Paying Positive to Go Negative: Advertisers' Competition and Media Reports*

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Abstract

This paper analyzes a two-sided market for news where advertisers may pay a media outlet to conceal negative information about the quality of their own product (paying positive to avoid negative) and/or to disclose negative information about the quality of their competitors' products (paying positive to go negative). We show that competition in the products market does not necessarily translate into competition over the media outlet's news reports. In particular, whether or not advertisers end up having negative consequences on the accuracy of the media outlet's news reports ultimately depends on the extent of the correlation in the quality of the advertisers' products: the lower this correlation, the higher is the accuracy of the media outlet's reports. The main results are robust to the presence of multiple media outlets and to asymmetries between the advertisers. Finally, our findings provides theoretical guidance for media regulators and for the empirical literature examining the link between advertising and news contents.

JEL Classification: L82, D82

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"The one area in which the case for a [Federal Trade Commission] agency is stronger than previously suggested is where no seller has an incentive to furnish correct information [...] An example is cigarettes [...] Apart from sellers of other tobacco products, for whom a campaign of disparaging cigarettes would involve a palpable risk of being hoist with their own petard, no seller or group of sellers could anticipate a marked rise in sales as a result of a reduction in smoking. There is therefore no competitor with an incentive to supply information on the relationship between smoking and health that cigarette companies naturally try to withhold".
Richard A. Posner, (1969), page 68.

1 Introduction

A series of recent empirical studies have consistently posited that the relationship between advertisers and media outlets may go well beyond the simple sales of advertising space.[1] In particular, advertisers may want to specifically direct the editorial content of a media outlet to influence the consumption decision of its viewers.[2]

This paper provides novel insights on this issue by proposing a theoretical framework to analyze the implications of advertisers' competition on the accuracy of news media reports. In particular, we analyze a setting where rival firms may compete via advertising fees to influence the information that the media disclose on the quality of their (and the rivals') product. The results show that the effect of advertisers on the accuracy of news media reports depends on whether or not the competition in the products market also translates into competition over the media editorial content, which is ultimately determined by the extent of correlation among the advertisers' products.

The following example illustrates the basic intuition of the model. Suppose that the media outlet is a magazine specialized in computer products and there are two firms competing in the products market (e.g., Acer and Toshiba). The magazine gathers information on whether each firm has a bad quality product (e.g., a defect) or not, i.e., it gets a signal on each firm's product. Each firm would never want the media outlet to publish negative information (if any) on its own product. On the other hand, it may benefit from the media outlet publishing negative information (if any) on its rival's product. Hence, if the magazine found negative evidence on either or on both firms, it may use such information to try to obtain a higher advertising fee from either firm. The advertisement expenditures may, then, end up representing a hidden payment aimed either at concealing negative information about the advertiser's own product (*paying positive to avoid negative*) or at revealing negative

[1] Reuter and Zitzewitz, 2006; Rinallo and Basuroy, 2009; Reuters, 2009; Gambaro and Puglisi, 2010; Di Tella and Franceschelli, 2011

[2] A recent survey of 27,000 individuals in 55 countries pointed out that, prior to choosing an electronic product, 57% of consumers read products' reviews. Similarly, 45% and 37% of individuals consult reviews before choosing a car and a software package, respectively. Source: Nielsen "Global Trends" June 2010.

information about the competitor's product (*paying positive to go negative*). Hence, even though in the model consumers watch only "positive" advertisements that do not provide any information *per se*, such advertisements may represent an implicit payment to obtain a "negative advertisement" in the editorial content of the media outlet (i.e., the disclosure of negative information about a competitor's product by the media outlet).[3] Therefore, while the advertising content has no direct informative value for media viewers, it may indirectly influence the informativeness (i.e., accuracy) of the non-advertising content by affecting the media outlet's incentives to disclose its available information to its viewers.

We then extend this simple theoretical framework to capture the degree of correlation in the quality of advertisers' products. When this correlation is high, firms share the same preferences over the media outlet's news reports (i.e., every firm would want the media to refrain from disclosing any negative information about any product since such news would hurt the sales of its own product). Hence, in this case, advertisers compete in the market for products but they do not compete over the media outlet's contents. When instead this correlation is low, firms have conflicting preferences over the media outlet's contents (i.e., "bad" firms want to *pay positive to avoid negative* and "good" firms want to *pay positive to go negative*). Hence, advertisers compete both in the products market and over the media outlet's contents. Consequently, we show that there exists a threshold in the degree of correlation in the quality of advertisers' products above which the media outlet never discloses any negative information on any of the advertisers' products.

The results are consistent with the observed differences in the accuracy of media reports on consumers' products across different industries. On one hand, there is plenty of evidence on significant under-reporting in the news media coverage of specific products/issues due to the advertisers' pressure to censor unfavorable contents.[4] In the US, for many years, tobacco advertisers had successfully pressured the media to not disclose any information about the health-related risks of smoking (Baker, 1994; Bagdikian, 2004; Chaloupka and Warner, 2000). Pharmaceutical companies have likewise exerted significant pressure on the editorial decisions of medical journals (Fletcher, 2003; Fugh-Berman et al., 2006).[5] In a notorious case, the executive editor of *Transplantation and Dialysis* rejected a guest editorial that questioned the efficacy of epoetin in the end-stage renal disease, despite favorable peer review, because, as he wrote to the author, "it went beyond what our marketing department was willing to accommodate" (Dyer, 2004, page 328).[6] This type of advertisers-induced

[3]The online appendix provides few examples consistent with the rationale of *"paying positive to go negative"*.

[4]See Blasco and Sobbrio (2012) for a detailed review of the anecdotal and empirical evidence on the "commercial media bias".

[5]In 2010, Pharmaceutical Companies spent 326$ millions on advertising in medical journals in the US (IMS Health 2010). Pharmaceutical companies may also finance medical journals through "sponsored subscriptions" (Fugh-Berman et al., 2006).

[6]The article also suggested that the Medicare spending on this treatment was unjustified given the limited benefits for patients. Medicare spent over $7.6 billions on epoetin between 1991 and 2002 (Dyer 2004). The conspicuous advertisements of car manufacturers also seem to represent one of the key factors leading media

distortion in the accuracy of news reports is referred to as "commercial media bias" or "self-censorship" (Ellman and Germano, 2009; Germano and Meier, 2013). At the same time, the media frequently report negative news on consumers products. Recent examples of news reports disclosing products' defects or negative side effects include the Boeing 787 Dreamliner Fuselage issues, the presence of horse-meat in Findus and Ikea's food products, Toyota with its malfunctioning car accelerators, the IPhone 4 with its signal reception issues, and Toshiba with its over-heating laptop series. These are all news likely to negatively affect the revenues of the advertiser whose product is the subject of such news.[7]

Therefore, it is somewhat puzzling to observe that the advertisers' influence on media contents has negatively affected the accuracy of news media reports only in some of these cases. Our theoretical framework provides a simple economic rationale to explain the heterogeneity in the occurrence of "commercial media bias"across advertisers' industries. Overall, the results show that when advertisers' products are weakly correlated, "commercial media bias" is endogenously swept away by the advertisers' competition over news contents. Instead, in the presence of a high degree of correlation among advertisers' products, "commercial media bias" represents a serious concern. The tobacco industry provides a straightforward example of products whose "qualities" (i.e., health risks) are almost perfectly correlated. Instead, the electronics industry provides an example of products whose qualities are weakly correlated. Consistent with anecdotal evidence, the model predicts that in the first case media are likely to hide any negative information observed, while in the second one media are likely to disclose it.

The correlation between the quality of the advertisers' products embeds several possible interpretations. Within a given industry this correlation might capture the possible similarities among products' characteristics, such as when different producers may use common inputs in their production and thus a defect in a common input may result in all of them ending up with a bad quality product.[8] A complementary interpretation of this correlation is that products may have similar negative externalities on consumers. For example, different tobacco products are likely to create similar health risks for consumers, different cars may produce similar quantities of pollutants and thus have similar effects on global warming and so on. Accordingly, the results imply that, even within an industry, media are more likely to disclose negative news on issues upon which firms have conflicting preferences, rather than on issues where firms share the same preferences over news reports (e.g., disclose

to present evidence on the sources of global warming which appear to be largely unbalanced with respect to the consensus within the scientific community (Oreskes, 2004; Boykoff and Boykoff, 2004; Ellman and Germano, 2009).

[7]In 2012, "Toyota agreed to pay about $1.1 billion to settle the class-action lawsuit stemming from complaints of unintended acceleration in its vehicles that soured its reputation for quality and undermined its sales globally" (Source: "Toyota in $1.1 Billion Gas-Pedal Settlement", *Wall Street Journal*, December 27, 2012).

[8]For example, between 2009 and 2010 the Toyota Aygo, the Citroën C1 and the Peugeot 107 all experienced a defect in their accelerator's pedal. This common shock was due to the fact that all three cars were produced at a joint venture factory. Source: "Peugeot Citroën joins Toyota and Honda in recall", *The Times*, February 1, 2010.

news on specific defects on a car manufacturer's product rather than news on the effects of automobiles' CO2 emissions on global warming).

Ultimately, the model provides testable empirical implications that could help better guide the empirical literature examining the link between advertising and news contents. Empirical studies aiming at testing the influence of advertisers of media contents should take into account that media are more likely to accurately report news on issues where competing producers have conflicting preferences. Hence, the empirical identification strategy should control for differences across industries in the degree of correlation in products' qualities and in the extent of competition among producers. Overall, the analysis suggests that media regulators should target their monitoring efforts towards news contents/issues upon which advertisers are likely to share similar preferences.

2 Related Literature

Our paper is closely related to the literature that analyzes how the accuracy of news reports may directly affect the purchasing decision of consumers and thus advertisers' profits (Ellman and Germano, 2009; Germano and Meier, 2013). Ellman and Germano (2009) show that, if an advertiser could commit to withdraw its ads as a reaction to unfavorable news coverage, it may induce the media outlet to not publish such information. Germano and Meier (2013) focus on a similar issue by looking at n media outlets located on a network within the Chen and Riordan's (2007) spokes model.[9] The authors show that if the number of media outlets is too small (or if there are very few owners), self-censorship by media outlets would arise endogenously.[10] The present paper contributes to the existing literature along two main dimensions.

First, both Ellman and Germano (2009) and Germano and Meier (2013) focus on the case where the net effect of increasing accuracy on a media outlet's advertising revenues is negative, for a given level of circulation. Instead, we do not make any prior assumption on this effect. While any advertiser would want a media outlet to always conceal any negative information regarding its own product, such advertiser may have different preferences regarding the disclosure of negative information about the competitor's products depending on the correlation structure. We show that when allowing advertisers to compete over news contents, the media incentives to produce truthful reports are not necessarily misaligned with the advertisers' ones. Specifically, whether advertisers have a negative influence on the accuracy of media reports or not, would be endogenously determined by the structure of the

[9] See also Germano (2009) for an analysis of the "uncovered" case of the spokes model. Blasco and Sobbrio (2012) review the literature on commercial media bias and provide a simple model summarizing the main intuitions of the present paper and the ones of Ellman and Germano (2009) and Germano and Meier (2013).

[10] See also Petrova (2012) for a model on media bias analyzing the interaction between advertising revenues and special interests groups' subsidies.

correlation in the products' industry.[11]

Second, while the above papers look at how competition in the media industry may increase the accuracy of media reports, while keeping constant the preferences of advertisers for low accuracy, we focus on the complementary research question. That is, we show how and when advertisers' competition in the products market may increase the accuracy of media reports even in the presence of a monopolistic media outlet.

In recent years, there has been a growing empirical literature looking at advertising expenditure and media coverage (Reuter and Zitzewitz, 2006; Rinallo and Basuroy, 2009; Reuters, 2009; Gambaro and Puglisi, 2010; Di Tella and Franceschelli, 2011). This literature usually finds a positive correlation between advertising expenditure and favorable media coverage. However, it also shows that this link weakens or disappears in contexts where there is higher advertisers competition over media contents, or where advertisers' products are more differentiated. Reuter and Zitzewitz (2006) find a positive relation between mutual fund recommendation and advertising expenditures for personal finance media while no correlation for national newspapers. Rinallo and Basuroy (2009) find that preferential coverage of the advertisers' products is weaker when the media outlet's advertising revenues are more diversified. Reuter (2009) finds weak evidence of a correlation between wine ratings and advertising in *Wine Spectator*. Thus, consistent with the predictions of our model, this recent empirical evidence seems to suggest that the stronger the competition among advertisers with conflicting preferences (e.g., more advertisers competing over media contents or lower correlation among advertisers' products), the higher the probability that a media outlet would report accurate information.[12]

Finally, our paper is related to the model of Besley and Prat (2006) on media capture by incumbent politicians. Specifically, the signal structure of the model builds upon the one specified in their paper.

[11] Ellman and Germano (2009) present an informal discussion, consistent with our results, of the case where advertisers have conflicting preferences over the accuracy of media reports. Germano and Meier (2013) consider in an extension a similar case, however they still assume that the overall (mean) effect of increasing accuracy on a media outlet's advertising revenues is negative. In line with the rationale behind our result, Petrova (2012) shows that media bias is lower when special interest groups have misaligned preferences.

[12] Historical evidence also seems to suggest that the overall impact of advertising on the accuracy of media reports is not necessarily negative. Gentzkow, Glaeser and Goldin (2006) focus on the US newspaper industry between the end of the 19th century and the beginning of the 20th century. They show that technological changes (i.e., decreasing production costs) induced significative economies of scale and an increase in competitiveness of the newspaper industry. In turn, these changes increased advertising revenues which contributed to create an independent press. Petrova (2011) focuses on the US press in the 1880s and shows that a higher profitability of advertising in local markets leads to the presence of more independent newspapers. Poitras and Sutter (2009) look at the decline in muckraking by US magazines at the beginning of the 20th century. They find no evidence in support of the hypothesis that such decline was the results of advertisers' boycott as a reaction to adverse news coverage.

3 The Model

There is one single media outlet and two firms, each selling a product to the same set of potential consumers. In this environment all agents are risk-neutral.

Firms can be thought as identical but their product's quality might differ. We assume that each firm l may experience a negative shock in the quality of its product q_l (e.g., a defect). Thus, a product put on the market may turn out to be either of good quality $q_l = g$ or of bad quality $q_l = b$ and the *ex–ante* probabilities of these two states of the world are determined as: $Pr(q_l = g) = \nu$ and $Pr(q_l = b) = 1 - \nu$. We further allow products to have correlated shocks affecting their quality so that:

$$Pr(q_l = g | q_j = g) = \rho \cdot (1 - \nu) + \nu$$

where $\rho \in [0, 1)$ denotes the coefficient of correlation between q_l and q_j.

There is a continuum of potential consumers whose measure is normalized to one. Each consumer derives a positive value v_g from consuming a product of quality g and, instead, a value $v_b < v_g$ from consuming a bad quality one. Consumers demand no more than one product and each of them may prefer to do not consume any of the products - choosing to stick to a status quo value v_0 (e.g., keep using an old product) - rather than end up using a bad quality or defective product, i.e., $v_g > v_0 > v_b = 0$.

Since we are interested in a problem of asymmetric information between consumers and producers, a product's quality is private information of firms and so, consumers prior information can be summarized by the pair (ν, ρ).

Each consumer may acquire additional information from the media outlet. Thus, we assume that the media outlet observes an informative signal $z_l \in \{\varnothing;\ b\}$ for each product l. Specifically, if product l is of bad quality, then the signal $z_l = b$ occurs with probability:

$$\Pr(z_l = b | q_l = b) = \theta \tag{1}$$

where $\theta \in (0, 1)$ captures media outlet's ability to detect issues or defects on each product.[13] Once the media outlet has received the vector of signals $\mathbf{z}$, it has to decide whether to include this information in its contents. Such media contents consist of generic contents and a news report about products' qualities represented by a vector of messages $\mathbf{m} = (m_1; m_2)$. Since we assume that signals are hard information, the media outlet may conceal but not forge information, i.e., $z_l = \varnothing \Rightarrow m_l = \varnothing$.

At the same time, we are implicitly assuming that a firm cannot directly communicate credible information to consumers regarding the bad quality of its rival's product. Indeed,

[13]Notice that, like Besley and Prat (2006), we assume that signals can only be bad. However, as in their model, the framework could be extended to incorporate good signals, as long as the probability of receiving a good signal is lower than the probability of a bad one. That is, from the media outlet's perspective, not observing any signal would increase the probability of the product being of good quality.

even if a firm may learn about the presence of a defect in such a product, it would need to use the media platform to access media viewers and communicate this information to them.[14]

Consumers have to pay a fixed price $p > 0$ to access the media outlet's contents,[15] and this choice is affected by their expectations regarding the media outlet's decision to conceal or not the signals received on firms' products. Of course, consumers derive also a benefit from the media outlet's generic contents *per se*. To capture this feature, we denote by u^i the utility of viewer i from the media outlet - net of the informative value of the report - and we introduce heterogeneity assuming that this is i.i.d. with uniform distribution f on the interval $[0, \bar{u}]$, with $\bar{u} > p$. For example, u^i may be related with the *entertainment* value of the media outlet.[16] The above structure implies that there is always a positive fraction of viewers $r = \frac{\bar{u}-p}{\bar{u}}$ who is willing to watch the media outlet, regardless of the informative value of its news report about the quality of the product.[17]

Hence, the endogenous fraction α of consumers who decide to watch the media outlet's will be as follows:

$$\begin{aligned} \alpha &= \int_0^{\bar{u}} \mathbf{1}_{(U^I - p + u > U^U)} \, df(u) \\ &= r + \frac{1}{\bar{u}} \int_0^{p} \mathbf{1}_{(U^I - p + u > U^U)} \, du \quad , \end{aligned} \tag{2}$$

where $\mathbf{1}_{(.)}$ is the *indicator function* which is one when the statement is true and 0 otherwise; U^I denotes the expected utility of a consumer when watching the media outlet's report:

$$U^I = \max \left\{ \arg\max_l \quad E_{\mathcal{Q}}[u(s_l)|\mathbf{m}];\ v_0 \right\} \quad , \tag{3}$$

where $E_{\mathcal{Q}}$ denotes expectations with respect to quality; and finally,

$$U^U = \max \{ \nu \cdot v_g;\ v_0 \} \tag{4}$$

denotes the expected utility of remaining uninformed. In the rest of the analysis we focus, without loss of generality, on the case where $\nu \cdot v_g \geq v_0$, wherein consumers will end

[14] Furthermore, viewers typically discount the bias of their news sources (e.g., Chiang and Knight, 2011). Hence, a firm would find it hard to deliver credible negative news regarding the product of its competitors. In addition, a firm may find far more effective to let the media outlet deliver the bad news on its rival product while placing its own advertisement next to such news.

[15] This price may simply represent the sum of the opportunity cost of watching/reading the media outlet's contents, plus the monetary price charged by the media outlet to its users.

[16] Since the focus of the analysis is on the media incentives to reveal or not information on a specific category of products, $\bar{u}$ and p are considered as exogenous. The implicit assumption is that they pertain to a more general maximization problem already solved by the media. More generally, the assumption of a fixed price well captures the structure of media markets where media outlets fix their (possibly null) price over a long period rather than modifying it on a daily basis depending on the news contents.

[17] This assumption is without loss of generality. Indeed, even if $p > \bar{u}$ and thus $r = 0$, the main intuition and results of the paper would still apply.

up purchasing a randomly chosen product whenever they had no access to any additional information about its quality.

Considering that we always have $U^I \geq U^U$, expression (2) can be simplified to obtain:

$$\alpha = r + \frac{U^I - U^U}{\bar{u}} \quad . \tag{5}$$

Note that, because consumers form correct expectations in equilibrium, if the media outlet were always to conceal all signals so that $U^I = U^U$, then the endogenous equilibrium viewership would simply be $\alpha = r$ (i.e., individuals watch the media outlet only for its non-informative value).

The media outlet's decision about what information to report to viewers will depend, among other things, on the existing commercial relationships between the media outlet and the producers. Abstracting from standard rationales for advertising (i.e., persuasive or informative advertising) we explicitly focus on an environment where firms' marginal benefit from additional advertising coverage is zero - e.g., any additional expenses would not raise awareness or persuade more consumers *per se* - and so, the only reason for acquiring ads slots is to induce the media outlet to hide/reveal bad news about products. In other words, we study how much ads-fees advertisers would be willing to pay in addition to their current ads expenditures in order to gain the control over the news content displayed to media viewers.

Since advertisers might want to persuade the media outlet to keep something out of consumers' sight, we assume that the media outlet incurs in a positive reputation cost $\eta > 0$ (sufficiently small: $\eta \to 0$) whenever it conceals some information, i.e., whenever $\mathbf{m} \neq \mathbf{z}$.[18] Hence, the media outlet will face a trade-off between reducing accuracy and increasing ads revenues (as in Ellman and Germano, 2009). In particular, in this environment we assume that the media outlet privately tells producers the set of currently available reports $\mathcal{M}_{\mathbf{z}}$, and then sell them a bundle of ads and the right to affect the report. To focus on the case of efficient bargaining among agents, we consider a simple selling mechanism implemented via a *first price auction*, where we call b_1 and b_2 the bids of the producers. Therefore, when bids are different the producer submitting the highest bid chooses $\mathbf{m}$ (consistent with $\mathbf{z}$) and pays her bid. When instead the two producers make the same bid the media outlet chooses one of the two producers (who pays $b_1 = b_2$) and let her choose $\mathbf{m}$. That is, simply, the highest-bidder advertiser may decide upon which signal(s) the media outlet has to disclose and, at the same time, which signal(s) it has to conceal. We call t_1 and t_2 the transfers paid by the producers in equilibrium, as they result from b_1, from b_2, and from the choice of the media if $b_1 = b_2$.[19]

[18] This cost η can be interpreted as the risk that in the long–run horizon the media is found to have misreported its available information. It can be seen as a reputation loss $\bar{\eta}$ multiplied by an exogenous (long-run) probability of being found misreporting.

[19] As typical in static models, we implicitly assume the existence of a reputation mechanism between the media outlet and the advertisers to rule-out trivial equilibria where the media outlet could never offer a

Hence the media outlet's profits are given by the sum of the revenues from selling copies at price $p > 0$ to α viewers, the advertising fees eventually collected from producers and the cost of reputation:

$$\Gamma = \alpha \cdot p + \sum_{l=1,2} t_l - \mathbf{1}_{(\mathbf{m} \neq \mathbf{z})} \cdot \eta \ . \tag{6}$$

Furthermore, the producer's net revenues from media outlet's report is:

$$V_l = R(\alpha_l(\mathbf{m})) - t_l$$

That is, V_l represents the revenues that producer l obtains from the media outlet's viewers minus the ads fees $t_l \geq 0$ eventually paid to the media outlet. Without loss of generality, we assume $R(\alpha_l(\mathbf{m})) = \alpha_l(\mathbf{m})$. Indeed, considering any other continuous function $R(\cdot)$ which is strictly increasing in the fraction of viewers α_l ending up purchasing product l after viewing the report, would not affect the results.[20]

Timing of the game. The timing of the above described game is as follows:

1. Nature determines which products experience a negative shock (i.e., *ex-post* quality $q_l, \forall l$).
2. The media outlet observes $\mathbf{z}$.
3. The media outlet reports $\mathcal{M}_{\mathbf{z}}$ to producers, and both firms independently decide upon their bids, i.e., $b_l \geq 0$.
4. If $b_1 \neq b_2$, the producer who submitted the highest bid selects the media outlet's news report $\mathbf{m}$ (consistent with $\mathbf{z}$) and pays her bid to the media outlet.
5. If instead $b_1 = b_2$ the media outlet chooses one of the two producers and let her select the news report.

credible contract to firms (i.e., where the media outlet may cash-in the winning bid and then it does not let the winning bidder chose its preferred $\mathbf{m}$). Indeed, firms typically terminate advertising contracts in the (rare) case they see the media outlet publishing something not in line with the (implicitly or explicitly) negotiated contents (Ellman and Germano, 2009; Petrova, 2011; Blasco and Sobbrio, 2012). The contract specified in our model where the payment is contingent on the actual news reported by the media outlet is *as if* firms were allowed to withdraw their ads (and payments) when the message that the media outlet reports to viewers is different from the one present in the contract.

[20] Notice that the model easily generalizes to advertisers belonging to different industries. As the intuition behind the initial quote by Posner (1969) suggests, a firm would be willing to pay a media outlet to disclose bad information on another firm's product only if this would result in an increase of its market sales. Hence, the model directly applies to advertisers selling substitutes products even if they do not belong to the same industry (e.g., automobiles and motorbikes producers). Instead, the case where two advertisers sell non-substitutable products (e.g., automobiles and dish washing detergents) is not relevant in this context. A firm in the car industry would not have any incentive to pay the media outlet to publish information regarding the presence of a defect in a dish-washing product. Indeed, a car manufacturer would not experience any increase in its market shares if this bad news is revealed by the media outlet.

6. Every consumer i decides whether to watch the media outlet's report (considering the non-informational benefit u^i she gets from doing so and the eventual benefit she would obtain knowing about the quality of the good) and if so she updates her beliefs on products' qualities.

7. Consumers choose the product(s) with the highest expected quality.

As discussed in the Appendix, this is a *dynamic game of incomplete information* that we solve with the concept of *Perfect Bayesian Nash Equilibrium*. The bargaining game in points 3 to 5 is a simple auction mechanism that has already been applied to lobbying and rent seeking settings (e.g., with a slightly more complicated structure, by Hillman and Samet, 1987). Any other bargaining mechanism that maximizes the aggregate profits of the media outlet and the producers (so that it is independent on transfers between these economic agents) would serve the same purpose.

4 Advertisers' competition and media outlet's reports

4.1 Uncorrelated products

Our analysis starts with the case where the negative shocks in products' qualities are uncorrelated, i.e., $\rho = 0$. When products' qualities are uncorrelated, competing producers always have conflicting preferences over news reports. Moreover, since ρ is common knowledge, both consumers and the media outlet anticipate the presence of these conflicting preferences.

The following result characterizes the equilibrium news reports of the media outlet (the formal proofs of this and of following results are in the Appendix).

Proposition 1 *Let B be the number of bad signals observed by the media outlet, given its signal $\mathbf{z}$, and let $D^* \leq B$ be the number of bad signals disclosed by the media outlet in equilibrium given its news report $\mathbf{m}^*$. Let firms face uncorrelated shock in the quality of their products.*
Then, there is a unique perfect equilibrium *of the game, with reputation concerns for the media outlet η, where $D^* = \min\{B, 1\}$. Moreover,*

$$\alpha^* = r + \frac{v_g}{\bar{u}}\theta \cdot \nu(1-\nu).$$

Hence, the equilibrium reporting strategy of the media outlet is very simple, as viewers might observe only two types of news reports. In the first scenario, $D^* = 0$ and so the media outlet would not show any negative information because it simply did not find any evidence against either firm. In this case, viewers know that the media outlet's report is truthful and there are no reputation losses for the media. Alternatively, $D^* = 1$. In this case, viewers observe a negative report on one of the two firms' products. In this second scenario,

informed consumers purchase the product not exposed to such bad news even though they are not able to tell whether the media outlet observed negative information about only one or both products. Indeed, when $B = 1$ the media outlet is paid by the "good" firm to disclose the signal on the rival's product. This is because the "good" and "bad" firms have the same willingness to pay to gain the control over the news content of the media outlet, but conflicting views on what this content should be. Hence, since equilibrium bids even up, the media outlet can count on advertisers competition to maximize ads revenues while selecting the report most informative to consumers. By contrast, when $B = 2$ there are no firms advocating a fully truthful report and this generates, for sufficiently small reputation concerns, a non-truthful report by the media outlet, i.e., $D^* < B$.

Of course, informed consumers will anticipate this barging process and update their beliefs accordingly.[21]

Therefore the equilibrium fraction of informed consumers α^* is consistent with the equilibrium strategy of the media outlet.

4.2 Correlated products

When firms face correlated shocks in the quality of their products, bad news about one product might not just harm the sales of its producer but may extend to the whole market. Indeed, also the other producer may be hurt by the publication of negative reports on the competing product. Under these circumstances, when shocks are sufficiently correlated, both producers share the same preferences over news reports (i.e., both want the media outlet to hide any negative information) regardless of which specific product the media outlet has found negative information about.

Then, the following proposition applies:

Proposition 2 *Let B be the number of bad signals observed by the media outlet, given its signal $\mathbf{z}$, and let $D^* \leq B$ be the number of bad signals disclosed by the media outlet in equilibrium given its news report $\mathbf{m}^*$. Then, there is a unique* perfect equilibrium *of the game, with reputation concerns for the media outlet η, that depends on the value of ρ. Specifically, there exists a threshold in the correlation between the negative shocks in products qualities:*

$$\bar{\rho} = 1 - \frac{\hat{v}_0(2-\theta)}{2-\hat{v}_0\theta} \cdot \nu^{-1} \tag{7}$$

where $\hat{v}_0 = v_0/v_g$ and such that:

1. *if $\rho \leq \bar{\rho}$, then $D^* = \min\{B, 1\}$, and $\alpha^* = r + \frac{v_g}{\bar{u}}\nu(1-\nu)(1-\rho)$;*
2. *if instead $\rho > \bar{\rho}$, then $D^* = 0$, and $\alpha^* = r$.*

[21] See Milgrom (1981) for an analysis of Bayesian updating upon observing "no-news".

For any given reporting strategy, the viewers' optimal consumption choice can be expressed as a cut-off rule, whereby any viewer will not purchase a new product if correlation is sufficiently high and at least one product has been revealed to be of a bad quality. For this reason, "good" and "bad" quality producers might end up sharing the same preferences over news reports. That is, when correlation is high, both advertisers would like to exert pressure on the media outlet to conceal any negative information to consumers but they also face a problem of free riding, as each of them would rather let the other pay the excess in ads fees needed to sway the media outlet.[22] This generates a multiplicity of equilibria in our setting. Nevertheless we show that, as long as the sum of benefits in terms of sales for producers is above the reputation costs incurred by the media outlet when misreporting information, any Nash equilibrium in the bidding sub-game involves the media outlet hiding any negative information to consumers.[23]

At the same time, since consumers rationally anticipate that the media outlet is influenced by the advertisers, the equilibrium cut-off expressed by equation (7) is lower than the one that would have arisen if the media outlet were always to disclose any available signal (i.e., commit to truthful news reports)[24]

$$\rho^{truth} = 1 - \frac{\hat{v}_0(1-\theta)}{1-\hat{v}_0\theta} \cdot \nu^{-1}.$$

Moreover the equilibrium fraction of viewers discontinuously drops to $\alpha^* = r$ when the correlation is above $\bar{\rho}$. Interestingly, this implies the existence of an interval of values $\rho \in [\bar{\rho}, \rho^{truth}]$ where the media outlet might increase its viewership (from $\alpha^* = r$ to $\alpha > r$) by committing to report any available signal at the expenses of lower ads revenues. While such commitment strategy is not profitable in this setting, since the media outlet's profits from advertising are higher than the costs of misreporting information to the viewers, in Section 5.1.2 we explicitly discuss the case where an ads-free media outlet competes with an ads-sponsored one.

Notice also that $\bar{\rho}$ is non-monotone in θ, because bad news about correlated products qualities are worse when reported by either a media outlet whose investigative skills are above average (high θ) or by one with very low skills (low θ), with respect to the same news reported by a media outlet with average values of θ. Furthermore, $\bar{\rho}$ is strictly decreasing in ν, as viewers' prospects of purchasing a good quality product are lower, and it is decreasing in $\hat{v}_0$, as the higher the ratio of the status-quo value over that of a good quality product, the more difficult is to convince viewers to purchase new products.

Overall, the degree of correlation in products' qualities has a key influence on the accuracy

[22] Of course, when correlation is sufficiently low all the results from the uncorrelated case of the previous section apply also here.

[23] This result is standard in the literature on public-good contribution games (e.g., Hirshleifer, 1983; Bramoullé and Kranton, 2007).

[24] The expression of ρ^{truth} comes from (9) in the proof of Propositions 1 and 2 in the Appendix by replacing $\sigma_{1,2} = 0$ and $\sigma_{1,1} = 1$.

of the media outlet's reports. For $\rho = \bar{\rho}$, a marginal increase in ρ leads to a (sharp) decrease in the accuracy of news reports since it changes the media outlet's optimal reporting strategy. On the other hand, while the optimal reporting strategy stays unchanged for $\rho < \bar{\rho}$, a marginal increase in ρ also leads to lower informativeness of news reports since it increases the probability of the media outlet's hiding a bad signal on one of the firms' products.

The following graph illustrates how these incentives will have repercussions on the equilibrium fraction of viewers as a function of ν in presence of different degrees of correlation in products' qualities.

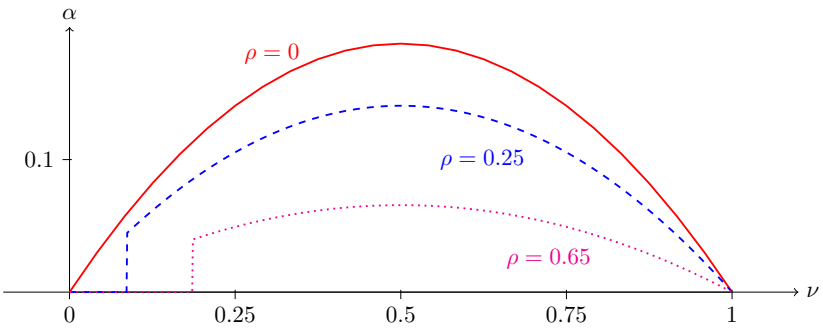

Figure 1. *Equilibrium Fraction of Informed Consumers for* $r = 0$, $v_g = 1.1$ *and* $\theta = 1/2$

Finally, our results provide a microfoundation and an economic rationale behind the assumption of Ellman and Germano (2009) and Germano and Meier (2013) that advertisers share the same preferences for low accuracy of news reports. The tobacco industry, which the two papers use as an archetypal example of negative advertisers' influence on news accuracy, is clearly a case in point. Arguably, the correlation among products' qualities in the tobacco industry (i.e., the negative effects on consumers' health of different tobacco products) is very high. Thus, our model predicts that tobacco companies would collude to pay the media outlet to hide any possible negative information.

It is also important to point out that our model predicts that, even within an industry, media should be more likely to report negative news on issues upon which firms have conflicting preferences, rather than on issues where all firms share the same preferences over news reports. For example, in the car industry a firm is likely to benefit from bad news on the quality of its competitor's product. However, the same firm may instead be hurt from news regarding the effects of car pollution on global warming. Indeed, while everyday we observe negative reports released by media on defects or problems of products of specific car manufacturers, there seems to be much less disclosure regarding the effects of pollution on global warming (Oreskes, 2004; Boykoff and Boykoff, 2004; Boykoff, 2007; Germano and Meier, 2013). Thus, even within an industry, there may be some issues where producers have conflicting preferences over media reports and others where they share the same preferences.[25] Hence, empirical studies aiming at testing the influence of advertisers of media

[25]For example, a similar logic may apply to the mobile phone industry. That is, while each firm is likely

contents should take into account that media are more likely to accurately report news on issues where competing producers have conflicting preferences.

5 Discussion and extensions

5.1 Multiple Media Outlets

This section discusses the robustness of our results in the presence of two media outlets (i.e., $N = 2$). In particular, we investigate whether increasing competition in the market for news might improve news accuracy. We consider two different cases to capture different frameworks. First, we discuss what happens when there are two perfectly symmetric media outlet in the market. Then, we analyze the asymmetric case where one of the two media outlets is "ads-free".

5.1.1 Symmetric media outlets

In this setting we assume, as in Besley and Prat (2006), that both media outlets have the same information (i.e., they both observe $\mathbf{z}$). Notice that, as pointed out by Besley and Prat (2006), if different media outlets were to receive heterogeneous information, increasing the number of media outlets would be beneficial *per se*. Hence, by assuming that both media outlets have the same information, it is possible to study whether media pluralism by itself changes the informativeness of news reports.

At the same time, we introduce an additional, but quite realistic, assumption: if the two media outlets report different news, then the one (if not both) misreporting faces a reputation cost $\bar{\eta} > \eta$ [26] Finally, we consider a situation in which media outlet 1 covers a fraction α_1 of the consumers, while media outlet 2 covers a fraction α_2, and their intersection $\alpha_{1\cap 2}$ is non–empty intersection. Contrarily to the case of a single media outlet and for the sake of brevity, we take those fraction as exogenous, but it is clear that they could be generally endogenized assuming that every consumer is heterogeneous in the utilities u_1^i and u_2^i that she gets from each media independently, and that this two parameters u_1 and u_2 are not distributed with perfect correlation in the population of consumers: in this way α_1 and α_2 would follow endogenously, and also the size of $\alpha_{1\cap 2}$ would depend positively on the degree of correlation between u_1 and u_2.

The following proposition provides a generalization of the results obtained in Proposition 2 to the case of multiple media outlets.

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to benefit from bad news on the defects in its rivals' products, every mobile producer would be negative affected by news on the (eventual) health risks of mobile phone usage.

[26] This assumption is implicitly capturing the fact that if the two media outlets report conflicting news, viewers are able to infer which one(s) has misreported its available information. Hence, the long-run probability of being found misreporting information becomes one. See footnote 18 for an interpretation of $\bar{\eta}$ and η as long–run losses for misreporting information. Finally, as η, $\bar{\eta}$ is also assumed to be small.

Proposition 3 *Consider the case with 2 media outlets and 2 producers. Let $D_1 \leq B$ and $D_2 \leq B$ be the number of bad signals disclosed by media outlets in equilibrium given their common information B and their news report $\mathbf{m}_1$ and $\mathbf{m}_2$. Then, there exists a threshold $\bar{\rho}$, where $\bar{\rho}$ is given by (7), such that:*

- *if $\rho < \bar{\rho}$, then $D_1 = D_2 = \min\{B, 1\}$;*
- *if $\rho > \bar{\rho}$, then $D_1 = D_2 = 0$.*

From the consumers' perspective, the value of information remains the same as that characterized in the single media outlet case. Hence, competition in the market for news does not increase the informativeness of news reports in the case of symmetric media outlets.[27]

5.1.2 Asymmetric media outlets: Ads-free and Ads-sponsored Media Outlets

In this section we consider the case of asymmetric media outlets. In particular, we assume that one of the two media outlet makes a commitment to not be financed by advertising fees (e.g., as in the case of *Consumer Report, Zagat* or a public news media entirely financed trough subscription fees/general taxation).

Suppose that the ads-free media outlet sells its report to viewers at a price $p_{na} \geq 0$, which is generally different from the ads-sponsored media outlet price $p_{na} \neq p_a$, and without extra news content $u^i_{na} = 0 \ \forall i$ (where the subscript "*na*" stands for "*no ads media outlet*" while the subscript "*a*" stands for "*ads-sponsored media outlet*"). Consumers have no limits in the number of reports to purchase, they can choose either none, or one, or two reports.

Consider, the most difficult case for the ads-sponsored media, as when the two outlets observe exactly the same signal $\mathbf{z}$ and independently decide what to report to consumers.[28]

Here, consumers are facing a simple trade-off between buying more accurate information about products from an entertaining ads-free media outlet or base their consumption choices only on the (possibly biased) news report from an ads-sponsored (but richer in terms of non-informative contents) media outlet.

As the following Proposition illustrates, even under these circumstances, competition among media outlets do not fully resolve the problem of commercial media bias.

Proposition 4 *In a market with ads-sponsored and ads-free media outlets, let denote by $\Delta = U^I_{na} - p_{na} > 0$ the value added to the viewers of the ads-free media outlet. Then, if*

[27] Clearly, as shown by Germano and Meier (2013), if media outlets could, instead, increase their audience share by increasing the accuracy of their news reports (i.e., media outlets committing to a given accuracy level), then competition in the market for news may also increase the expected accuracy of news reports. Moreover, if there were a transaction cost between advertisers and media outlets (as in Besley and Prat, 2006), there may be a threshold in the number of media outlets above which firms with a bad quality product would not have enough resources to "silence" all media outlets.

[28] If they observed different signals the ads-sponsored would be still be informative even conditional on observing the unbiased report. In that case, we could simply restate our initial problem in terms of a different initial pair (ρ, ν) so as to include the additional information contained in the unbiased report but results would not change much.

$U_a^I > \Delta$ there exists a positive fraction of viewers $\hat{\alpha}$ that is influenced in their consumption choices by the ads-sponsored media outlet (i.e., viewing only the ads-sponsored media outlet).

Therefore, as long a subset of consumers $\hat{\alpha} > 0$ find more valuable the bundle of news contents and entertainment provided by the ads-sponsored media outlet with respect to the one provided by the ads-free media outlet, the intuition and results of the model would still apply to the competition of advertisers over the ads-sponsored media outlet's contents relative to this fraction of consumers.

5.2 Asymmetric producers

In this section we consider how the reporting strategy might change when facing asymmetric producers, as for instance when there is an incumbent producer with an already existing group of loyal customers competing with an entrant.

Imagine that an incumbent can use its customers' loyalty to offer good quality products of higher utility. In our environment we can consider this feature by assuming that producer 1 is an incumbent and its product, when of good quality, leads to $v_g^1 = v_g + \gamma$ (with $\gamma > 0$), while the value of a bad product is the same across producers. Then, it turns out that the reporting strategy of the media outlet does not change when the correlation between the shocks in products' qualities is sufficiently small. Indeed, in this case, any emerging negative information about the incumbent product, will induce producer 2 to bid high in order to win the auction and steal the market of the incumbent. Then, if the media outlet has to choose between the same bids, it will certainly prefer to save on reputation costs and thus it will accept the bid from the "good quality" producer.

A different scenario emerges when instead there is high correlation between products' qualities. In this case, while consumers will be more willing to purchase the incumbent product as soon as there is some positive probability that the quality is good, they will not purchase the product of the entrant conditional on observing negative news about any product. Therefore, if the media outlet were to reveal bad news (only) on the incumbent's product, consumers would not buy the entrant's product as well. Hence, in this case, the incumbent is the only firm that can succeed in hiding negative information about its products.

Proposition 5 *Let $v_g^1 = v_g + \gamma$ with $\gamma > 0$, and $v_g^2 = v_g$. Let B be the number of bad signals observed by the media outlet, given its signal $\mathbf{z}$, and let $D^* \leq B$ be the number of bad signals disclosed by the media outlet in equilibrium given its news report $\mathbf{m}^*$. Then, there is a unique* perfect equilibrium *of the game, with reputation concerns for the media outlet η, that depends on the value of ρ. Specifically there are two thresholds $\underline{\rho}$ and $\hat{\rho}$, with $\underline{\rho} < \hat{\rho}$, such that:*

- *If $\rho \leq \underline{\rho}$, then the strategy for the media outlet is $D^* = \min\{B, 1\}$ (as in Proposition 2);*

- *If $\underline{\rho} < \rho \leq \hat{\rho}$, then the media always conceals any negative news about the incumbent's product and it always reports any negative news about the entrant's product;*

- *If $\rho > \hat{\rho}$, then the media always report $D = 0$ (as in Proposition 2).*

5.3 Multiple producers and free-riding

The analysis presented in the previous sections has focused on the case of two firms competing in the market for products. In presence of more than two competing advertisers, the implications on news accuracy may be more subtle to analyze. In particular, producers sharing the same preferences over news reports have a natural incentive to free-ride on each other upon whom is going to be the one paying the media outlet in exchange for a favorable news report. In this context, groups of smaller size might be more effective in achieving their preferred outcome via the first price auction over news contents.

To exemplify this point we may look at the case where $L = 3$. Let $\bar{D}$ represent the maximum number of bad signal that the media outlet may disclose to its viewers without them deciding not to buy any of the firms' products, and let D^* be the number of bad signal disclosed by the media outlet in equilibrium. $\bar{D}$ crucially depends on the level of correlation among the qualities of the advertisers' products (Blasco, Pin and Sobbrio, 2012).

Suppose that the correlation in products' qualities is sufficiently high such that $\bar{D} = 0$. Then, this case is essentially analogous to the case where $L = 2$ and $\rho > \bar{\rho}$. That is, advertisers face a public good contribution situation where each firm has an incentive to free-ride on the other upon whom has to bid η to induce the media outlet to not disclose any negative information about any product. Hence, when $\bar{D} = 0$, any equilibrium of the game will be such that one of the three firms bids η, the others submit a null bid and $D^* = 0$. Now suppose that $\bar{D} = 1$. Then, if $B = 1$ the "bad" quality firm is willing to bid up to $\alpha^*/3$ to have his bad signal not disclosed to the media outlet's viewers. Instead, each of the two "good" firms will be willing to bid only up $\alpha^*/6$ to have the media outlet disclosing such signal. Hence, regardless of the free-riding issue arising between the two "good" firms upon whom will bid $\alpha^*/6$, the first-price auction provides an advantage to the bad quality firm who may easily overbid each of the "good" quality firms. Hence, in this case $D^* = 0$. Instead, if $B = 2$ the two bad quality firms compete to win the auction, to hide their own negative signal while revealing that of the rival. The "good" quality firm cannot do better than disclosing at most one signal, and thus it will submit a null bid. Hence, one of the two bad quality firms will win the auction and then $D^* = 1$. Now, suppose that $\bar{D} = 2$. If $B = 1$, the situation is exactly the same as when $\bar{D} = 1$ and $B = 1$. Instead, for $B = 2$ the "good" quality producer will be willing to bid up to $\alpha^*/2$ to have the media outlet disclose all the bad signals on its rivals. Hence, $D^* = 2$. Finally, for any $\bar{D} > 0$ when $B = 3$ each firm will compete over the others upon whom will be the one whose signal will not be disclosed by the media outlet and so, $D^* = \bar{D}$.

Overall, the above example shows that for $L \geq 3$ correlation remains a crucial determinant of news accuracy. That is, a higher degree of correlation in products quality translates into a (weakly) number of signals disclosed by the media outlet in equilibrium. More generally, while in the presence of $L \geq 3$ competing producers, free-riding becomes a more relevant issue and might affect the equilibrium media outlet's news reports, it is neither necessarily enhancing nor reducing commercial media bias. The presence of multiple producers may or may not favor the disclosure of truthful information by the media outlet depending on *i*) the relative size of the groups of producers with "bad" and "good" quality products, respectively; *ii*) the degree of correlation among products' qualities; *iii*) the ability of different groups (or of the media outlet) to overcome public-good contribution issues by designing mechanisms that might eliminate the incentives to free-ride. For example, Blasco et al. (2012) show that when the media outlet could make offers to the advertisers by acting as a coordination device, e.g., making take-or-leave-it offers to advertisers, then all our previous results hold more generally for $L \geq 3$.

Finally, note that free-riding may play a less relevant role in a more general advertising framework. In particular, if producers were to care both about media contents and about the exposure of media viewers to their own advertisement, they may have an interest to show their ads along with the bad news on the rival products. Hence, even if a subset of firms were to share the same preference over news reports, they might still have an interest to compete over the media outlet's ads slots rather than having an incentive to free-ride on each other.

5.4 Exogenous variations in α

The above described framework implies that α is completely determined by the parameters and the equilibrium strategies. Clearly, in the real world, many sources of randomness could create fluctuations in the realized value of α, e.g., a consumer may find out the true quality of a product independently from watching the media outlet's report. Nevertheless, our analysis is without loss of generality in this respect. Indeed, since all the payoffs are linear in α and all players are risk neutral, adding any source of noise with zero mean to equation (5) would not modify any of our results.

5.5 Role of advertising

Differently from the literature on informative advertising (e.g., Nelson, 1974; Butters, 1977; Grossman and Shapiro, 1984; Milgrom and Roberts, 1986; Dukes, 2004), advertising in our model does not convey or signal any information to viewers *per se*. Indeed, advertising does not have any signaling value since viewers do not observe the advertising fees paid by firms.[29]

[29]Indeed, the secrecy practices in the advertising industries are such that even competitors are unable to observe advertising agreements (see Dukes and Gal-Or, 2003).

In our framework, advertising *indirectly* influences viewers' information by shaping the media outlet's incentives to disclose its information. Indeed, a higher level of advertising may be associated with a higher or lower level of information of consumers on the firms' products depending on whether ads are paid to reveal or to hide information. The advertisers' willingness to pay depends both on how many consumers they may reach trough the media outlet and on what kind of information the media outlet is reporting. As a consequence, the ads fee that advertisers are willing to pay upon not obtaining a favorable news report by the media outlet is normalized to zero. This normalization is without loss of generality since the contract between advertisers and the media outlet does not involve the level of ads but only the *price* of ads. For the same reason, introducing in the model a nuisance parameter γ to capture the consumers' disutility from ads would not affect the results. Indeed, a higher ads fee paid by the advertisers does not correspond to a higher level of ads and, thus, it does not affect negatively the media outlet's viewership.[30]

Since the focus of our analysis is on the relationship between advertising expenditures and non-advertising contents, the rationale of the model also differs from the one of comparative advertising (e.g., Anderson and Renault, 2009; Barigozzi, Garella, Peitz, 2009). More generally, while a firm may use comparative advertising to "go negative" it cannot use this instrument to "avoid negative".[31] Therefore, our theoretical model captures a wider framework with respect to comparative advertising. Indeed, the model naturally extends to a scenario where any negative message is provided in the advertising message itself (as in the case of comparative advertising), rather than by the media outlet's reports. That is, a firm with a good quality product may pay a media outlet to broadcast (comparative) negative ads (*paying positive to go negative*) while a firm with a bad quality product may pay a media outlet to broadcasts its own "neutral" ads and not to broadcast the (comparative) negative ads of the good quality firm (*paying positive to avoid negative*). Finally, while the literature on comparative advertising shows that "a quality disadvantage is necessary for comparative advertising" (Anderson and Renault 2009, page 560), our analysis shows that different editorial contents may arise even in the presence of the same quality among firms. Indeed, a media outlet may choose to disclose only a subset of the negative information available to it.

[30]Notice also that our model would be exactly equivalent to one where producers could make side payments to the media outlet. Nevertheless, there may be several reasons why advertising is likely to represent a more effective way of carrying out this type of transactions rather than side payments. First, side payments to the media outlet's employees may be subject to monitoring issues. Second, side-payments may not be strictly legal. Finally, in a more general advertising framework where ads have also a direct effect on consumers' behavior, a firm is likely to benefit from displaying its ads along the bad news on its rival product. In sum, advertising fees might represent a subtle yet effective way to pay a media outlet to deliver the news contents preferred to the producer/advertiser.

[31]Moreover, as observed by Gambaro and Puglisi (2010) "pieces of news that appear to be "objective" are likely to have a stronger persuasive effect on consumers than proper ads, so that there is a clear incentive to disguise ads as news stories." (Gambaro and Puglisi, 2010, page 9)

6 Conclusions

Consumers typically watch media for their entertainment and informational value. Such an informational value also involves news on consumer products. Hence, the information supplied by media ultimately affect the purchasing decisions of consumers. Since producers are also potential advertisers, there may be a subtle relationship between the media editorial contents (i.e., news) and advertising. Specifically, adverting fees may represent a form of hidden transfer to induce media to hide negative information about the advertiser's own product (*paying positive to avoid negative*) or to disclose negative information about the competitors' products (*paying positive to go negative*).

The results of the analysis show that whether or not advertisers' pressure on media has negative consequences on the accuracy of media reports ultimately depends on whether the competition in the products' market also translates into competition over media contents. In turn, the extent of competition over media contents depends on the degree of correlation among the firms' products. When the correlation in products' qualities is high, all the firms share the same preferences over media reports (i.e., every firm wants media to refrain from disclosing any negative information about any product since such news would hurt the sales of its own product). Hence, in this case, advertisers compete in the market for products but they do not compete over media reports. Instead, when the correlation is low, firms have conflicting preferences over media contents (i.e., "bad" firms want to *pay positive to avoid negative* and "good" firms want to *pay positive to go negative*). Hence, advertisers compete both in the products market and over media contents. Therefore, our results suggests that the media are likely to report more accurate information (i.e., disclose relatively more "bad news") on products belonging to industries where the correlation among firms' products is lower.

The results also suggest that empirical studies investigating the link between advertising and news contents should take into account the differences in the degree of correlation in products' qualities and in the extent of competition among producers across advertisers' industries.

More generally, the analysis suggests that "commercial media bias" represents a serious concern in the presence of a high degree of correlation among advertisers' products. On the other hand, when advertisers' products are weakly correlated, "commercial media bias" is endogenously swept away by the advertisers' competition over news contents. Therefore, media regulators should target their monitoring efforts towards news contents/issues upon which advertisers are likely to share similar preferences.

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Appendix

In this Appendix we include the definition of the concept of equilibrium of the game presented in Section 3. Then, we propose the formal proofs to all the statements in the main paper
Our setting is a *dynamic game of incomplete information*, as actions are taken sequentially and there is asymmetric information between producers and consumers. For this reason the notion of equilibrium used in this paper is *Perfect Bayesian Nash Equilibrium* (e.g., Selten 1975):

Definition 1 *(Equilibrium) Let $D : \mathcal{M} \to \mathcal{M}$ denote a reporting strategy from the signals observed by the media into news content reported to consumers. Let $\Sigma : \mathcal{M} \to [0,1]^2$ denote viewers' beliefs on the true quality of products. We say that "a strategy w is sequentially rational given σ" if no agent can take actions to improve his utility given the system of beliefs, and we say that "a system of beliefs σ is consistent given the strategy w" if it can be derived by Bayesian rule. Then the pair (w^*, σ^*) is a PBE if w^* is sequentially rational given σ^*, and σ^* is consistent given w^*.*

Note that consumers play their actions (i.e. to watch or to do not watch the media outlet's reports) as in a simultaneous game against the expected outcome of the extended game between the media outlet and the producers. This leads to the following remark.

Remark 1 *The equilibrium fraction of informed consumers α^* is endogenous, but the media outlet and the producers will consider it as given when they choose their actions, as expectations are formed by consumers before observing the equilibrium report $\mathbf{m}^*$.*

Note further that we need to make a technical assumptions on how viewers would react if they observe something that is not consistent with the equilibrium strategy, e.g., *off the equilibrium path.*

Assumption 1 *Conditional on viewing a report $\mathbf{m}'$ which is not consistent with consumer's beliefs as determined by Bayesian rule, consumers update their beliefs by assigning an equal probability to every state which is still feasible, as not ruled out by $\mathbf{m}'$.*

Now we prove Propositions 1 and 2 from the main text. It is clear that, even if they are presented separately for the sake of clarity, Propositions 1 is a special case of Proposition 2, where $\rho = 0$. For this reason we provide a single proof.

Proof of Propositions 1 and 2. Nature can choose one of four possible states: $\{s_0 = (\varnothing, \varnothing), s_1 = (b, \varnothing), s_2 = (\varnothing, b), s_3 = (b, b)\}$ such that:
$\Pr\{s = s3\} = [1 - \nu(1-\rho)](1-\nu)$;
$\Pr\{s = s0\} = [\nu + (1-\nu)\rho)]\nu$;
$\Pr\{s = s1\} = \Pr\{s = s2\} = (1-\nu)\nu(1-\rho)$.
This defines uniquely the probability vector for all the possible states of the world.
We proceed in two steps. First we characterize the equilibrium reporting strategy and then we characterize the equilibrium fraction of viewers.
Step 1. Let first consider α^* as given. We call α_1 and α_2 the shares of informed consumers that each producer gets (on top of $(1-\alpha^*)/2$) and consider them as the payoffs of the game. In this *unit* we *measure* also the transfers between producers and the media outlet.
In equilibrium, whenever $\mathbf{m}$ has no negative signals, e.g., $D = 0$, viewers will purchase a random product for every possible reporting strategy and so, symmetric producers will equally split $\alpha_1(\varnothing, \varnothing) = \alpha_2(\varnothing, \varnothing) = \alpha^*/2 > 0$.

Suppose that $\mathbf{m}$ contains one negative signal, e.g., $D = 1$. Without loss of generality we focus on $\mathbf{m} = (b, \varnothing)$. By the chain rule viewers will not purchase product 1 and will purchase product 2 if and only if

$$\frac{\Pr\{m = (b, \varnothing) | s = s_1\} \Pr\{s = s_1\}}{\Pr\{m = (b, \varnothing)\}} \cdot v_g \geq v_0$$

Let $\sigma_{k,j} = \Pr(D = k | B = j)$. That is σ_k, j denote the posterior beliefs that viewers assign in equilibrium to the media outlet reporting k bad signals on firms' products conditional upon having found j bad signals. Then, the above expression can be written as:

$$\frac{\sigma_{1,1}\theta \Pr\{s = s_1\}}{\sigma_{1,1}\left[\theta \Pr\{s = s_1\} + \theta(1-\theta)\Pr\{s = s_3\}\right] + \sigma_{1,2}\frac{\theta^2}{2}\Pr\{s = s_3\}} \cdot v_g \geq v_0 \quad . \tag{8}$$

This can be rearranged to obtain:

$$\rho \leq \bar{\rho} \equiv 1 - \frac{\hat{v}_0(2\sigma_{1,1}(1-\theta) + \sigma_{1,2}\theta)}{[2\sigma_{1,1} + \hat{v}_0(-2\sigma_{1,1} + \sigma_{1,2})\theta]} \cdot \nu^{-1} \tag{9}$$

where $\hat{v}_0 = v_0/v_g$.

Assume (9) is verified. If there are no bids from producers, the media outlet will report the true signals and so, $\alpha_1 = 0$, $\alpha_2 = \alpha^* > r$ if $B = 1$ and $\mathbf{m} = (b, \varnothing)$, otherwise $\alpha_1 = \alpha_2 = 0$ if $B = 2$ and $\mathbf{m} = (b, b)$. However, for sufficiently small reputation costs η, this cannot be sequentially rational. Indeed, if $B = 1$ a bad quality producer - say producer 1- submits a positive bid (i.e. $b_1 \geq \eta$) to conceal any negative info about its product. A good quality producer instead, would lose revenues from less accurate news and therefore will bid positive to reveal information about the rival. The marginal values V_1 and V_2 that each producers assign to a difference in the news are $V_1 = V_2 = \alpha^*/2 > 0$. In a perfect information first price auction, where producer 2 is preferred in case of tie (because of $\eta > 0$), both producers would bid $V_1 = V_2$ and producer 2 wins the auction (because of the media outlet's reputation concern, given by $\eta > 0$). As a result, it is the good quality producer who wins the auction and $D^* = 1$ turns out to be sequentially rational. For the same reason, if $B = 2$, producers bid to conceal their own bad signal and at the same time to reveal the negative news about the rival's product, thus $b_1 = b_2 = \alpha^* > \eta$ (for sufficiently small η) and the media outlet breaks ties at random. Also in this case, $D^* = 1$ is the only sequentially rational reporting strategy.

Assume (9) is *not* verified. In this case, any negative news about whichever product would lead to $\alpha_1 = \alpha_2 = r/2$. If so, producers face a problem of public good contribution (e.g., Hirshleifer, 1983). Hence, only two asymmetric Nash equilibria arise: provided that one producer (say 1) bids $b_1 = \eta$, and the other bids strictly less (being indifferent between any $b_2 \in [0, \eta)$).

Now, we need to check that beliefs are consistent, given the sequentially rational strategy just derived. When (9) is verified, this leads to $\sigma_{1,1} = 1$ and $\sigma_{1,2} = 1$, and therefore $\bar{\rho}$ becomes as in Proposition 2 which is of course verified when product's qualities are uncorrelated, as in Proposition 1.

Finally note that there might be only one profitable out of the equilibrium deviation and this happens when $\rho > \bar{\rho}$. In this case, the producer who wins the auction, say producer 1, could deviate and reveal (through his request to the media outlet) one negative signal about the rival. However, by Assumption 1, producer 1 would earn 0 instead of $r/2$, at the cost of a positive bid, which is is not a profitable deviation.

Step 2. Given the equilibrium reporting strategy (σ^*, D^*), let us now characterize the equilibrium fraction of informed consumers α^*.

The expected utility of the consumers from observing $D \in \{0, 1, 2\}$ bad reports are given by

$$E[U^I | D^* = 2] = v_0 \quad ,$$

which happens however with null probability;

$$E[U^I|D^*=1] = \max\left\{\frac{\sigma_{1,1}\theta\Pr\{s=s_1\}}{\Pr\{m=(b,\varnothing)\}}\cdot v_g; v_0\right\} \quad ,$$

which happens with probability $\Pr\{m=(b,\varnothing)\} = \frac{1}{2}\Pr\{D=1\}$; and finally $E[U^I|D=0]$.
We have seen that, when inequality (9) does not hold, the reporting strategy of the media is such that $\sigma_{1,1}=0$, so that $D^*=0$ and $\alpha^*=r$.
When instead inequality (9) holds, then the reporting strategy of the media is $D^*=\min\{B,1\}$. In this case both $E[U^I|D^*=1]$ and

$$E[U^I|D^*=0] = v_g\cdot\frac{\Pr\{s=s_0\}+(1-\theta)\Pr\{s=s_1\}}{\Pr\{B=0\}} \quad ,$$

which happens with probability $\Pr\{D=0\}=\Pr\{B=0\}$, are greater than v_0 (the first one becomes inequality (9), and the second one cannot be worse), $\sigma_{1,1}=1$, and we obtain

$$\begin{aligned} U^I &= E[U^I|D^*=1]\Pr\{D=1\} + E[U^I|D^*=0]\Pr\{D=0\} \\ &= v_g\left(\Pr\{s=s_0\}+(1+\theta)\Pr\{s=s_1\}\right) \\ &= \nu\Big(1+\theta(1-\nu)(1-\rho)\Big) \quad . \end{aligned}$$

So that

$$\alpha^* = r + \frac{v_g}{\bar{u}}\theta\cdot\nu(1-\nu)(1-\rho) \quad .$$

■

Proof of Proposition 3.
Most of the proof of this result follows the steps of the proof of Propositions 1 and 2, so we focus on the differences. It is also clear that if $\alpha_{1\cap2}=0$ then we are considering two separate games already analyzed in that proof, so we consider always that $\alpha_{1\cap2}>0$. Let us call $b_{i\to j}$ the bid from producer i to media outlet j.
In the case in which $\rho>\bar{\rho}$ the informed consumers in α_1 and α_2 would (respectively) not buy any product if $D_1>0$ and $D_2>0$. The two producers can silence the media outlets by paying them a cost η each: as discussed in the proof of Proposition 2 each of this payments results in a public good for the producers, so that every strategy profile in which either $b_{1\to j}$ or $b_{2\to j}$ is η (and the other is 0), for each $j\in\{1,2\}$, results in an equilibrium.
When $\rho\leq\bar{\rho}$ we distinguish two cases. First of all let us assume that $B=1$ (and that producer 1 is the bad one). In this case the bad firm would pay to hide true information, while the good one would pay to reveal it. Bids in equilibrium will be such that:

- $b_{1\to j} = b_{2\to j}$, for each $j\in\{1,2\}$, because otherwise the higher one could be profitably reduced;
- $b_{i\to1}+b_{i\to2} = (\alpha_1+\alpha_2-\alpha_{1\cap2})/2$, for each $i\in\{1,2\}$, because otherwise a producer who is loosing market shares could bid more and break the equalities of previous point;
- $b_{2\to j}\geq(\alpha_j-\alpha_{1\cap2})/2$, because otherwise the bad producer 1 could deviate by bidding less to the other media outlet (where she is loosing anyway), more to media outlet j, and get a market share of $(\alpha_j-\alpha_{1\cap2})/2$.

The system given by those equalities and inequalities fully characterizes bids in equilibrium, but is not unique when $\alpha_{1\cap2}>0$.

Finally, when $\rho \leq \bar{\rho}$ and $B = 2$, we have the same system of inequalities as in previous point, but without the factor $\frac{1}{2}$, because now the disclosure of bad news on a single bad producer by any media outlet will provide full market share to the other producer over the set of viewers of that media outlet.
In the last step of the extensive game the media outlets will play a coordination game to disclose only one bad producer. As there is a miscoordination cost of $\bar{\eta} - \eta > 0$, in equilibrium they will always provide the same news report. ■

Proof of Proposition 4. First, if $\Delta > 0$, everyone would purchase the ads-free report rather than staying uninformed, i.e., the price is below the expected gains from truthful information. However, some consumers may prefer to purchase the ads-sponsored report and base his or her decision of consumption only on that report.
All we need to show is that some viewers will purchase the ads-sponsored report alone instead of both reports. In particular, a viewer i will prefer purchasing the ads-sponsored to the ads-free only if:

$$u_a^i + U_a^I - p_a \geq \Delta > 0$$

which on the unit interval of consumers this occurs with probability one. However, the utility from reading both reports needs to be lower than the utility from the ads-sponsored report alone:

$$u_a^i + U_a^I - p_a > u_a^i + \Delta - p_a > 0 \iff \Delta < U_a^I$$

■

Proof of Proposition 5.
Consider $\bar{\rho}$ as defined in equation (9), and set $\underline{\rho} = \bar{\rho}$. If $\rho < \underline{\rho}$ then everything follows as in the proof of Proposition 2. When $B = 2$ the media conceals negative information only about one of the firms, but the bids of both firms are equal and the media outlet has no incentives to prefer the incumbent with respect to the entrant. So, we get that $\underline{\rho}$ is equal to $\bar{\rho}$ as defined in (7).
Now define $\hat{\rho}$ as what would follow from equation (9) substituting $\hat{v}_0 = v_0/v_g$ with $\frac{v_0}{v_g+\gamma}$. As $\bar{\rho}$ from (9) is decreasing in $\hat{v}_0$ for any $\sigma_{k,j}$, we have that $\underline{\rho} < \hat{\rho}$.
If $\underline{\rho} < \rho \leq \hat{\rho}$ the consumers would buy the product of the incumbent even if they know that the media outlet received bad news about the quality of the product of the entrant, but not the other way round.
So, when there are bad news about the incumbent both producers know that this will kill the market for both of them and will bid η (i.e. one of them will, as it is a public good) to hide it, while the incumbent will not wish to hide bad news about the entrant because she will get half of the market share, so the incumbent will bid half of the market share to make that piece of information public.
Moreover, in equilibrium consumers will form correct beliefs about the reporting strategy $\sigma_{k,j}$ of the media outlet. So, we get that $\hat{\rho}$ is equal to $\bar{\rho}$, as defined in (7), substituting $\hat{v}_0 = v_0/v_g$ with $\frac{v_0}{v_g+\gamma}$.
Finally, if $\rho > \hat{\rho}$ (and note that $\hat{\rho} \to 1$ as $\gamma \to \infty$), then as in the proof of Proposition 2, the media outlet will hide any bad news about any producer (and the share of informed consumers will be minimal). ■