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“Media market structure and confirmatory news”

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Media market structure and confirmatory news.*

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Abstract

This paper extends the reputational cheap-talk model to study the effect of media market structure on the quality of news, depending on news coverage characterized by: (i) the precision of common priors and (ii) the likelihood of follow-up quality assessment. We find that competition (weakly) increases the quality of news, except when the news covers controversial issues, the quality of which is likely to remain uncertain, such as politics. Competition adversely affects the quality of such news by increasing the elasticity of demand, thereby creating incentives to confirm common priors.
Key words: quality of news, competition, reputational cheap-talk.
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1 Introduction.

The media has a high degree of freedom in reporting[1] and may bias news in favor of certain views. There is growing evidence of various biases (Puglisi and

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[1] It can "lie" if not by fabricating news, then at least by "slanting", that is, selectively reporting facts in favour of some view.

Snyder 2015). One bias discussed in the theoretical literature is the tendency to confirm common priors in an attempt to appear competent. Competition has been proposed as a means to decrease this bias, as consumers can better evaluate the quality of news by cross-checking reports from different outlets (Gentzkow and Shapiro 2006). However, many consumers tend to buy news from just one outlet, a phenomenon commony termed "single homing".[2]

This paper studies the effect of competition on the bias described above,[3] while allowing for both single- and multi-homing. It considers a two-period model in which news reported in period one affects consumer posteriors about media quality, hence demand for news in period two. We find that competition (weakly) increases the quality of news, except when the news covers controversial issues, the quality of which is likely to remain uncertain, such as politics. Competition adversely affects the quality of such news by increasing the elasticity of demand, thereby creating incentives to confirm common priors.

These findings contribute to the debate on the role of competition in mitigating media bias (see the survey by Gentzkow and Shapiro 2008). The general insight from this debate is that competition mitigates biases originating on the supply side of the market,[4] except when the quality of private information by the media is endogenous (as in Chen and Suen 2023).[5] However, it has an ambiguous effect on demand-driven biases when consumers

[2]For example, in the sample by Affeldt et al. (2021), an average of between 25% and 62% of the readers single-home depending on newspaper.

[3]Our focus on reputation-driven bias of news content rather than on timing of reporting makes our paper complementary to growing literature studying the effect of competition on speed-accuracy trade-off (see Shahanaghi 2024, Pant and Trombetta 2023 and references therein).

[4]Some biases discussed in the literature originate on the supply-side of the media market. Durante and Knight (2012) find biases created by partisan control, Enikolopov and Petrova (2016) find biases created by politicians capturing the media, Beattie et al. (2021) find biases created by advertisers. Other biases are demand-driven, for example, a bias towards readers' political partisanship (Gentzkov and Shapiro, 2010).

[5]In Chen and Suen (2023) new entry may drive reader attention away from the incumbent media news reducing its quality (yet, overall welfare effect is positive).

are differentiated (Burke 2008, Perego and Yuksel 2022).[6] In this paper, that effect is ambiguous even if consumers are homogeneous.

2 A model of market for news.

Consider a two-period model of the media market. In each period $t = 1, 2$, a continuum of identical consumers makes a decision from the set $\{0, 1\}$. They receive a benefit normalized to 1 if and only if their decision matches the period-specific hidden state of nature x,[7] which is drawn anew in each period from a Bernoulli distribution with parameter p:

$$\Pr(x = 0) = p;\ \Pr(x = 1) = 1 - p. \tag{1}$$

Without loss of generality, decision "0" is (weakly) more likely to be optimal than decision "1", that is, $p \geqslant \frac{1}{2}$.

Consumers can buy news about the prevailing state from the media. We consider two media market structures: a monopoly with one outlet indexed by $i = 1$, and a duopoly with two outlets indexed by $i = 1, 2$.

The media information structure is commonly termed "*nested*".[8] In either period t, media outlet i receives private signal s^i on the prevailing state. The quality of that signal depends on two random variables drawn once for all. The first variable θ_i drawn from Bernoulli distribution with parameter $\frac{1}{2}$ represents time-invariant competence by outlet i . It is termed "high" if $\theta_i = 1$ and "low" if $\theta_i = 0$. The second variable, Δ, drawn from the uniform distribution on interval $[0, 1]$, indicates whether high competence is necessary

[6] Burke (2008) proposes that the competition creates excessive differentiation and its effect depends on the distribution of consumer priors. In Perego and Yuksel (2022) competition may induce the media outlets to bias their coverage away from the issues of common interest.

[7] Here and below, we omit period-indicator for period-specific variables.

[8] Nested information structure simplifies revision of beliefs upon the agreement/disagreement by competing outlets: their agreement is not a signal of competence while their disagreement means that their competencies differ. Note that our insights are not specific to this information structure.

to learn the state. This is true if and only if Δ realizes above a given threshold q.[9] Hence,

$$s_i = \begin{cases} x, \text{ if } \theta_i = 1 \text{ or } \theta_i = 0 \text{ and } \Delta \leqslant q; \\ 1 - x, \text{ otherwise.} \end{cases} \tag{2}$$

In order to make the game non-trivial, we focus on situation in which the common priors are more precise than the signal by a low competence outlet and less precise than the signal by an outlet of an "average" competence:

$$q < p < \tfrac{1+q}{2}. \tag{3}$$

We simplify an outlet's reporting strategy by assuming that outlet i has no private information other than its signal (in particular, it does not know its own competence). Outlet i can report any news n_i in set $\{0, 1\}$, regardless of its signal. It sells news n_i at an arbitrarily small price, which we take to be zero for notational convenience. Additionally, it receives a price per "eyeball" from advertisers.[10] Its objective is to maximize its advertising revenue, which is proportional to demand, depending on consumer beliefs about the media competence.

At the end of period one, with probability δ, consumers receive feedback $\varphi = x$ on the state that was prevailing, allowing them to learn whether the reported news was true or false. With probability $1 - \delta$, they receive no feedback ($\varphi = \varnothing$) and remain uncertain about the quality of the period one news.

3 Media market structure and consumer information.

We solve the above game using the concept of Perfect Bayesian Equilibrium (PBE), focusing on the most informative pure strategy symmetric equilibria.

[9]High realization may be interpreted as a difficult issue, while low realization as an easy issue.

[10]For simplicity, and without a qualitative impact on the insights, the price is the same regardless of whether or not the "eyeball" is "exclusive".

In such an equilibrium, an outlet reports its signal in period two because the content of its news has no impact on its revenues. In period one, it reports to increase its expected demand in period two. There are two possible types of equilibria: (i) "*babbling*," where the period one news is uninformative, and (ii) "*informative*," where the news reported by outlet i reveals its signal (for concreteness, outlet i reports its signal). The babbling equilibrium exists for any set of parameter values. We compare two media market structures - monopoly and duopoly - in terms of their efficiency in sustaining the informative equilibrium.

Monopoly media market. First, consider a monopoly media market. Suppose that consumers believe the outlet reports its signal in period one. Their corresponding posteriors, $\Pr(\theta_1 = 1 \mid \varphi,\ n_1)$, on the outlet's competence - termed "*reputation*" hereafter - are specified in Appendix A. The outlet's reputation is highest when consumers learn that the period one news was true, and lowest (null) when they learn it was false. If the quality of news remains uncertain, the outlet's reputation is higher when its news is *confirmatory* (i.e., "0") rather than *contrarian* (i.e., "1"). The reason for this, as emphasized in the reputational cheap-talk literature pioneered by Ottaviani and Sørensen (2006a,b), is that the higher the outlet's competence, the closer the realizations of its signal are to the prior mean of the state: $p > pq + (1-p)(1-q)$.

Consumers buy news in period two if and only if the outlet's reputation is sufficiently high, making its signal a better guide for their period two decision than the common priors:[11]

$$q + (1-q)\Pr(\theta_1 = 1 \mid \varphi,\ n_1) > p. \tag{4}$$

Consumers do not buy news if the period one news is false. They buy news if the period one news is true or confirmatory. They also buy news if the

[11] Recall that consumers are rewarded for decisions that match the binary state. Therefore, they pay an arbitrarily small positive price for a report if and only if it can improve their decision.

period one news is contrarian, but only if the associated reputational cost is sufficiently small, which occurs when the prior probability p lies below threshold:

$$\underline{p}(q) = \tfrac{1+q^2-(1-q)\sqrt{1+q^2}}{2q}. \tag{5}$$

The media outlet panders its period one news to the above demand. Reporting its signal is its dominant strategy unless the signal contradicts the common priors ($s_1 = 1$) which precision lies above threshold (5). In that situation, the outlet's incentives are controversial. On one hand, its signal is likely to be true, therefore reporting it is likely to help retain consumers if they discover the true state. On the other hand, contrarian news leads to zero future demand if consumers remain uncertain about the quality of the news. The outlet reports its signal if and only if

$$\delta \Pr\left(x = 1 \mid s_1 = 1\right) \geqslant \delta \Pr\left(x = 0 \mid s_1 = 1\right) + 1 - \delta, \tag{6}$$

which holds iff the quality of news is likely to be revealed, that is $\delta > \frac{1}{2}$, and the precision of common priors lies below threshold

$$p^m(q, \delta) = \tfrac{(2\delta-1)(1+q)}{(2\delta-1)(1+q)+1-q}. \tag{7}$$

Proposition 1. *A monopoly media market sustains the informative news equilibrium if and only if the precision of common priors p lies below the least of thresholds (5) and (7).*

The region in which monopoly media news is informative is marked with dark grey in Figure 1, left (see the end of the section).

Duopoly media market. Now, consider a duopoly media market. Suppose that consumers believe both media outlets report their signals in period one. In this case, their demand for news in period two is as follows (see details in Appendix B):

If both outlets agree in period one, they gain the same reputations, and consumers will crosscheck their news, unless the period one news is clearly false or contradicts the common priors with the precision above threshold

$$\overline{p}(q) = \tfrac{1+3q^2-(1-q)\sqrt{1+3q^2}}{2q(1+q)}. \tag{8}$$

If the outlets disagree in period one, the outlet with the highest reputation wins the entire market, while its competitor is out of business. The winner is the outlet that reported the true state, if the consumers eventually learn the state. Otherwise, it is the outlet that confirmed the common priors.

Hence, competition creates two countervailing effects on an outlet's incentives. The "*complementarity*" effect relaxes the incentive constraint (6) by introducing the possibility of selling news following contrarian reporting if the competitor's news is also contrarian. Formally, the term $(1-\delta)\Pr(s_{-i}=1 \mid s_i=1)$ is added to the left-hand side of the incentive constraint (6) which is indexed with i. The effect of higher "*demand elasticity*", creates a risk of losing business following contrarian news if the competitor's news is confirmatory, no matter how diffuse the common priors are. As a result, outlet i reports its signal if and only if:

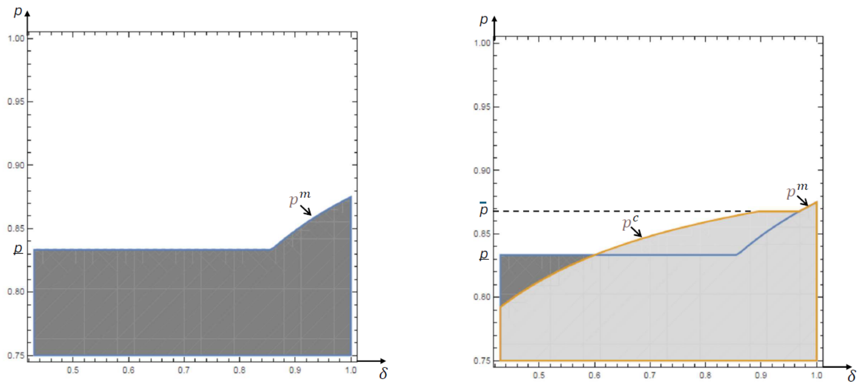
$$\begin{gathered}\delta\Pr(x=1 \mid s_i=1) + (1-\delta)\Pr(s_{-i}=1 \mid s_i=1) \geqslant \\ \delta\Pr(x=0 \mid s_i=1) + (1-\delta),\end{gathered} \tag{9}$$

which holds iff p lies below threshold

$$p^c(q,\delta) = \tfrac{\delta(3+q)+q-1}{4\delta}. \tag{10}$$

Proposition 2. *A duopoly media market sustains equilibrium in which news is informative if and only if the precision of common priors p lies below threshold (7) or the least of thresholds (8) and (10).*

Duopoly media market sustains the informative news equilibrium in the area marked with light grey in Figure 1, right. In the light grey region the competing outlets supply two informative reports while monopoly outlet at most one. In the dark grey region, monopoly media outlet supplies one informative report while reporting by the competing outlets is uninformative. Hence, competition (weakly) increases consumer information outside the dark-grey region in Figure 1 (right), but it adversely affects this information within that region.



Parameter areas of the informative equilibrium ($q = 0.75$).

4 Conclusion.

We have analyzed the impact of media market structure on the quality of news, focusing on one possible bias: the tendency to report news that confirms common priors in an attempt to appear competent. We find that competitive outlets provide (weakly) more information to consumers, unless the likelihood of follow-up assessments of news quality is sufficiently low, and the news concerns issues on which common priors are diffuse. In such cases, competition exacerbates media incentives to confirm common priors, thereby adversely affecting the quality of information provided to consumers. We hope that this theoretical insight can contribute to the analysis of media mergers.

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Appendix A: proof of Proposition 1.

Step 1 characterizes the demand for news in period two, assuming that consumers believe $n_1(s_1) = s_1$.

Step 1.1. Suppose that $\varphi = x$, $n_1 = 1-x$. By Bayes rule,[12] $\Pr(\theta = 1 \mid \varphi = x,\ n_1 = 1-x) = 0$, hence, inequality (4) is violated (recall the lower limitation in set of inequalities (3)).

Step 1.2. Suppose that $\varphi = \varnothing$, $n_1 = 1$. Then, $\Pr(\theta = 1 \mid \varphi = \varnothing,\ n_1 = 1) = \frac{1-p}{(1-p)(1+q)+p(1-q)}$, hence, inequality (4) holds for $p = q$, and fails for $p = \frac{1+q}{2}$. Furthermore,

$$\frac{\partial}{\partial p} \Pr(\theta = 1 \mid \varphi = \varnothing,\ s_1 = 1) = -\frac{1-q}{((1-p)(1+q)+p(1-q))^2} < 0,$$

[12] Here and below, we use Bayes' rule to find conditional probabilities.

which implies that there exist a threshold such that inequality (4) holds iff p lies below this threshold. We find this threshold by equalizing the left- and the right-hand-side of inequality (4). It is given by equation (5).
Step 1.3. Suppose that $\varphi = \varnothing$ and $n_1 = 0$ or $\varphi = n_1 = x$. Then,

$$\Pr(\theta = 1 \mid \varphi = x,\ n_1 = x) = \tfrac{1}{1+q},\ \Pr(\theta = 1 \mid \varphi = \varnothing,\ n_1 = 0) = \tfrac{p}{p(1+q)+(1-p)(1-q)},$$

$$\text{hence, } \Pr(\theta = 1 \mid \varphi = x, n_1 = x) > \Pr(\theta = 1 \mid \varphi = \varnothing, n_1 = 0) \geqslant \tfrac{1}{2}. \quad (11)$$

By the upper limitation in set of inequalities (3), inequality (4) holds if $\Pr(\theta = 1 \mid \varphi, n_1)$ is replaced with $\frac{1}{2}$. By set of inequalities (11), inequality (4) holds**.**
Step 2 describes conditions for informative reporting. Suppose first that $s_1 = 0$. Then,

$$\Pr(x = 0 \mid s_1 = 0) = \tfrac{p(1+q)}{p(1+q)+(1-p)(1-q)},\ \Pr(x = 1 \mid s_1 = 0) = \tfrac{(1-p)(1-q)}{p(1+q)+(1-p)(1-q)},$$

$$\text{which implies } \Pr(x = 0 \mid s_1 = 0) > \Pr(x = 1 \mid s_1 = 0). \quad (12)$$

By step 1, the outlet reports $n_1 = s_1$ if and only if

$$\delta \Pr(x = 0 \mid s_1 = 0) \geqslant \delta \Pr(x = 0 \mid s_1 = 0) + 1 - \delta,$$

which is true by inequality (12). Suppose now that $s_1 = 1$. Then,

$$\Pr(x = 1 \mid s_1 = 1) = \tfrac{(1-p)(1+q)}{(1-p)(1+q)+p(1-q)},\ \Pr(x = 0 \mid s_1 = 1) = \tfrac{p(1-q)}{(1-p)(1+q)+p(1-q)}.$$

By set of inequalities (3),

$$\Pr(x = 1 \mid s_1 = 1) > \Pr(x = 0 \mid s_1 = 1). \quad (13)$$

Suppose first that p lies below threshold (5). By step 1, the outlet reports $n_1 = s_1$ if and only if

$$1 - \delta + \delta \Pr(x = 1 \mid n_1 = 1) \geqslant 1 - \delta + \delta \Pr(x = 0 \mid n_1 = 1),$$

which is true by inequality (13). Suppose now that p lies above threshold (5). Then, the outlet reports $n_1 = s_1$ if and only if the incentive constraint

(6) holds. This is true if and only if both $\delta \geqslant \frac{1}{2}$ and p lies below threshold (7) which equalizes the left- and the right-hand-side of inequality (6). Note that threshold (7) is increasing in δ and it is null at $\delta = \frac{1}{2}$. Therefore, inequality $\delta > \frac{1}{2}$ holds whenever threshold (7) lies above threshold (5).

Appendix B: proof of Proposition 2.

Step 1 characterizes demand for news in period two. The consumers buy news by outlet with the highest reputation if and only if

$$q + (1-q) \max_{i=1,2} \{\Pr(\theta_i = 1 \mid \varphi, n_1, n_2)\} > p. \tag{14}$$

They crosscheck reports by different outlets in order to pick a priori efficient decision "0" if it is endorsed by at least one outlet if and only if both:

$$\begin{gathered} (1-p)\Pr(\theta_1 = \theta_2 = 1 \mid \varphi, n_1, n_2) + \\ +p\,(1 - \Pr(\theta_1 = \theta_2 = 0 \mid \varphi, n_1, n_2)) > \max_{i=1,2}\{\Pr(\theta_i = 1 \mid \varphi, n_1, n_2)\} \end{gathered} \tag{15}$$

$$\begin{gathered} \text{and } q + (1-q)((1-p)\Pr(\theta_1 = \theta_2 = 1 \mid \varphi, n_1, n_2) + \\ +p\,(1 - \Pr(\theta_1 = \theta_2 = 0 \mid \varphi, n_1, n_2))) > p. \end{gathered} \tag{16}$$

Suppose that the consumers believe that $n_i(s_i) = s_i$.

Step 1.1. Suppose first that $n_1 = 1 - n_2$. Then, $\Pr(\theta_1 = \theta_2 \mid \varphi, n_1 = 1 - n_2) = 0$, which implies that inequality (15) is violated (no crosschecking). Suppose that $\varphi = x$. Then inequality (14) holds if $s_i = x$, because

$$\Pr(\theta_i = 1 \mid \varphi = x, n_i = x, n_{-i} = 1 - x) = 1,$$

and it fails if $s_i = 1 - x$, because

$$\Pr(\theta_i = 1 \mid \varphi = x, n_i = 1 - x, n_{-i} = x) = 0.$$

Suppose now that $\varphi = \varnothing$. Then, inequality (14) holds if $n_i = 0$ because

$$\Pr(\theta_i = 1 \mid \varphi = \varnothing, n_i = 0, n_{-i} = 1) = p$$

and it fails if $n_i = 1$ because

$$\Pr\left(\theta_i = 1 \mid \varphi = \varnothing, n_i = 1, n_{-i} = 0\right) = 1 - p.$$

Step 1.2. Suppose now that $n_1 = n_2$.
Step 1.2.1. Suppose first that $\varphi = x$ and $s_i = 1 - x$, $i = 1, 2$. Then, both inequalities (14) and (16) are fail (demand for news is null) because

$$\Pr\left(\theta_i = 1 \mid \varphi = x, n_1 = 1 - x, n_2 = 1 - x\right) = 0.$$

Step 1.2.2 shows that inequality (15) holds for any triple φ, n_1, n_2 other than those in step 1.2.1. Indeed, by true equations

$$\Pr\left(\theta_1 = 1 \mid \varphi, n_1, n_2\right) = \Pr\left(\theta_2 = 1 \mid \varphi, n_1, n_2\right) \text{ and} \tag{17}$$

$$\Pr\left(\theta_1 = 1 \mid \varphi, n_1, n_2\right) = \Pr\left(\theta_1 = 1, \theta_2 = 1 \mid \varphi, n_1, n_2\right) + \Pr\left(\theta_1 = 1, \theta_2 = 0 \mid \varphi, n_1, n_2\right), \tag{18}$$

inequality (15) is equivalent to

$$\begin{gathered} p\left(1 - \Pr\left(\theta_1 = \theta_2 = 0 \mid \varphi, n_1, n_2\right) - \Pr\left(\theta_1 = \theta_2 = 1 \mid \varphi, n_1, n_2\right)\right) > \\ \Pr\left(\theta_1 = 1, \theta_2 = 0 \mid \varphi, n_1, n_2\right). \end{gathered} \tag{19}$$

By true equations

$$\Pr\left(\theta_1 = 0, \theta_2 = 1 \mid \varphi, n_1, n_2\right) = \Pr\left(\theta_1 = 1, \theta_2 = 0 \mid \varphi, n_1, n_2\right) \text{ and} \tag{20}$$

$$\begin{gathered} 1 - \Pr\left(\theta_1 = 0, \theta_2 = 0 \mid \varphi, n_1, n_2\right) - \Pr\left(\theta_1 = 1, \theta_2 = 1 \mid \varphi, n_1, n_2\right) = \\ = \Pr\left(\theta_1 = 1, \theta_2 = 0 \mid \varphi, n_1, n_2\right) + \Pr\left(\theta_1 = 0, \theta_2 = 1 \mid \varphi, n_1, n_2\right), \end{gathered} \tag{21}$$

inequality (19) is equivalent to inequality

$$2p \Pr\left(\theta_1 = 1, \theta_2 = 0 \mid \varphi, n_1, n_2\right) > \Pr\left(\theta_1 = 1, \theta_2 = 0 \mid \varphi, n_1, n_2\right),$$

which holds for any $p > \frac{1}{2}$.
Step 1.2.3. Suppose that $\varphi = n_i = x$, $i = 1, 2$. By true equations

$$\Pr\left(\theta_1 = \theta_2 = 1 \mid \varphi = x, n_1 = x, n_2 = x\right) = \tfrac{1}{1+3q},$$

$$\Pr\left(\theta_1 = \theta_2 = 0 \mid \varphi = x, n_1 = x, n_2 = x\right) = \tfrac{q}{1+3q},$$

$$\Pr\left(\theta_i = 1 \mid \varphi = x, n_1 = x, n_2 = x\right) = \tfrac{1+q}{1+3q},$$

inequality (16) because its left-hand-side lies above the right extreme of the interval (3).

Step 1.2.4. Suppose that $\varphi = \varnothing$, $n_i = 0$, $i = 1, 2$. By true equations

$$\Pr\left(\theta_1 = \theta_2 = 1 \mid \varphi = \varnothing, n_1 = 0, n_2 = 0\right) = \tfrac{p}{p(1+3q)+(1-p)(1-q)},$$

$$\Pr\left(\theta_1 = \theta_2 = 0 \mid \varphi = \varnothing, n_1 = 0, n_2 = 0\right) = \tfrac{pq+(1-q)(1-p)}{p(1+3q)+(1-p)(1-q)},$$

$$\Pr\left(\theta_i = 1 \mid \varphi = \varnothing, n_1 = 0, n_2 = 0\right) = \tfrac{p(1+q)}{p(1+3q)+(1-p)(1-q)},$$

inequality (16) holds because its left-hand-side lies above the right extreme of interval (3). Indeed,

$$q + \tfrac{(1-q)p(1+(1+q)q)}{p(1+3q)+(1-p)(1-q)} > \tfrac{1+q}{2} \text{ or, equivalently, } 2p(1-q) + 2pq^2 > 1 - q.$$

Step 1.2.5. Finally, suppose that $\varphi = \varnothing$, $n_i = 1$, $i = 1, 2$. By true equations (17) and

$$\Pr\left(\theta_1 = \theta_2 = 1 \mid \varphi = \varnothing, n_1 = 1, n_2 = 1\right) = \tfrac{1-p}{(1-p)(1+3q)+p(1-q)},$$

$$\Pr\left(\theta_1 = \theta_2 = 0 \mid \varphi = \varnothing, n_1 = 1, n_2 = 1\right) = \tfrac{p(1-q)+q(1-p)}{(1-p)(1+3q)+p(1-q)},$$

$$\Pr\left(\theta_i = 1 \mid \varphi = \varnothing, n_1 = 1, n_2 = 1\right) = \tfrac{(1-p)(1+q)}{(1-p)(1+3q)+p(1-q)},$$

inequality (16) holds at the left extreme of the interval (3), that is, for $p = q$:

$$q + \tfrac{1-q}{1+4q}(1 + 2tq) > q,$$

and it fails at the right extreme of the interval (3), that is for $p = \frac{1+q}{2}$:

$$q + (1-q)\left(\tfrac{1-q}{2}\tfrac{1}{1+4q} + \tfrac{1+q}{2}\left(1 - \tfrac{1+2q}{1+4q}\right)\right) < \tfrac{1+q}{2} \text{ or, equivalently, } 2q < 3.$$

Inequality (16) is the tighter, the higher p:

$$\begin{gathered} sign\left(\tfrac{\partial}{\partial p}\left((1-p)\Pr\left(\theta_1 = \theta_2 = 1 \mid \varphi = \varnothing, n_1 = 1, n_2 = 1\right) - \right.\right. \\ \left.\left. p\Pr\left(\theta_1 = \theta_2 = 0 \mid \varphi = \varnothing, n_1 = 1, n_2 = 1\right)\right)\right) = \\ = sign\left[1 - 2pq + q^2\left((1-2p)^2 + 2 - 2p\right)\right] > 0 \text{ for } p \leqslant \tfrac{1+q}{2}, \end{gathered}$$

which implies that there exist a threshold of parameter p such that inequality (16) is true if and only if p lies below this threshold. We find this threshold by equalizing the left- and the right-hand-side of inequality (16). It is given by equation (8).

Step 2 describes conditions for informative reporting. Outlet i has strong incentives to report its signal if $s_i = 0$. Suppose that $s_i = 1$.

Step 2.1. Suppose first that p lies weakly above threshold (8). By step 1, the incentives constraint for informative reporting is given by inequality (6) indexed with i instead of 1.

Step 2.2. Suppose now that p lies below threshold (8). By step 1, the incentives constraint for informative reporting is given by inequality (9). Using true equation

$$\Pr\left(s_{-i} = 1 \mid s_i = 1\right) = \frac{(3q+1)(1-p)+p(1-q)}{2((1-p)(1+q)+p(1-q))},$$

we find that inequality (9) holds if and only if p lies above threshold (10) which equalizes its right- and left-hand sides.