0)\sigma_{cc}} > 0,$

and

$\frac{\partial F(\cdot)}{\partial \alpha_0} = \frac{(1-\mu_K)\sigma_c(\hat{n})}{(\alpha_0+(1-\alpha_0)(\sigma_c(\hat{n})+1))^2} - \frac{\mu_K(1-\gamma)^2(1-\sigma_c(\hat{n}))}{(\alpha_0+(1-\alpha_0)(\gamma+(1-\gamma)\sigma_c(\hat{n})))^2} + \frac{(1-\mu_{K+1})^2(1-\sigma_c(\hat{c}))}{(\alpha_0+(1-\alpha_0)\sigma_c(\hat{c}))^2} + \frac{\mu_{K+1}\gamma(1-\gamma\sigma_c(\hat{c}))}{(\alpha_0+(1-\alpha_0)\gamma\sigma_c(\hat{c}))^2} > 0,$

since $\frac{\mu_K(1-\gamma)^2(1-\sigma_c(\hat{n}))}{(\alpha_0+(1-\alpha_0)(\gamma+(1-\gamma)\sigma_c(\hat{n})))^2} < \frac{\mu_{K+1}\gamma(1-\gamma\sigma_c(\hat{c}))}{(\alpha_0+(1-\alpha_0)\gamma\sigma_c(\hat{c}))^2}$, because $\mu_K(1-\gamma)^2(1-\sigma_c(\hat{n})) > \mu_{K+1}\gamma(1-\gamma\sigma_c(\hat{c}))$ and $(\alpha_0+(1-\alpha_0)(\gamma+(1-\gamma)\sigma_c(\hat{n}))) > (\alpha_0+(1-\alpha_0)\gamma\sigma_c(\hat{c}))$.

Consequently,

$\frac{\partial \sigma_c(\hat{n})^*}{\partial \gamma} < 0$, $\frac{\partial \sigma_c(\hat{n})^*}{\partial \alpha_0} > 0$, $\frac{\partial \sigma_c(\hat{n})^*}{\partial \mu_K} < 0$ $\frac{\partial \sigma_c(\hat{n})^*}{\partial \mu_{K+1}} > 0$. ■

A.4 Competition: A model of two strategic scoop-firms

We first obtain the posterior probability $\alpha_1^i(r_i, r_j, X)$ that the consumers place on media firm i as being of high type, given report $r_i \in \{\hat{n}_i, \hat{c}_i\}$ and feedback $X \in \{N, C, 0\}$, with $i, j \in \{1, 2\}$ and $i \neq j$. We focus on the case without feedback, as in the case $X \neq 0$ the statistic X is sufficient and so beliefs are given by expressions (1)-(4) and (7)-(8). Let us denote by H a high type and by L a normal type (remember that N represents one of the states of the world).

Let $r_i \in \{\hat{n}_i, \hat{c}_i\}$, with $i \in \{1, 2\}$, $i \neq j$, and $X = \{0\}$. Then,

$$\begin{aligned} \alpha_1^i(r_i, r_j, 0) = P(H_i \mid r_i, r_j) &= \frac{P(r_j|r_i,H_i)P(r_i|H_i)P(H_i)}{P(r_j|r_i,H_i)P(r_i|H_i)P(H_i)+P(r_j|r_i,L_i)P(r_i|L_i)P(L_i)} \\ &= \frac{P(H_i)}{P(H_i)+P(L_i)\frac{P(r_j|r_i,L_i)P(r_i|L_i)}{P(r_j|r_i,H_i)P(r_i|H_i)}}, \end{aligned}$$

where for $t_i \in \{H_i, L_i\}$ we have:

$$\begin{aligned} P(r_j \mid r_i, t_i) &= P(r_j \mid r_i, t_i, C)P(C \mid r_i, t_i) + P(r_j \mid r_i, t_i, N)P(N \mid r_i, t_i) \\ &= P(r_j \mid C)P(C \mid r_i, t_i) + P(r_j \mid N)P(N \mid r_i, t_i), \end{aligned}$$

with,

$$\begin{aligned} P(C \mid r_i, t_i) &= \frac{P(r_i|t_i,C)P(t_i|C)P(C)}{P(r_i|t_i,C)P(t_i|C)P(C)+P(r_i|t_i,N)P(t_i|N)P(N)}, \\ P(N \mid r_i, t_i) &= \frac{P(r_i|t_i,N)P(L_i|N)P(N)}{P(r_i|t_i,C)P(L_i|C)P(C)+P(r_i|t_i,N)P(L_i|N)P(N)}, \end{aligned}$$

and so,

$$\begin{aligned} P(r_j \mid r_i, t_i) &= \frac{P(r_j|C)P(r_i|t_i,C)P(t_i|C)P(C)+P(r_j|N)P(r_i|t_i,N)P(t_i|N)P(N)}{P(r_i|t_i,C)P(t_i|C)P(C)+P(r_i|t_i,N)P(t_i|N)P(N)} \\ &= \frac{P(r_j|C)P(r_i|t_i,C)+P(r_j|N)P(r_i|t_i,N)}{P(r_i|t_i,C)+P(r_i|t_i,N)} \\ &= \frac{P(r_j|C)P(r_i|t_i,C)+P(r_j|N)P(r_i|t_i,N)}{2P(r_i|t_i)}. \end{aligned}$$

Now,

$$\begin{aligned} \frac{P(r_j|r_i,L_i)P(r_i|L_i)}{P(r_j|r_i,H_i)P(r_i|H_i)} &= \frac{P(r_j|C)P(r_i|L_i,C)+P(r_j|N)P(r_i|L_i,N)}{P(r_j|C)P(r_i|H_i,C)+P(r_j|N)P(r_i|H_i,N)} \\ &= \frac{P(r_i|L_i,C)+P(r_i|L_i,N)\frac{P(r_j|N)}{P(r_j|C)}}{P(r_i|H_i,C)+P(r_i|H_i,N)\frac{P(r_j|N)}{P(r_j|C)}}, \end{aligned}$$

and so,

$$\alpha_1^i(r_i, r_j, 0) = \frac{P(H_i)}{P(H_i)+P(L_i)\frac{P(r_i|L_i,C)+P(r_i|L_i,N)\frac{P(r_j|N)}{P(r_j|C)}}{P(r_i|H_i,C)+P(r_i|H_i,N)\frac{P(r_j|N)}{P(r_j|C)}}}.$$

Note that if $r_i = \hat{c}_i$ then $P(r_i \mid H_i, C) = 1$ and $P(r_i \mid H_i, N) = 0$. In this case

$$\alpha_1^i(\hat{c}_i, r_j, 0) = \frac{P(H_i)}{P(H_i)+P(L_i)\Big(P(\hat{c}_i|L_i,C)+P(\hat{c}_i|L_i,N)\frac{P(r_j|N)}{P(r_j|C)}\Big)}.$$

On the other hand, note that if $r_i = \hat{n}_i$ then $P(r_i \mid H_i, C) = 0$ and $P(r_i \mid H_i, N) = 1$. In this case

$$\alpha_1^i(\hat{n}_i, r_j, 0) = \frac{P(H_i)}{P(H_i)+P(L_i)\Big(P(\hat{n}_i|L_i,N)+P(\hat{n}_i|L_i,C)\frac{P(r_j|C)}{P(r_j|N)}\Big)}.$$

Last, substituting we get beliefs (11)-(14) in the text.

Now we have the beliefs, let us obtain the expected payoff to a normal media firm $i \in \{1, 2\}$ when it observes signal $s_i \in \{n_i, c_i\}$ and reports $r_i \in \{\hat{n}_i, \hat{c}_i\}$. We denote it by $E\{\alpha_1^i(r_i) \mid s_i\}$,

$$E\{\alpha_1^i(\hat{n}_i) \mid s_i\} = P(\hat{n}_j \mid \hat{n}_i, s_i)E\{\alpha_1^i(\hat{n}_i, \hat{n}_j, X) \mid s_i\} + P(\hat{c}_j \mid \hat{n}_i, s_i)E\{\alpha_1^i(\hat{n}_i, \hat{c}_j, X) \mid s_i\},$$
$$E\{\alpha_1^i(\hat{c}_i) \mid s_i\} = P(\hat{n}_j \mid \hat{c}_i, s_i)E\{\alpha_1^i(\hat{c}_i, \hat{n}_j, X) \mid s_i\} + P(\hat{c}_j \mid \hat{c}_i, s_i)E\{\alpha_1^i(\hat{c}_i, \hat{c}_j, X) \mid s_i\},$$

where $P(r_j \mid \hat{n}_i, s_i) = P(r_j \mid \hat{c}_i, s_i) = P(r_j \mid s_i)$ and $P(\hat{n}_j \mid s_i) = 1 - P(\hat{c}_j \mid s_i)$. Since

$$P(r_j \mid s_i) = P(r_j \mid s_i, C)P(C \mid s_i) + P(r_j \mid s_i, N)P(N \mid s_i),$$

substituting we have,

$$P(\hat{n}_j \mid n_i) = (1-\alpha_0)(\gamma\sigma_c^j(\hat{n}) + (1-\gamma)\sigma_n^j(\hat{n}))(1-\gamma) + (\alpha_0 + (1-\alpha_0)(\gamma\sigma_n^j(\hat{n}) + (1-\gamma)\sigma_c^j(\hat{n})))\gamma,$$
$$P(\hat{n}_j \mid c_i) = (1-\alpha_0)(\gamma\sigma_c^j(\hat{n}) + (1-\gamma)\sigma_n^j(\hat{n}))\gamma + (\alpha_0 + (1-\alpha_0)(\gamma\sigma_n^j(\hat{n}) + (1-\gamma)\sigma_c^j(\hat{n})))(1-\gamma).$$

Additionally, $E\{\alpha_1^i(r_i, r_j, X) \mid s_i\}$ denotes the expected payoff to media firm $i \in \{1, 2\}$ when it observes signal $s_i \in \{n_i, c_i\}$, publishes $r_i \in \{\hat{n}_i, \hat{c}_i\}$ and media firm j reports $r_j \in \{\hat{n}_j, \hat{c}_j\}$. This expected payoff is

$$E\{\alpha_1^i(r_i, r_j, X) \mid s_i\} = (1-\mu_k)\alpha_1^i(r_i, r_j, 0) + \mu_k(P(N \mid s_i, r_j)\alpha_1^i(r_i, r_j, N) + P(C \mid s_i, r_j)\alpha_1^i(r_i, r_j, C)),$$

with $k \in \{0, 1, 2\}$ depending on whether no firm reports $\hat{c}$, just one does it or the two do it, respectively. Note that $\mu_0 = 0$ and $0 < \mu_1 \leq \mu_2 < 1$. Substituting we have,

$$E\{\alpha_1^i(\hat{n}_i, \hat{n}_j, X) \mid s_i\} = \alpha_1^i(\hat{n}_i, \hat{n}_j, 0),$$
$$E\{\alpha_1^i(\hat{n}_i, \hat{c}_j, X) \mid n_i\} = (1-\mu_1)\alpha_1^i(\hat{n}_i, \hat{c}_j, 0) + \mu_1 P(N \mid n_i, \hat{c}_j)\alpha_1^i(\hat{n}_i, \hat{c}_j, N),$$
$$E\{\alpha_1^i(\hat{n}_i, \hat{c}_j, X) \mid c_i\} = (1-\mu_1)\alpha_1^i(\hat{n}_i, \hat{c}_j, 0) + \mu_1 P(N \mid c_i, \hat{c}_j)\alpha_1^i(\hat{n}_i, \hat{c}_j, N),$$
$$E\{\alpha_1^i(\hat{c}_i, \hat{n}_j, X) \mid n_i\} = (1-\mu_1)\alpha_1^i(\hat{c}_i, \hat{n}_j, 0) + \mu_1 P(C \mid n_i, \hat{n}_j)\alpha_1^i(\hat{c}_i, \hat{n}_j, C),$$
$$E\{\alpha_1^i(\hat{c}_i, \hat{n}_j, X) \mid c_i\} = (1-\mu_1)\alpha_1^i(\hat{c}_i, \hat{n}_j, 0) + \mu_1 P(C \mid c_i, \hat{n}_j)\alpha_1^i(\hat{c}_i, \hat{n}_j, C),$$
$$E\{\alpha_1^i(\hat{c}_i, \hat{c}_j, X) \mid n_i\} = (1-\mu_2)\alpha_1^i(\hat{c}_i, \hat{c}_j, 0) + \mu_2 P(C \mid n_i, \hat{c}_j)\alpha_1^i(\hat{c}_i, \hat{c}_j, C),$$
$$E\{\alpha_1^i(\hat{c}_i, \hat{c}_j, X) \mid c_i\} = (1-\mu_2)\alpha_1^i(\hat{c}_i, \hat{c}_j, 0) + \mu_2 P(C \mid c_i, \hat{c}_j)\alpha_1^i(\hat{c}_i, \hat{c}_j, C).$$

Last, note that

$$P(C \mid s_i, r_j) = \frac{P(s_i|r_j,C)P(r_j|C)P(C)}{P(s_i|r_j,C)P(r_j|C)P(C)+P(s_i|r_j,N)P(r_j|N)P(N)} = \frac{P(s_i|C)}{P(s_i|C)+P(s_i|N)\frac{P(r_j|N)}{P(r_j|C)}},$$

analogously for $P(N \mid s_i, r_j)$. Substituting we have,

$$
\begin{aligned}
P(C \mid n_i, \hat{n}_j) &= \frac{(1-\gamma)}{(1-\gamma)+\gamma\frac{\alpha_0+(1-\alpha_0)(\gamma\sigma_n^j(\hat{n})+(1-\gamma)\sigma_c^j(\hat{n}))}{(1-\alpha_0)(\gamma\sigma_c^j(\hat{n})+(1-\gamma)\sigma_n^j(\hat{n}))}},\\
P(N \mid n_i, \hat{c}_j) &= \frac{\gamma}{\gamma+(1-\gamma)\frac{\alpha_0+(1-\alpha_0)(\gamma\sigma_c^j(\hat{c})+(1-\gamma)\sigma_n^j(\hat{c}))}{(1-\alpha_0)(\gamma\sigma_n^j(\hat{c})+(1-\gamma)\sigma_c^j(\hat{c}))}},\\
P(C \mid c_i, \hat{n}_j) &= \frac{\gamma}{\gamma+(1-\gamma)\frac{\alpha_0+(1-\alpha_0)(\gamma\sigma_n^j(\hat{n})+(1-\gamma)\sigma_c^j(\hat{n}))}{(1-\alpha_0)(\gamma\sigma_c^j(\hat{n})+(1-\gamma)\sigma_n^j(\hat{n}))}},\\
P(N \mid c_i, \hat{c}_j) &= \frac{(1-\gamma)}{(1-\gamma)+\gamma\frac{\alpha_0+(1-\alpha_0)(\gamma\sigma_c^j(\hat{c})+(1-\gamma)\sigma_n^j(\hat{c}))}{(1-\alpha_0)(\gamma\sigma_n^j(\hat{c})+(1-\gamma)\sigma_c^j(\hat{c}))}}.
\end{aligned}
$$

Now, let $\Delta_{s_i}[\sigma_n^1(\hat{n}), \sigma_c^1(\hat{c}), \sigma_n^2(\hat{n}), \sigma_c^2(\hat{c})]$ be the expected gain to media firm i from reporting $\hat{n}_i$ rather than $\hat{c}_i$, after observing signal $s_i \in \{n_i, c_i\}$,

$$
\begin{aligned}
\Delta_{n_i}[\sigma_n^1(\hat{n}), \sigma_c^1(\hat{c}), \sigma_n^2(\hat{n}), \sigma_c^2(\hat{c})] &= E\{\alpha_1^i(\hat{n}_i) \mid n_i\} - E\{\alpha_1^i(\hat{c}_i) \mid n_i\},\\
\Delta_{c_i}[\sigma_n^1(\hat{n}), \sigma_c^1(\hat{c}), \sigma_n^2(\hat{n}), \sigma_c^2(\hat{c})] &= E\{\alpha_1^i(\hat{n}_i) \mid c_i\} - E\{\alpha_1^i(\hat{c}_i) \mid c_i\}.
\end{aligned}
$$

Substituting we obtain expressions (15)-(16) in the text.

Now, we prove the results.

***Proof of Proposition* 3**

From (15),

$\Delta_{n_i}[\sigma_n^1(\hat{n}) = 1, \sigma_c^1(\hat{c}) = 1, \sigma_n^2(\hat{n}) = 1, \sigma_c^2(\hat{c}) = 1] =$
$\frac{\alpha\left(2\alpha^3(\gamma-1)^3\mu_2+2\alpha^2(2\gamma-1)(\gamma-1)^2(\mu_1-2\mu_2+2)-2\alpha(\gamma-1)((\gamma-1)\gamma(4\mu_1-5\mu_2+8)+\mu_1-\mu_2+2)+(2\gamma-1)(2(\gamma-1)\gamma(\mu_1-\mu_2+2)+\mu_1+1)\right)}{2(\gamma-\alpha(1-\gamma))(2\alpha^2(\gamma-1)^2+\alpha(6\gamma-4\gamma^2-2)+1+2\gamma(\gamma-1))}$
$= \frac{\alpha N_n(\gamma,\mu_1,\mu_2,\alpha)}{D(\gamma,\alpha)}$,

where $D(\gamma, \alpha) > 0$, thus

$\Delta_{n_i}[\sigma_n^1(\hat{n}) = 1, \sigma_c^1(\hat{c}) = 1, \sigma_n^2(\hat{n}) = 1, \sigma_c^2(\hat{c}) = 1] > 0 \iff N_n(\gamma, \mu_1, \mu_2, \alpha) > 0.$

After some algebra it can be shown that $\frac{\partial N_n(\gamma,\mu_1,\mu_2,\alpha)}{\partial\gamma} > 0$, consequently $N_n(\gamma, \mu_1, \mu_2, \alpha) > 0 \iff N_n(\gamma = \frac{1}{2}, \mu_1, \mu_2, \alpha) > 0$. Since $N_n(\gamma = \frac{1}{2}, \mu_1, \mu_2, \alpha) = \frac{1}{4}\alpha\mu_2\left(1-\alpha^2\right) > 0$, then for the honest strategy profile, $\Delta_{n_i} > 0$.

Now from (16),

$\Delta_{c_i}[\sigma_n^1(\hat{n}) = 1, \sigma_c^1(\hat{c}) = 1, \sigma_n^2(\hat{n}) = 1, \sigma_c^2(\hat{c}) = 1] =$
$\frac{\alpha\left(2\alpha^3(\gamma-1)^3\mu_2-2\alpha^2(2\gamma-1)(\gamma-1)^2(\mu_1+\mu_2+2)+2\alpha(\gamma-1)((\gamma-1)\gamma(4\mu_1+\mu_2+8)+\mu_1+2)-(2\gamma-1)(2(\gamma-1)\gamma(\mu_1+2)+\mu_1+1)\right)}{2(\gamma-\alpha(1-\gamma))(2\alpha^2(\gamma-1)^2+\alpha(6\gamma-4\gamma^2-2)+1+2\gamma(\gamma-1))}$
$= \frac{\alpha N_c(\gamma,\mu_1,\mu_2,\alpha)}{D(\gamma,\alpha)}$,

where $D(\gamma, \alpha) > 0$. Thus $\Delta_{c_i}[\sigma_n^1(\hat{n}) = 1, \sigma_c^1(\hat{c}) = 1, \sigma_n^2(\hat{n}) = 1, \sigma_c^2(\hat{c}) = 1] < 0 \iff N_c(\gamma, \mu_1, \mu_2, \alpha) < 0$.

Now, if we write $N_c(\gamma, \mu_1, \mu_2, \alpha)$ in terms of γ we get polynomial

$$
\begin{aligned}
&\gamma^3\left(2(\alpha-1)^2(\alpha\mu_2-2\mu_1-4)\right)+\gamma^2(2(\alpha-1)((5\alpha-3)(\mu_1+2)+\alpha(2-3\alpha)\mu_2))\\
&+\gamma\left(2\left(\alpha\left(3\alpha^2\mu_2-4\alpha(\mu_1+\mu_2+2)+5\mu_1+\mu_2+10\right)-2\mu_1-3\right)\right)\\
&-2(\alpha-1)\alpha(\alpha\mu_2-\mu_1-2)+\mu_1+1.
\end{aligned}
\tag{20}
$$

After some algebra, it can be shown that $\frac{\partial N_c(\gamma,\mu_1,\mu_2,\alpha)}{\partial\gamma} < 0$.

In addition, $N_c(\gamma = \frac{1}{2}, \mu_1, \mu_2, \alpha) = \frac{1}{4}\alpha\mu_2\left(1-\alpha^2\right) > 0$ and $N_c(\gamma = 1, \mu_1, \mu_2, \alpha) = -1-\mu_2 < 0$. Thus, there exists $\frac{1}{2} < \tilde{\gamma} < 1$ such that if $\gamma < \tilde{\gamma}$, then $\Delta_{c_i}[\sigma_n^1(\hat{n}) = 1, \sigma_c^1(\hat{c}) = 1, \sigma_n^2(\hat{n}) = 1, \sigma_c^2(\hat{c}) = 1] > 0$, and if $\gamma > \tilde{\gamma}$, then $\Delta_{c_i}[\sigma_n^1(\hat{n}) = 1, \sigma_c^1(\hat{c}) = 1, \sigma_n^2(\hat{n}) = 1, \sigma_c^2(\hat{c}) = 1] < 0$, where $\tilde{\gamma}$ is the unique real root of expression (20).

To prove the second point, note that

$\Delta_{c_i}[\sigma_n^1(\hat{n})=1,\sigma_c^1(\hat{c})=0,\sigma_n^2(\hat{n})=1,\sigma_c^2(\hat{c})=0]=-\frac{2+\alpha((1+\gamma)\alpha-3)}{2+(\alpha-2)\alpha}-\gamma\mu_1+\mu_1<0.$

Consequently, reporting $\hat{n}$ for any signal cannot be an equilibrium. ■

***Proof of Corollary* 3**

First, we prove that $\frac{\partial\tilde{\gamma}}{\partial\mu_1}<0$ and $\frac{\partial\tilde{\gamma}}{\partial\mu_2}>0$.

As it is shown in the proof of Proposition 3, the unique real root of $N_c(\gamma,\mu_1,\mu_1,\alpha)$ in γ is $\tilde{\gamma}$. In addition,

$\frac{\partial N_c(\gamma,\mu_1,\mu_2,\alpha)}{\partial\mu_1}=-2\alpha^2(2\gamma-1)(\gamma-1)^2+2\alpha(1-2\gamma)^2(\gamma-1)-2\gamma(\gamma(2\gamma-3)+2)+1<0.$

On the other hand, as it is mentioned in the proof of Proposition 3, $\frac{\partial N_c(\gamma,\mu_1,\mu_2,\alpha)}{\partial\gamma}<0$.

Thus, by the theorem of the implicit function, $\frac{\partial\tilde{\gamma}}{\partial\mu_1}=-\frac{\frac{\partial N_c(\gamma,\mu_1,\mu_2,\alpha)}{\partial\mu_1}}{\frac{\partial N_c(\gamma,\mu_1,\mu_2,\alpha)}{\partial\gamma}}<0.$

Analogously, $\frac{\partial N_c(\gamma,\mu_1,\mu_1,\alpha)}{\partial\mu_2}=2(\alpha-1)\alpha(\gamma-1)^2(\alpha(\gamma-1)-\gamma)>0$. Thus $\frac{\partial\tilde{\gamma}}{\partial\mu_1}=-\frac{\frac{\partial N_c(\gamma,\mu_1,\mu_2,\alpha)}{\partial\mu_2}}{\frac{\partial N_c(\gamma,\mu_1,\mu_2,\alpha)}{\partial\gamma}}>0.$

The first point of Corollary 3 is already shown. To see it, remember that from the proof of Proposition 3

$\Delta_{n_i}[\sigma_n^1(\hat{n})=1,\sigma_c^1(\hat{c})=1,\sigma_n^2(\hat{n})=1,\sigma_c^2(\hat{c})=1]>0$ and

$\Delta_{c_i}[\sigma_n^1(\hat{n})=1,\sigma_c^1(\hat{c})=1,\sigma_n^2(\hat{n})=1,\sigma_c^2(\hat{c})=1]<0\iff N_c(\gamma,\mu_1,\mu_2,\alpha)<0,$

$\frac{\partial N_c(\gamma,\mu_1,\mu_2,\alpha)}{\partial\gamma}<0$, and $N_c(\gamma=\frac{1}{2},\mu_1,\mu_2,\alpha)=\frac{1}{4}\alpha\mu_2\left(1-\alpha^2\right)>0.$

Consequently $N_c(\gamma=\frac{1}{2},\mu_1=0,\mu_2=0,\alpha)=0$, which implies that if $\mu_2=0$, then $N_c(\gamma,\mu_1=0,\mu_2=0,\alpha)<0$ for any $\gamma>\frac{1}{2}$ because $\frac{\partial N_c(\gamma,\mu_1,\mu_2,\alpha)}{\partial\gamma}<0$. In addition $N_c(\gamma,\mu_1=0,\mu_2=0,\alpha)\leq 0\iff\Delta_{c_i}[\sigma_n^1(\hat{n})=1,\sigma_c^1(\hat{c})=1,\sigma_n^2(\hat{n})=1,\sigma_c^2(\hat{c})=1]\leq 0$. Therefore $\sigma_c^i(\hat{c})^*=\sigma_n^i(\hat{n})^*=1$ for $i\in\{1,2\}$ is always an equilibrium strategy.

To prove the second point of Corollary 3 note that if $\mu_2>0$, then by Proposition 3 there exists $\frac{1}{2}<\tilde{\gamma}(\alpha,\mu_1,\mu_2)<1$ such that $\sigma_c^i(\hat{c})^*=\sigma_n^i(\hat{n})^*=1$ for $i\in\{1,2\}$ is equilibrium strategy if and only if $\gamma>\tilde{\gamma}(\alpha,\mu_1,\mu_2)$. ■

***Proof of Corollary* 4**

By Proposition 3, for any $0<\mu_1<\mu_2<1$, there exists $\frac{1}{2}<\tilde{\gamma}(\alpha,\mu_1,\mu_2)<1$, such that, $\sigma_c^i(\hat{c})^*=\sigma_n^i(\hat{n})^*=1$ for $i\in\{1,2\}$ is equilibrium strategy if and only if $\gamma>\tilde{\gamma}(\alpha,\mu_1,\mu_2)$.

For any $\gamma'<\tilde{\gamma}^{Max}$, there exists a $0<\hat{\mu}_1<\hat{\mu}_2<1$ such that $\tilde{\gamma}(\alpha,\hat{\mu}_1,\hat{\mu}_1)=\gamma'$. As $\frac{\partial\tilde{\gamma}}{\partial\mu_1}<0$ and $\frac{\partial\tilde{\gamma}}{\partial\mu_2}>0$, if $\mu_1<\hat{\mu}_1$ and $\mu_2>\hat{\mu}_2$, then $\gamma'<\tilde{\gamma}(\alpha,\mu_1,\mu_1)$, which implies that $\sigma_c^i(\hat{c})^*=\sigma_n^i(\hat{n})^*=1$ for $i\in\{1,2\}$ is not an equilibrium strategy. In addition, if $\mu_1>\hat{\mu}_1$ and $\mu_2<\hat{\mu}_2$, then $\gamma'>\tilde{\gamma}(\alpha,\mu_1,\mu_1)$, which implies that $\sigma_c^i(\hat{c})^*=\sigma_n^i(\hat{n})^*=1$ for $i\in\{1,2\}$ is an equilibrium strategy. ■

A.5 Extension: Unbalanced prior

Here we consider $\theta\in(0,1)$, with $P(\omega=C)=\theta$. We do the analysis for the case of a monopoly.

First, we obtain the posterior probability $\alpha_1(r,X)$ that consumers assign to the media firm as being of high type, given report $r\in\{\hat{n},\hat{c}\}$ and feedback $X\in\{N,C,0\}$:

$$\alpha_1(\hat{n},0)=\frac{\alpha_0(1-\theta)}{\alpha_0(1-\theta)+(1-\alpha_0)((1-\theta)(\gamma\sigma_n(\hat{n})+(1-\gamma)\sigma_c(\hat{n}))+\theta(\gamma\sigma_c(\hat{n})+(1-\gamma)\sigma_n(\hat{n})))},\tag{21}$$

$$\alpha_1(\hat{c},N)=0,\tag{22}$$

$$\alpha_1(\hat{c},C)=\frac{\alpha_0}{\alpha_0+(1-\alpha_0)(\gamma\sigma_c(\hat{c})+(1-\gamma)\sigma_n(\hat{c}))},\tag{23}$$

$$\alpha_1(\hat{c},0)=\frac{\alpha_0\theta}{\alpha_0\theta+(1-\alpha_0)(\theta(\gamma\sigma_c(\hat{c})+(1-\gamma)\sigma_n(\hat{c}))+(1-\theta)(\gamma\sigma_n(\hat{c})+(1-\gamma)\sigma_c(\hat{c})))}.\tag{24}$$

In the main body of the paper, we differentiate two cases: $\theta<\frac{1}{2}$ and $\theta>\frac{1}{2}$. Next result (Proposition 7) considers the two cases together, and so holds for any $\theta\in(0,1)$. It then proves Proposition 4.

Before going into this proof, note that the only difference with respect to the monopoly scenario is that instead of considering beliefs (1)-(4), we now have to consider beliefs (21)-(24). As for the functions Δ_n and Δ_c, they are now:

$$\Delta_n = \alpha_1(\hat{n},0) - ((1-\mu)\alpha_1(\hat{c},0) + \mu\frac{\theta(1-\gamma)}{\theta(1-\gamma)+(1-\theta)\gamma}\alpha_1(\hat{c},C)), \quad (25)$$

$$\Delta_c = \alpha_1(\hat{n},0) - ((1-\mu)\alpha_1(\hat{c},0) + \mu\frac{\theta\gamma}{\theta\gamma+(1-\theta)(1-\gamma)}\alpha_1(\hat{c},C)). \quad (26)$$

Proposition 7. *Let $\theta \in (0,1)$. There exist $\bar{\theta}_1$, $\bar{\theta}_2$ and $\bar{\theta}_3$, with $0 < \bar{\theta}_1 < \bar{\theta}_2 < \bar{\theta}_3 < 1$. For each $\theta \in (1/2,1)$ there is a unique equilibrium. In the equilibrium:*

1. *If $\theta \in (0,\bar{\theta}_1)$, $\sigma_n(\hat{n})^* = 1$ and $\sigma_c(\hat{n})^* = min\{1,x_1\} > 0$,*
2. *If $\theta \in (\bar{\theta}_1,\bar{\theta}_2)$, $\sigma_n(\hat{n})^* = 1$ and $\sigma_c(\hat{c})^* = 1$,*
3. *If $\theta \in (\bar{\theta}_2,\bar{\theta}_3)$, $\sigma_n(\hat{c})^* = x_2 > 0$ and $\sigma_c(\hat{c})^* = 1$,*
4. *If $\theta \in (\bar{\theta}_3,1)$, $\sigma_n(\hat{c})^* = 1$ and $\sigma_c(\hat{c})^* = 1$*

Where $x_1(\gamma,\alpha_0,\mu,\theta)$ is such that $\Delta_c\left[\sigma_n(\hat{n}) = 1, \sigma_c(\hat{c}) = 1-x_1; \theta\right] = 0$, and $x_2(\gamma,\alpha_0,\mu,\theta)$ is such that $\Delta_n\left[\sigma_n(\hat{n}) = 1-x_2, \sigma_c(\hat{c}) = 1; \theta\right] = 0$

Proof

The Proposition is proven through eight Lemmas.

Lemma 3. *The function Δ_n is strictly greater than Δ_c.*

Proof.

$\Delta_n = \alpha_1(\hat{n},0) - ((1-\mu)\alpha_1(\hat{c},0) + \mu P(C \mid n)\alpha_1(\hat{c},C)) > \Delta_c = \alpha_1(\hat{n},0) - ((1-\mu)\alpha_1(\hat{c},0) + \mu P(C \mid c)\alpha_1(\hat{c},C))$

$\Longleftrightarrow P(C \mid n) < P(C \mid c) \Longleftrightarrow \frac{\theta(1-\gamma)}{\theta(1-\gamma)+(1-\theta)\gamma} < \frac{\theta\gamma}{\theta\gamma+(1-\theta)(1-\gamma)} \Longleftrightarrow \gamma > \frac{1}{2}$. ♦

Lemma 4. *The functions Δ_n and Δ_c are decreasing in θ.*

Proof. From (21)-(24) and (25)-(26), we obtain that as $\frac{\partial\alpha_1(\hat{c},C)}{\partial\theta} = 0$, then

$\frac{\partial\Delta_n}{\partial\theta} = \frac{\partial\alpha_1(\hat{n},0)}{\partial\theta} - \Big((1-\mu)\frac{\partial\alpha_1(\hat{c},0)}{\partial\theta} + \mu\frac{\partial P(C|n)}{\partial\theta}\alpha_1(\hat{c},C)\Big)$ and $\frac{\partial\Delta_c}{\partial\theta} = \frac{\partial\alpha_1(\hat{n},0)}{\partial\theta} - \Big((1-\mu)\frac{\partial\alpha_1(\hat{c},0)}{\partial\theta} + \mu\frac{\partial P(C|c)}{\partial\theta}\alpha_1(\hat{c},C)\Big)$,

with,

$\frac{\partial\alpha_1(\hat{n},0)}{\partial\theta} = \frac{-\alpha_0(1-\alpha_0)(\gamma\sigma_c(\hat{n})+(1-\gamma)\sigma_n(\hat{n}))}{(\alpha_0(1-\theta)+(1-\alpha_0)((1-\theta)(\gamma\sigma_n(\hat{n})+(1-\gamma)\sigma_c(\hat{n}))+\theta(\gamma\sigma_c(\hat{n})+(1-\gamma)\sigma_n(\hat{n}))))^2} < 0$,

$\frac{\partial\alpha_1(\hat{c},0)}{\partial\theta} = \frac{\alpha_0(1-\alpha_0)(\gamma\sigma_n(\hat{c})+(1-\gamma)\sigma_c(\hat{c}))}{(\alpha_0\theta+(1-\alpha_0)(\theta(\gamma\sigma_c(\hat{c})+(1-\gamma)\sigma_n(\hat{c}))+(1-\theta)(\gamma\sigma_n(\hat{c})+(1-\gamma)\sigma_c(\hat{c}))))^2} > 0$,

$\frac{\partial P(C|n)}{\partial\theta} = \frac{(1-\gamma)\gamma}{(\theta+\gamma-2\theta\gamma)^2} > 0$ and $\frac{\partial P(C|c)}{\partial\theta} \frac{(1-\gamma)\gamma}{(\theta+\gamma-2\theta\gamma-1)^2} > 0$.

Consequently,

$\frac{\partial\Delta_n}{\partial\theta} = \frac{\partial\Delta_c}{\partial\theta} < 0$. ♦

Lemma 5. $\Delta_n\left[\theta = 1\right] < 0$ *and* $\Delta_c\left[\theta = 1\right] < 0$.

Proof. Note that $\Delta_n = \alpha_1(\hat{n},0) - ((1-\mu)\alpha_1(\hat{c},0) + \mu P(C \mid n)\alpha_1(\hat{c},C))$. Thus, $\Delta_n\left[\theta = 1\right] = 0 - ((1-\mu)\alpha_1(\hat{c},0) + \mu\alpha_1(\hat{c},C)) < 0$, since $\alpha_1(\hat{c},0) > 0$, $\alpha_1(\hat{c},C) > 0$ and $P(C \mid n) = 1$ for $\theta = 1$.

Analogously, we show $\Delta_c\left[\theta = 1\right] = -((1-\mu)\alpha_1(\hat{c},0) + \mu\alpha_1(\hat{c},C)) < 0$. ♦

Lemma 6. *The function Δ_n is strictly decreasing in $\sigma_n(\hat{n})$.*

Proof. Note that $\frac{\partial\Delta_n}{\partial\sigma_n(\hat{n})} = \frac{\partial\alpha_1(\hat{n},0)}{\partial\sigma_n(\hat{n})} - ((1-\mu)\frac{\partial\alpha_1(\hat{c},0)}{\partial\sigma_n(\hat{n})} + \mu P(C \mid n)\frac{\partial\alpha_1(\hat{c},C)}{\partial\sigma_n(\hat{n})})$, with

$\frac{\partial\alpha_1(\hat{n},0)}{\partial\sigma_n(\hat{n})} = \frac{-\alpha_0(1-\theta)(1-\alpha_0)(\gamma(1-\theta)+(1-\gamma)\theta)}{(\alpha_0(1-\theta)+(1-\alpha_0)((1-\theta)(\gamma\sigma_n(\hat{n})+(1-\gamma)\sigma_c(\hat{n}))+\theta(\gamma\sigma_c(\hat{n})+(1-\gamma)\sigma_n(\hat{n}))))^2} < 0$,

$\frac{\partial\alpha_1(\hat{c},0)}{\partial\sigma_n(\hat{n})} = \frac{\alpha_0\theta(1-\alpha_0)(\gamma(1-\theta)+(1-\gamma)\theta)}{(\alpha_0\theta+(1-\alpha_0)(\theta(\gamma\sigma_c(\hat{c})+(1-\gamma)\sigma_n(\hat{c}))+(1-\theta)(\gamma\sigma_n(\hat{c})+(1-\gamma)\sigma_c(\hat{c}))))^2} > 0$,

$\frac{\partial\alpha_1(\hat{c},C)}{\partial\sigma_n(\hat{n})} = \frac{\alpha_0(1-\alpha_0)(1-\gamma)}{(\alpha_0+(1-\alpha_0)(\gamma\sigma_c(\hat{c})+(1-\gamma)\sigma_n(\hat{c})))^2} > 0$.

Consequently, $\frac{\partial\Delta_n}{\partial\sigma_n(\hat{n})} < 0$. ♦

Lemma 7. *The function Δ_c is strictly increasing in $\sigma_c(\hat{c})$.*

Proof. Note that $\frac{\partial \Delta_c}{\partial \sigma_c(\hat{c})} = \frac{\partial \alpha_1(\hat{n},0)}{\partial \sigma_c(\hat{c})} - ((1-\mu)\frac{\partial \alpha_1(\hat{c},0)}{\partial \sigma_c(\hat{c})} + \mu P(C \mid c)\frac{\partial \alpha_1(\hat{c},C)}{\partial \sigma_c(\hat{c})})$, with

$\frac{\partial \alpha_1(\hat{n},0)}{\partial \sigma_c(\hat{c})} = \frac{\alpha_0(1-\theta)(1-\alpha_0)((1-\gamma)(1-\theta)+\gamma\theta)}{(\alpha_0(1-\theta)+(1-\alpha_0)((1-\theta)(\gamma\sigma_n(\hat{n})+(1-\gamma)\sigma_c(\hat{n}))+\theta(\gamma\sigma_c(\hat{n})+(1-\gamma)\sigma_n(\hat{n}))))^2} > 0,$

$\frac{\partial \alpha_1(\hat{c},0)}{\partial \sigma_c(\hat{c})} = \frac{-\alpha_0\theta(1-\alpha_0)((1-\gamma)(1-\theta)+\gamma\theta)}{(\alpha_0\theta+(1-\alpha_0)(\theta(\gamma\sigma_c(\hat{c})+(1-\gamma)\sigma_n(\hat{c}))+(1-\theta)(\gamma\sigma_n(\hat{c})+(1-\gamma)\sigma_c(\hat{c}))))^2} < 0,$

$\frac{\partial \alpha_1(\hat{c},C)}{\partial \sigma_c(\hat{c})} = \frac{-\alpha_0(1-\alpha_0)\gamma}{(\alpha_0+(1-\alpha_0)(\gamma\sigma_c(\hat{c})+(1-\gamma)\sigma_n(\hat{c})))^2} < 0.$

Consequently, $\frac{\partial \Delta_c}{\partial \sigma_c(\hat{c})} > 0$. ♦

Lemma 8. *The equilibrium is unique.*

Proof. This result is a consequence of Lemmas 6 and 7.

Lemma 9. *Let $\bar{\theta}_1$, $\bar{\theta}_2$, and $\bar{\theta}_3$ be thresholds such that*

$\Delta_c\left[\sigma_n(\hat{n}) = 1, \sigma_c(\hat{c}) = 1; \theta = \bar{\theta}_1\right] = 0,$

$\Delta_n\left[\sigma_n(\hat{n}) = 1, \sigma_c(\hat{c}) = 1; \theta = \bar{\theta}_2\right] = 0,$ *and*

$\Delta_n\left[\sigma_n(\hat{n}) = 0, \sigma_c(\hat{c}) = 1; \theta = \bar{\theta}_3\right] = 0.$

Then, $\frac{1}{2} < \bar{\theta}_1 < \bar{\theta}_2 < \bar{\theta}_3 < 1$.

Proof. First, it is shown that $\bar{\theta}_1 > \frac{1}{2}$. If $\theta = \frac{1}{2}$, then $\Delta_c\left[\sigma_n(\hat{n}) = 1, \sigma_c(\hat{c}) = 1; \theta = \frac{1}{2}\right] = \frac{\mu\alpha_0^2(1-\gamma)}{\alpha_0+\gamma(1-\alpha_0)} > 0$. Now, from Lemma 4, we know $\frac{\partial \Delta_c}{\partial \theta} < 0$. Then, $\bar{\theta}_1$ must be greater than $\frac{1}{2}$.

The inequality $\bar{\theta}_1 < \bar{\theta}_2$ follows, as $\Delta_n > \Delta_c$, $\frac{\partial \Delta_n}{\partial \theta} < 0$ and $\frac{\partial \Delta_c}{\partial \theta} < 0$ (by Lemma 3 and Lemma 4).

Now, from Lemmas 4 and 6, we have $\bar{\theta}_2 < \bar{\theta}_3$.

Last, since $\Delta_n[\theta = 1] < 0$ (by Lemma 5) and $\frac{\partial \Delta_n}{\partial \theta} < 0$ (by Lemma 4), threshold $\bar{\theta}_3$ must be strictly smaller than 1. ♦

Lemma 10. *Suppose $\sigma_c(\hat{c}) = 1$. Then:*

1) If $\theta \in (0, \bar{\theta}_2)$, $\Delta_n > 0$.

2) If $\theta \in (\bar{\theta}_2, \bar{\theta}_3)$, Δ_n only has one inner root.

3) If $\theta \in (\bar{\theta}_3, 1)$, $\Delta_n < 0$.

Proof. Consider first $\theta \in (0, \bar{\theta}_2)$. As $\Delta_n\left[\sigma_n(\hat{n}) = 1, \sigma_c(\hat{c}) = 1; \theta = \bar{\theta}_2\right] = 0$, $\frac{\partial \Delta_n}{\partial \theta} < 0$ and $\frac{\partial \Delta_n}{\partial \sigma_n(\hat{n})} < 0$ (see Lemmas 9, 4 and 6), we have $\Delta_n > 0$.

Consider now $\theta \in (\bar{\theta}_2, \bar{\theta}_3)$. As $\Delta_n\left[\sigma_n(\hat{n}) = 1, \sigma_c(\hat{c}) = 1; \theta = \bar{\theta}_2\right] = 0$, $\Delta_n\left[\sigma_n(\hat{n}) = 0, \sigma_c(\hat{c}) = 1; \theta = \bar{\theta}_3\right] = 0$, $\frac{\partial \Delta_n}{\partial \theta} < 0$ and $\frac{\partial \Delta_n}{\partial \sigma_n(\hat{n})} < 0$ (see Lemmas 9, 4 and 6), we have that the function Δ_n has only one inner root (in $\sigma_n(\hat{n})$).

Last, consider $\theta \in (\bar{\theta}_3, 1)$. As $\Delta_n\left[\sigma_n(\hat{n}) = 0, \sigma_c(\hat{c}) = 1; \theta = \bar{\theta}_3\right] = 0$, $\frac{\partial \Delta_n}{\partial \theta} < 0$, $\frac{\partial \Delta_n}{\partial \sigma_n(\hat{n})} < 0$ and $\Delta_n[\theta = 1] < 0$ (see Lemmas 9, 4, 6 and 5), we have $\Delta_n < 0$. ♦

Lemma 11. *Suppose $\sigma_n(\hat{n}) = 1$. Then, if $\theta \in (\bar{\theta}_1, 1)$, $\Delta_c < 0$.*

Proof. Consider $\theta \in (\bar{\theta}_1, 1)$. As $\Delta_c\left[\sigma_n(\hat{n}) = 1, \sigma_c(\hat{c}) = 1; \theta = \bar{\theta}_1\right] = 0$, $\frac{\partial \Delta_c}{\partial \theta} < 0$, $\frac{\partial \Delta_c}{\partial \sigma_c(\hat{c})} > 0$ and $\Delta_c[\theta = 1] < 0$ (see Lemmas 9, 4, 7 and 5), we have $\Delta_c < 0$. ♦

Now, there are nine possible equilibrium configurations to analyze, where Δ_c and Δ_n are evaluated in the corresponding equilibrium configurations.

1.	$\sigma_c(\hat{c})^* = 1$	$\sigma_n(\hat{n})^* = 1$	$\iff$	$\Delta_c \leq 0$	$\Delta_n \geq 0$
2.	$0 < \sigma_c(\hat{c})^* < 1$	$\sigma_n(\hat{n})^* = 1$	$\iff$	$\Delta_c = 0$	$\Delta_n \geq 0$
3.	$\sigma_c(\hat{c})^* = 0$	$\sigma_n(\hat{n})^* = 1$	$\iff$	$\Delta_c \geq 0$	$\Delta_n \geq 0$
4.	$\sigma_c(\hat{c})^* = 1$	$\sigma_n(\hat{n})^* = 0$	$\iff$	$\Delta_c \leq 0$	$\Delta_n \leq 0$
5.	$0 < \sigma_c(\hat{c})^* < 1$	$\sigma_n(\hat{n})^* = 0$	$\iff$	$\Delta_c = 0$	$\Delta_n \leq 0$
6.	$\sigma_c(\hat{c})^* = 0$	$\sigma_n(\hat{n})^* = 0$	$\iff$	$\Delta_c \geq 0$	$\Delta_n \leq 0$
7.	$\sigma_c(\hat{c})^* = 1$	$0 < \sigma_n(\hat{n})^* < 1$	$\iff$	$\Delta_c \leq 0$	$\Delta_n = 0$
8.	$0 < \sigma_c(\hat{c})^* < 1$	$0 < \sigma_n(\hat{n})^* < 1$	$\iff$	$\Delta_c = 0$	$\Delta_n = 0$
9.	$\sigma_c(\hat{c})^* = 0$	$0 < \sigma_n(\hat{n})^* < 1$	$\iff$	$\Delta_c \geq 0$	$\Delta_n = 0$

Note that from Lemma 3, configurations 5, 6, 8, and 9 cannot be. Then, we next analyze the remaining equilibrium configurations (for each of the intervals of θ considered in Proposition 7). We do it taking into account the restriction $\Delta_n > \Delta_c$ imposed by Lemma 3.

a) Interval $\theta \in (0, \bar{\theta}_1)$. By Lemma 10, in this interval we have $\Delta_n[\sigma_c(\hat{c}) = 1] > 0$. Then, $\sigma_n(\hat{n})^* = 1$, and thus configurations 4 and 7 cannot be. Hence, only configurations 1, 2 and 3 are left. However, configuration 1 is neither possible. The reason is that if $\sigma_n(\hat{n})^* = 1$, then $\sigma_c(\hat{c})^* < 1$ (since $\Delta_c \left[\sigma_c(\hat{c}) = 1; \sigma_n(\hat{n}) = 1; \theta = \bar{\theta}_1\right] = 0$ and $\frac{\partial \Delta_c}{\partial \theta} < 0$, which implies $\Delta_c \left[\sigma_c(\hat{c}) = 1; \sigma_n(\hat{n}) = 1; \theta < \bar{\theta}_1\right] > 0$, and thus $\sigma_c(\hat{c})^* < 1$). Therefore, only configurations 2 and 3 are possible, and thus $\sigma_n(\hat{n})^* = 1$ and $0 \leq \sigma_c(\hat{c})^* < 1$. Additionally, as $\frac{\partial \Delta_c}{\partial \sigma_c(\hat{c})} > 0$ (see Lemma 7), there is only one equilibrium. Therefore, $\sigma_c(\hat{c})^*$ has to be either 0 or the root of equation $\Delta_c \left[\sigma_n(\hat{n}) = 1, \sigma_c(\hat{c}); \theta < \bar{\theta}_1\right] = 0$ in the interval (0,1). Let $\tilde{x}_1$ be that root. Then $\sigma_c(\hat{c})^* = \max\{0, \tilde{x}_1\}$ and consequently $\sigma_c(\hat{n})^* = \min\{1, x_1\}$, with $\tilde{x}_1 = 1 - x_1$.

b) Interval $\theta \in (\bar{\theta}_1, \bar{\theta}_2)$. The same argument above shows that configurations 4 and 7 can neither be here. Thus, in equilibrium, $\sigma_n(\hat{n})^* = 1$. In this case, if $\sigma_n(\hat{n})^* = 1$, then $\sigma_c(\hat{c})^* = 1$ (because by Lemma 11, if $\sigma_n(\hat{n})^* = 1$, then $\Delta_c < 0$, and consequently $\sigma_c(\hat{c})^* = 1$).

c) Interval $\theta \in (\bar{\theta}_2, \bar{\theta}_3)$. Analogously to the previous point, by Lemma 11, if $\sigma_n(\hat{n})^* = 1$, then $\Delta_c < 0$, and consequently $\sigma_c(\hat{c})^* = 1$. Thus, configurations 2 and 3 cannot be. The only possible configurations that are left are 1, 4 and 7, which implies that in equilibrium $\sigma_c(\hat{c})^* = 1$. However, configurations 1 and 4 cannot be either. The reason is that by Lemma 10, in this interval, if $\sigma_c(\hat{c}) = 1$, then Δ_n has only one inner root. Let $\tilde{x}_2$ be that root. Thus, in equilibrium, $0 < \sigma_n(\hat{n})^* = \tilde{x}_2 < 1$ and consequently $0 < \sigma_n(\hat{c})^* = x_2 < 1$, with $x_2 = 1 - \tilde{x}_2$.

d) Interval $\theta \in (\bar{\theta}_3, 1)$. Again, from Lemma 11, if $\sigma_n(\hat{n})^* = 1$, then $\sigma_c(\hat{c})^* = 1$. Thus, only 1, 4 or 7 can be. However, from lemma 10, neither 1 nor 7 can hold. The reason is that in this interval, if $\sigma_c(\hat{c}) = 1$, then $\Delta_n < 0$, and thus $\sigma_n(\hat{n})^* = 0$. Consequently, in equilibrium, $\sigma_c(\hat{c})^* = 1$ and $\sigma_n(\hat{n})^* = 0$. ■

Additional results

Lemma 12. $\frac{\partial \sigma_c(\hat{n})^*}{\partial \theta} < 0$.

Proof.
Since $\frac{\partial \sigma_c(\hat{n})^*}{\partial \theta} = -\frac{\frac{\partial \Delta_c}{\partial \theta}}{\frac{\partial \Delta_c}{\partial \sigma_c(\hat{n})^*}}$, from Lemmas 4 and 7, the proof follows. ■

Lemma 13. *For any $\theta \in (0, \bar{\theta}_1)$, there exists $\bar{\alpha_0} \in (0, 1)$ such that for all $\alpha_0 > \bar{\alpha_0}$, $\sigma_c(\hat{n})^* = 1$*

Proof.
First note that from Proposition 7, if $\theta < \bar{\theta}_1$, then $\sigma_n(\hat{n})^* = 1$.

Now, we show that $\Delta_c \left[\sigma_n(\hat{n}) = 1, \sigma_c(\hat{c}) = 0; \alpha_0\right]$ is increasing in α_0. To this aim, note that $\Delta_c \left[\sigma_n(\hat{n}) = 1, \sigma_c(\hat{c}) = 0\right] = \alpha_1(\hat{n}, 0) - ((1 - \mu)\alpha_1(\hat{c}, 0) + \mu + P(C \mid c)\alpha_1(\hat{c}, C)) = \frac{\alpha_0(1-\theta)}{1-\alpha_0\theta} + \mu + \frac{\gamma\theta\mu}{\gamma-1+\theta-2\gamma\theta} - 1$, and
$\frac{\partial \Delta_c[\sigma_n(\hat{n})=1, \sigma_c(\hat{c})=0]}{\partial \alpha_0} = \frac{1-\theta}{(\theta\alpha_0-1)^2} > 0$.

Finally, note that $\Delta_c \left[\sigma_n(\hat{n}) = 1, \sigma_c(\hat{c}) = 0; \alpha_0 = 0\right] = \mu + \frac{\gamma\theta\mu}{\gamma-1+\theta-2\gamma\theta} - 1 < 0$, which implies that if α_0 is small enough, then $\sigma_c(\hat{n})^* < 1$. Additionally, by Proposition 7, $\sigma_c(\hat{n})^* > 0$. Finally, $\Delta_c \left[\sigma_n(\hat{n}) = 1, \sigma_c(\hat{c}) = 0; \alpha_0 = 1\right] = \mu + \frac{\gamma\theta\mu}{\gamma-1+\theta-2\gamma\theta} > 0$, which implies that if α_0 is high enough, then $\sigma_c(\hat{n})^* = 1$. From here, the proof follows.
■

A.6 Extension: Is silence always bad?

Proof of Proposition 5

Let $EU(\sigma_n(\hat{n}), \sigma_c(\hat{c}))$ denote the expected utility to the consumers. It is:

$$\frac{1}{2}(\alpha_0\pi + (1-\alpha_0)((\gamma\sigma_n(\hat{n}) + (1-\gamma)(1-\sigma_c(\hat{c})))\pi - (\gamma(1-\sigma_n(\hat{n})) + (1-\gamma)\sigma_c(\hat{c}))\varphi_{\hat{c}})) +$$
$$\frac{1}{2}(\alpha_0\pi + (1-\alpha_0)((\gamma\sigma_c(\hat{c}) + (1-\gamma)(1-\sigma_n(\hat{n})))\pi - (\gamma(1-\sigma_c(\hat{c})) + (1-\gamma)\sigma_n(\hat{n}))\varphi_{\hat{n}})).$$

Note that the function $EU(\sigma_n(\hat{n}), \sigma_c(\hat{c}))$ is linear in both arguments and have derivatives:

$$\frac{d(EU(\sigma_n(\hat{n}),\sigma_c(\hat{c})))}{d\sigma_c(\hat{c})} = \frac{1}{2}(1-\alpha_0)(2\pi\gamma - \varphi_{\hat{c}} - \pi + \gamma\varphi_{\hat{c}} + \gamma\varphi_{\hat{n}}), \tag{27}$$

$$\frac{d(EU(\sigma_n(\hat{n}),\sigma_c(\hat{c})))}{d\sigma_n(\hat{n})} = \frac{1}{2}(1-\alpha_0)(2\pi\gamma - \varphi_{\hat{n}} - \pi + \gamma\varphi_{\hat{c}} + \gamma\varphi_{\hat{n}}), \tag{28}$$

which are increasing in γ. In addition, evaluated at $\gamma = \frac{1}{2}$ and $\gamma = 1$ we have:

$$\left.\frac{d(EU(\sigma_n(\hat{n}),\sigma_c(\hat{c})))}{d\sigma_c(\hat{c})}\right|_{\gamma=\frac{1}{2}} = \frac{1}{2}(1-\alpha_0)\frac{1}{2}(\varphi_{\hat{n}} - \varphi_c), \tag{29}$$

$$\left.\frac{d(EU(\sigma_n(\hat{n}),\sigma_c(\hat{c})))}{d\sigma_c(\hat{c})}\right|_{\gamma=1} = \frac{1}{2}(1-\alpha_0)(\pi + \varphi_{\hat{n}}) > 0, \tag{30}$$

$$\left.\frac{d(EU(\sigma_n(\hat{n}),\sigma_c(\hat{c})))}{d\sigma_n(\hat{n})}\right|_{\gamma=\frac{1}{2}} = \frac{1}{2}(1-\alpha_0)\frac{1}{2}(\varphi_{\hat{c}} - \varphi_n), \tag{31}$$

$$\left.\frac{d(EU(\sigma_n(\hat{n}),\sigma_c(\hat{c})))}{d\sigma_n(\hat{n})}\right|_{\gamma=1} = \frac{1}{2}(1-\alpha_0)(\pi + \varphi_{\hat{c}}) > 0. \tag{32}$$

Now, suppose $\varphi_{\hat{n}} > \varphi_{\hat{c}}$. In this case, equations (29) and (30) are positive. Then equation (27) is always positive and consequently $\hat{\sigma}_c(\hat{c}) = 1$. Additionally, when $\varphi_{\hat{n}} > \varphi_{\hat{c}}$, equation (31) is negative and (32) is positive. Since equation (28) is increasing in γ, there must be $\tilde{\gamma}_1 \in \left(\frac{1}{2}, 1\right)$ such that if $\gamma < \tilde{\gamma}_1$, equation (28) is negative; and if $\gamma > \tilde{\gamma}_1$, equation (28) is positive. Consequently, if $\gamma < \tilde{\gamma}_1$, $\hat{\sigma}_n(\hat{n}) = 0$, and if $\gamma > \tilde{\gamma}_1$, $\hat{\sigma}_n(\hat{n}) = 1$. The proof for the case $\varphi_{\hat{n}} < \varphi_{\hat{c}}$ is analogous and then omitted.

From (27) and (28), if $\varphi_{\hat{n}} = \varphi_{\hat{c}}$, then $\frac{d(EU(\sigma_n(\hat{n}),\sigma_c(\hat{c})))}{d\sigma_c(\hat{c})} = \frac{d(EU(\sigma_n(\hat{n}),\sigma_c(\hat{c})))}{d\sigma_n(\hat{n})} > 0$. Thus, $\hat{\sigma}_c(\hat{c}) = 1$ and $\hat{\sigma}_n(\hat{n}) = 1$. ■

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