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 two rival 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 competitor's product (paying positive to go negative). We show that competition in the product market does not necessarily prevent the emergence of commercial media bias. Whether or not competing advertisers end up having negative consequences on news accuracy ultimately depends on the extent of correlation in the quality of their products: the lower the correlation, the higher the expected accuracy of the media outlet's reports. These findings provide a rationale to explain the observed differences in the extent of commercial media bias across seemingly similar industries or products, within the same media market. The results are robust to the presence of multiple media outlets and to asymmetries between the advertisers. Overall, the paper provides theoretical insights for media regulators and for the empirical literature examining the link between advertising and news contents.

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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."(Posner 1969, page 68)

1 Introduction

The relationship between advertisers and media outlets may go well beyond the simple sales of advertising space. More than just raising awareness of or curiosity about their products, advertisers may seek to specifically control the editorial content of a media outlet to influence the consumption decisions of its viewers.[1] In some instances, this relationship has evolved to the point that many observers have accused advertisers of having induced a "commercial media bias" in news reports (Ellman and Germano, 2009; Germano and Meier, 2013). That is, of interfering with the breadth and accuracy of media content to sway the public opinion away from news that could have reduced their profits (Herman and Chomsky, 1988; Baker, 1994; Bagdikian, 2004; Hamilton, 2004).

In this paper, we investigate an issue neglected by the existing literature: the role of advertisers' competition on the emergence of commercial media bias. Our starting observation is that, as long as there is competition in the product market, firms could potentially pit themselves against each other as they seek to influence the news reports of a media outlet. Accordingly, we investigate to what extent this kind of competition serves as a force to limit the advertisers' influence on media editorial content. We analyze a theoretical setting where two rival firms may compete via advertising fees to influence the information that a media outlet discloses on the quality of their (and the rival's) product. The analysis shows that advertisers end up having a negative effect on the accuracy of news reports when the competition in the product market does not translate into competition over the media outlet's editorial content. In turn, this is ultimately determined by the extent of correlation in the qualities of the advertisers' products. These findings provide theoretical guidance for media regulators and for the empirical literature examining the link between advertising and news contents. In particular, our results explain the observed differences in the extent of commercial media bias that exist across seemingly similar industries or products within the same media market.

[1] 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.

The following example illustrates the basic intuition of our two-sided market model. Suppose there is a magazine specialized in reviewing computer products (e.g., laptops). The magazine collects evidence on the qualities of two *ex-ante* symmetric products made by two competing brands (e.g., Acer and Toshiba), and then decides what to report to its readers. In doing so, the magazine takes into account how the reported news will affect not only its reputation among readers, but also its relationship with these two producers, who are valued as potential advertisers. In particular, a firm found selling a low-quality product may attempt to suppress any negative information on its own product through advertising. Hence, assuming that the magazine faces a small expected reputation cost—relative to advertising revenues—when it hides some information, the pressure by the low-quality producer may induce the magazine to conceal information in its report. In turn, this may result in some consumers ending up buying a low-quality product even when there are better products in the market. As a consequence, a competitor with a high-quality product may lose sales, and it may then offer a higher ads fee to the media outlet to offset the rival's influence over the news reports (*paying positive to go negative*).[2] In short, producers may compete over the media outlet's editorial content through advertising.[3] Accordingly, the model shows that if the disclosure of flaws in a competitor's product grants a firm with more sales, commercial media bias is endogenously swept away by the advertisers' competition over news contents. Therefore, remarkably, this kind of competition appears capable to preserve the accuracy of news reports—and, thus, consumers' welfare—even in the absence of any concrete media pluralism.

Unfortunately, this positive result does not hold in general. The model shows that competition in the product market may not protect consumers from commercial media bias when there is a positive correlation in the qualities of the advertisers' products. When this correlation is high, and the quality of products is low, firms share the same preferences over the media outlet's news reports (i.e., every firm wants the media outlet to refrain from disclosing 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. More generally, our analysis suggests that the need to exert influence on the media outlet's news reports becomes akin to the need to provide a public good (from the point of view of advertisers aiming to conceal information to consumers). When the products are of similar qualities, firms

[2]The online appendix (http://goo.gl/NEUAuy) provides a few examples consistent with the rationale of *"paying positive to go negative"*.

[3]Even though in the model advertisements that do not provide any information *per se*, ads expenditures may, then, end up representing an implicit payment aimed at: *a*) compensating the media outlet for the expected reputation loss from misreporting information to its readers; and/or, *b*) obtaining 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). Of course, there are other ways through which a producer can exert pressure on a media outlet, for example, through ownership. However, these other forms might be less flexible or more costly than advertising. So we maintain the underlying assumption that advertising would be preferred as a relatively more efficient way to influence the media.

would rather seek to coordinate their actions in the market for editorial contents than compete over such contents. Consequently, and for small reputation costs in the media market, we show that there exists a threshold in the degree of correlation above which a strong form of commercial media bias will be present: the media outlet will not disclose any negative information on any of the advertisers' products.

The correlation between the qualities of the advertisers' products contains several possible interpretations. Within a given industry this correlation might capture the possible similarities among products' characteristics that result when different producers use common inputs in their production and thus a defect in a common input may result in all of them ending up with a low quality product.[4] 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 news on specific defects on a car manufacturer's product rather than news on the effects of automobiles' CO2 emissions on global warming).

These 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 product defects/issues due to the advertisers' pressure to censor unfavorable contents.[5] In the US, for many years, tobacco advertisers had successfully pressured the media to do 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, Alladin, and Chow, 2006).[6] 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).[7]

[4]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.

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

[6]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, Alladin, and Chow, 2006).

[7]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 may also represent one of the factors leading media to present evidence on the

On the other hand, 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's malfunctioning car accelerators, the IPhone 4's signal reception issues, and Toshiba's over-heating laptop series. These news stories are likely to negatively affect the revenues of the advertiser whose product is the subject of such news.[8]

Whereas it is somewhat puzzling to observe that the advertisers' influence on media contents has negatively affected the accuracy of news 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 or products. 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.

At this point, it is important to remark that media pluralism may make more difficult and costly the coordination among advertisers when the correlation in the qualities of their products is high. Nevertheless, as we discuss in Section 5, the presence of competing media outlets (or, even, the presence of some ads-free media outlets) may not always protect media viewers against the perils of commercial media bias.

Ultimately, the model provides testable empirical implications that could help guide the empirical literature examining the link between advertising and news contents. 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.

The paper is structured as follows. The next section briefly summarizes the existing literature related with the topics in this paper. Section 3 introduces the main elements of the model. Section 4 characterizes the media outlet's equilibrium news reports as a function of the correlation in the qualities of the advertisers' products. Section 5 discusses the robustness of the results with respect to several possible extensions of the benchmark model. Section 6 forms the conclusions.

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).

[8] 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).

2 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 (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 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 product 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; Reuter, 2009; Gambaro and Puglisi, 2009; Di Tella and Franceschelli, 2011). This literature usually finds a pos-

[9] See also Germano (2008) 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.

[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.

itive correlation between advertising expenditure and favorable media coverage. However, it also shows that this link weakens or disappears in contexts where there is higher competition among advertisers 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.

3 The Model

Consider an environment with one single media outlet, two firms, and a unit mass of consumers. All agents are risk-neutral. Each firm l produces a substitute good whose quality q_l may turn out to be either high $q_l = H > 0$ with probability $\Pr(q_l = H) = \nu$, or low $q_l = L < 0$ with probability $\Pr(q_l = L) = 1 - \nu$ and $\nu \in (0, 1)$ is the same across firms, so products are *ex-ante* symmetric. It is common knowledge that there is some degree of (positive) correlation in the quality of products, as when firms put on the market goods manufactured with common inputs or technologies, and we let $\rho \in (0, 1)$ denote the coefficient of correlation between q_l and q_j.

Each consumer demands at most one product and she has specific preferences for quality consisting of a positive value v_H from consuming a product of quality H and a value $v_L < v_H$ from consuming a low quality one. In addition, consumers may prefer to stick to a status quo value v_0—choosing to do not consume any of the products (e.g., keep using an old product)—rather than end

[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 significant 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.

up using a low quality or defective product. The realized product's quality is private information of the firms but not of consumers whose prior beliefs can be summarized by the pair (v, ρ). For simplicity, we focus on the case where consumers purchase one of the products (at random) when they lack additional information on products' qualities (i.e., when they are uninformed). In sum, consumers' preferences are captured by the following assumption:

Assumption 1.

$$v_H \nu \geq v_0 > v_L = 0 \ . \tag{1}$$

Additional "hard" information concerning each product's quality may be obtained by watching the media outlet's news report at a fixed price $p > 0$.[13] We assume that the media outlet can detect issues or defects on each product before consumers make their choice of consumption. Specifically, the media outlet observes a signal $z_l \in \{\varnothing, L\}$ on each product l's quality and such that $z_l = L$ occurs with probability $\theta > 0$ when the product is in fact of low quality, whereas $z_l = \varnothing$ occurs otherwise.[14]

After observing this information, the media outlet may intentionally decide to conceal some or all of the observed signals to its viewers. In particular, the media outlet chooses a message m_l for each product of quality q_l, which can either contain the observed signal, i.e., $m_l = z_l$, or present no evidence at all, i.e., a null report $m_l = \varnothing$. So the news report simply consists of a vector of messages $\mathbf{m} = (m_1, m_2)$ picked from the power set of the observed signals $M = \mathcal{P}(\{z_1, z_2\})$.

Upon viewing the media outlet's report, consumers do not know with certainty whether the absence of any negative signal in the report is simply good news about a product's quality or the result of an intentional manipulation made by the media outlet. Nevertheless, they have rational expectations over the media outlet's reporting strategy, and they accordingly update beliefs about the quality of each product.

Since consumers are indifferent among products of the same quality, their expectations over the media outlet's reporting strategy may be specified by a density function over $D \leq 2$, i.e., the number of negative messages disclosed by the media outlet. By the chain rule, this is as follows:

$$s(D; \nu, \rho, \theta) = \sum_{z_1} \sum_{z_2} s(D|\mathbf{z}) g(\mathbf{z}; \nu, \rho, \theta).$$

where $s(D|\mathbf{z})$ is endogenously determined by the relationships between advertisers and the media outlet, which we are going to describe below, and $g(\mathbf{z}; \nu, \rho, \theta)$ simply denotes the exogenous joint

[13] 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.

[14] Notice that, like Besley and Prat (2006), we assume that signals can only be negative. However, as in their model, good news about the quality of products can be inferred from the absence of negative information on a product. At the same time, the framework could be extended to incorporate positive signals, as long as the probability of receiving a positive signal is lower than the probability of a negative one. That is, as long as not observing any signal increases the probability of a product being of high quality.

density over the signals that can be observed in this economy. Then, let $\hat{v}_{l|\mathbf{m}}$ denote the expected value of consuming a product l upon viewing a news report $\mathbf{m}$ so that a viewer's consumption choice can be simply written as:

$$\hat{U}_{l|\mathbf{m}} = \max\{\arg\max_{l} \hat{v}_{l|\mathbf{m}}, v_0\}$$

And the expected value of the media outlet's news report in terms of consumption (net of the price paid to watch the report) equals:

$$\hat{U} = E_{M|s(D;\nu,\rho,\theta)}\left[\hat{U}_{l|\mathbf{m}}\right]$$

where $E_{M|s(D;\nu,\rho,\theta)}$ denotes expectations over the set of possible messages given a consumer's beliefs about the reporting strategy of the media outlet.

At this point, we further introduce heterogeneity in the demand for the media outlet's news report by assuming that consumers hold an idiosyncratic taste for the news report's generic contents *per se* (e.g., entertainment, local news, national news). Specifically, a viewer's utility is characterized by a random value u^i drawn from a uniform distribution on the interval $[0, \bar{u}]$, with $\bar{u} > p$.[15] Since consumers learn their own idiosyncratic preferences before purchasing the report, the demand for the media outlet's report (i.e., the fraction of consumers paying p to watch the news report) will be as follows:

$$\begin{aligned}\alpha &= \int_0^{\bar{u}} \mathbf{1}_{(\hat{U}-p+x>v_H\nu)}\, dx \\ &= r + \frac{1}{\bar{u}}\int_0^{p} \mathbf{1}_{(\hat{U}-p+x>v_H\nu)}\, dx \\ &= r + \frac{1}{\bar{u}}\left(\hat{U} - v_H\nu\right)\ . \end{aligned} \tag{2}$$

where $\mathbf{1}_{(\cdot)}$ is an indicator function and $r = \frac{\bar{u}-p}{\bar{u}}$ is the measure of consumers who would watch the news report even without any hard information about product's quality.[16] In what follows, we will simply refer to α as the "fraction of viewers".

Finally, the commercial relationships between the media outlet and the producers may affect the reporting strategy of the media outlet. This occurs because the media outlet anticipates the interest of producers in concealing/revealing certain signals in order to affect consumers' consumption decisions. Hence, we assume that, first, the media outlet privately displays its hard information to

[15] 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.

[16] The value of r is positive by assumption. Nevertheless, even if $p > \bar{u}$ and thus $r = 0$, the main intuition and results of the paper would still apply.

producers.[17] Then, it auctions off its advertising slots together with the right of deciding upon which signal(s) has to be disclosed or to be concealed through a first price auction. Producers then evaluate the opportunity to pay the cost of advertising as a side-transfer to induce the media outlet to *hide or reveal* negative signals about products. Here, to simplify the analysis of producer's choices, we abstract from standard rationales for advertising (i.e., persuasive or informative advertising), to explicitly focus on an environment where any additional expenses would not raise awareness or persuade more consumers *per se*—firms' marginal benefit from additional advertising coverage is zero—and the only reason for acquiring advertising slots (say, in addition to the current ads expenditures) is to gain the control over the news content displayed to viewers (e.g., Ellman and Germano 2009).

For simplicity, the auction is implemented via a complete-information *first price auction*. Furthermore, since advertisers might want to persuade the media outlet to keep something out of consumers' sight, we assume that, whenever the media outlet conceals information to consumers, i.e., $\mathbf{m} \neq \mathbf{z}$, it incurs in a positive reputation cost η, which is positive but sufficiently small ($\eta \to 0$).[18] Hence, the media outlet will face a trade-off between reducing accuracy and increasing ads revenues. So that, if we denote by t_l the transfer eventually paid by producer l to the media outlet (as a result of its bid b_l), then the media outlet's profits are:

$$\Gamma = \arg\max_{l} \left\{ p\alpha + \sum_{l:b_l \geq b_j} t_l - \mathbf{1}_{(\mathbf{m}\neq\mathbf{z})}\eta \right\} . \tag{3}$$

where, if bids are even, the media outlet will pick the producer's offer that is consistent with the highest level of profits (eventually randomizing). Furthermore, if we denote by $\alpha_l \leq \alpha$ the fraction of viewers who purchased product l after viewing the report, the producer's revenues (on top of the revenues from the non-viewers) are:

$$V_l = \pi\alpha_l - \mathbf{1}_{(b_l \geq b_j)} t_l \tag{4}$$

where $\pi > 0$ represents the firm's profit margin obtained from the sales of its product.[19]

[17] We are implicitly assuming that a firm cannot directly communicate credible information to consumers regarding the low quality of its rival's product. Indeed, even if a firm may learn hard information 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. 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.

[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] Notice that the model easily generalizes to advertisers belonging to different industries. Indeed, 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

Timing of the game. The timing of the 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 a vector of signals $\mathbf{z}$.
3. The media outlet reports $\mathbf{z}$ to producers, and both firms independently and simultaneously 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 to maximize (3) and let her select the news report.
6. Every consumer i decides whether to watch the media outlet's report (considering the realized idiosyncratic benefit u^i she gets from doing so and the additional expected utility she might obtain from knowing something more about the quality of the products) and if so she updates her beliefs on products' qualities.
7. Each consumer chooses the product with the highest expected quality.

Finally, it is perhaps worth mentioning that the auction mechanism described in points 3 to 5 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 selling or 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 provide similar results in terms of equilibrium media outlet's news reports.[20]

4 Advertisers' competition and media outlet's reports

Our setting is a dynamic game of incomplete information, as actions are taken sequentially and there is asymmetric information between producers and consumers, as well as between consumers and the media outlet. For this reason we solve this game for its Perfect Bayesian Equilibrium (PBE).

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.

[20] See the accompanying working paper version of our work (Blasco, Pin, and Sobbrio 2012 – http://ssrn.com/abstract=2388196) for a bargaining mechanism involving a take-it-or-leave-it offer by the media outlet to the advertisers.

4.1 Uncorrelated products

Our analysis starts with the case where the negative shocks in products' qualities are uncorrelated, i.e., $\rho = 0$. In this case, competing producers always have conflicting preferences over news reports. Moreover, since $\rho = 0$ is common knowledge, consumers and the media outlet anticipate the presence of these conflicting preferences. The following result formally characterizes the equilibrium news reports of the media outlet in this case (the formal proofs of this and of following results are in Appendix A).

Proposition 1. *Let L_N be the number of low quality products observed by the media outlet, given its signal $\mathbf{z}$, and let $D^* \leq L_N$ be the number of products with a negative signal disclosed by the media outlet in equilibrium, given its news report $\mathbf{m}^*$. Let firms face uncorrelated shocks in the quality of their products. Then, there is a unique PBE of the game, with low reputation concerns for the media outlet, where $D^* = \min\{L_N, 1\}$, and where the equilibrium fraction of viewers is:*

$$\alpha^* = r + \frac{v_H}{\bar{u}}\theta \cdot \nu(1-\nu). \tag{5}$$

A media outlet with low reputation concerns will end up misreporting signals to its viewers when both producers seek to hide negative news on their own product's quality, and there are no firms advocating a fully truthful report. So a sufficient condition for an unbiased report is that the expected quality of products varies across producers, given the signal observed by the media outlet. In this case, competition arises between the low-quality producer seeking to keep the negative signal out of consumers' sight and the (supposedly) high-quality rival willing to expand sales in the market of viewers by revealing the negative news about the other firm's product. Although the marginal value obtained from modifying the news report is the same for both firms (i.e., due to the *ex-ante* symmetry), the news report ends up to be unbiased because the offer from the firm on which account the media outlet has not found any negative information, wins the auction as it spares the media outlet the reputation costs of concealing information to consumers.

Our results suggest that competition among advertisers may prevent a negative influence on a media outlet's news report in two ways. First, it makes such influence particularly costly to producers. Absent competition and for low reputation concerns, it is trivial for a monopolist firm to succeed in exerting a negative influence on a media outlet's news report. Instead, competing producers would have to outbid one another and, in our case, this implies giving away entirely the marginal value of a difference in the news report. Second, competition shall not be entirely symmetric as it yields a comparative advantage to firms with high-quality products. Thus, when products have uncorrelated qualities, competition is unambiguously improving the conditions for those consumers who decide to become informed through the media outlet's news report.

These incentives are anticipated by consumers and have an impact on the demand for the news report. Indeed, the value v_0 does not appear in (5)—as viewers will never choose to consume the

status quo upon viewing the report. Moreover, the second summand of the equation is exactly the *ex-ante* probability that the media outlet will find just one product of low quality (multiplied by a constant $1/\bar{u}$), which highlights that consumers can only expect to derive a benefit from viewing the media outlet's report when products are in fact of different qualities (i.e., when the report could enhance their probability of choosing a high quality product).

To better illustrate these points, we compare α^* against a benchmark α^{truth}, which represents the fraction of consumers that would watch the media outlet's report if they believed the media outlet were always to report all the observed signals (i.e., $\mathbf{m} = \mathbf{z}$, $\forall \mathbf{z}$). In other words, it represents the fraction of viewers occurring in the absence of any possible negative influence from the advertisers. That is:[21]

$$\alpha^{truth} = r + \frac{1}{\bar{u}}\left[\theta^2(1-\nu)^2 v_0 + v_H \theta(1-\nu)\nu\right] \tag{6}$$

As can be seen in Figure 1, the demand for news is generally non-monotonic in consumers' *ex-ante* beliefs about a product's quality. Furthermore, when consumers' initial beliefs are "pessimistic"about products' quality (i.e., $v_H\nu \to \nu_g$), the difference between α^* and its benchmark α^{truth} is positive. However this difference is decreasing in ν and it will eventually vanish when ν is sufficiently high. Moreover, α^* reaches its maximum value when the uncertainty about each product quality is maximal (i.e., $\nu = 1/2$). Indeed, as we remarked before, the expected value of the media outlet's reporting strategy is higher when products are expected to be of different qualities.

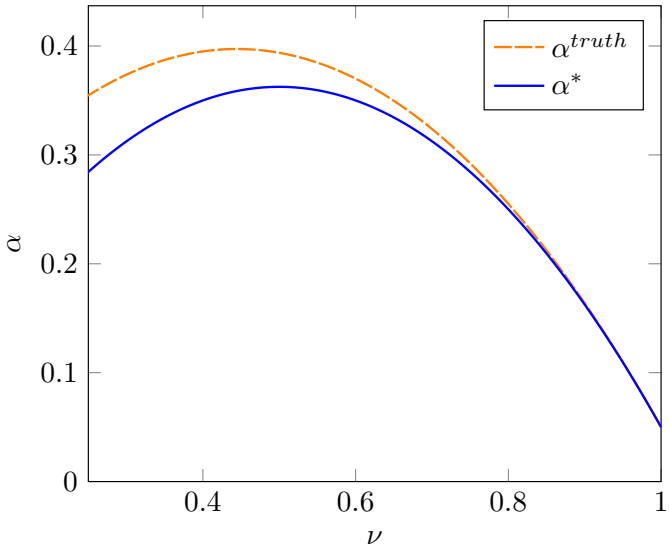

Figure 1: Uncorrelated products. α^* denotes the equilibrium fraction of viewers when the media outlet's reporting strategy is the one described by proposition 1. α^{truth} denotes the equilibrium fraction of viewers when the media outlet always discloses all the observed signals. Both curves are plotted with the following parameters: $\theta = .5$, $v_H = 2.5$, $v_0 = .5$, $\bar{u} = 1$, $r = .05$.

[21] See Appendix B for its derivation.

4.2 Correlated products

When the two firms face correlated shocks in the quality of their products, negative news about one product might not just harm the sales of its producer but may extend to the whole market. Indeed, the other producer may also 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 L_N be the number of negative signals observed by the media outlet, given its signal* $\mathbf{z}$*, and let $D^* \leq L_N$ be the number of products with a negative signal disclosed by the media outlet in equilibrium, given its news report* $\mathbf{m}^*$*. Then, there is a unique* PBE *of the game, with low reputation concerns for the media outlet, which 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 $\hat{v}_0 = v_0/v_H$ and such that:

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

Because of assumption 1, a viewer will always purchase a product unless either both products are shown to be of low quality or one negative signal has been revealed and correlation is sufficiently high to discourage the purchase of the other product. Thus, when $\rho < \bar{\rho}$, it is straightforward to extend our previous results from Proposition 1 to this case. Note, however, that in this case the equilibrium fraction of viewers α^* is *decreasing* in ρ. This is because, as we discussed in the previous section, consumers derive a positive value from the news report for their consumption choice exclusively when products are of different quality and this is less likely to happen when product's quality is highly (positively) correlated. On the other hand, when correlation is sufficiently high (i.e., above $\bar{\rho}$), a difference in the product's quality of the two producers is no longer a sufficient condition for unbiased reports (as it was the case for $\rho < \bar{\rho}$) . Although products might be found of different quality, each producer would like to conceal any negative information to consumers. Therefore, the influence over the media outlet's news report becomes a public good for the producers, who would rather free-ride than pay the excess in advertising fees needed to cover the reputation loss of the media outlet. Accordingly, there exist two asymmetric bidding equilibria and any Nash equilibrium in the bidding sub-game involves the media outlet hiding all negative

signals to consumers. Thus, the report will be always uninformative and therefore the equilibrium fraction of viewers discontinuously drops to $\alpha^* = r$.

It is insightful to compare the fraction of viewers obtained in equilibrium with the demand for news that would arise if the media outlet were to commit to truthful news reports (or, equivalently, to do not accept any advertising fee from any firm). So, let ρ^{truth} denote the threshold in the correlation above which viewers would not consume a product upon observing a negative signal from an ads-free media outlet. That is:[22]

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

Note that this threshold is higher than (7) because viewers anticipate the negative influence of the advertisers on the news content displayed by a commercial media outlet, and they behave as if they were more "optimistic"about the expected quality of products. The corresponding fraction of consumers watching the news report is as follows:

$$\alpha^{truth} = r + \begin{cases} \frac{1}{\bar{u}}\left[\theta^2(1-\nu(1-\rho))(1-\nu)v_0 + v_H\theta(1-\nu)\nu(1-\rho)\right] & \text{if } \rho > \rho^{truth} \\ \frac{1}{\bar{u}}\left\{(1-\nu)\left[(2-\theta)\theta + \nu\left(1-\theta+\theta^2\right)(1-\rho)\right]v_0 - v_H\theta(1-\nu)\nu(1-\rho)\right\} & \text{if } \rho \leq \rho^{truth} \end{cases}$$

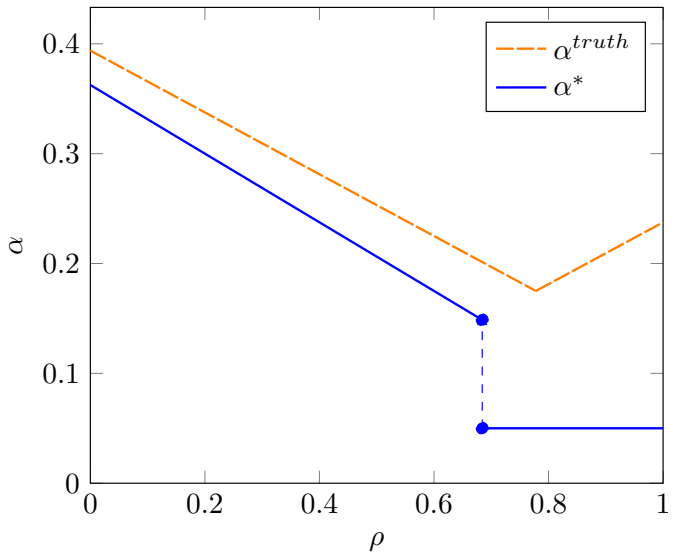

Figure 2: α^* denotes the equilibrium fraction of viewers when the media outlet's reporting strategy is the one described by Proposition 2 and α^{truth} denotes the equilibrium fraction of viewers when the media outlet's reporting strategy is to display all the observed signals. Both curves are plotted with the following parameters: $\nu = .5$ $\theta = .5$, $v_H = 2.5$, $v_0 = .5$, $\bar{u} = 1$, $r = .05$.

As can be seen in Figure 2, the curves α^{truth} and α^* behave differently. First, α^{truth} is always above α^*, and second it is increasing in ρ when $\rho > \rho^{truth}$ (this is because, since signals are

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

independent conditional on quality, when correlation is very high, consumers view the media outlet's report as if it was the result of observing two signals on the same product). Overall, the advertisers' negative effect on the demand of news is higher when products are more correlated.

Our results suggest that the degree of correlation in products' qualities has a key influence on the accuracy of the media outlet's reports. This goes beyond the well-known effects of making viewers more pessimistic upon viewing negative signals about product's quality. In particular, as the degree of correlation among products' quality increases, the reporting strategy of the media outlet will also change and the direction of this change is unambiguously unfavorable to consumers. 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.

These results can 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.

5 Discussion and extensions

Overall, the results of our model show that when product's qualities 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, a "commercial media bias" might represent a more serious concern for consumers. This section shows that the main insights of the paper hold in the presence of more than one media outlets, the presence of ads-free media outlet and asymmetries among producers. Moreover, it discusses how the presence of more than two advertisers might affect the results of the model. Finally, it clarifies the role of advertising in the model with respect to the existing literature.

5.1 Multiple Media Outlets

This section discusses the robustness of our results in the presence of two media outlets (i.e., $N = 2$: we label them x and y). 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 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, 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 $\bar{\eta} > \eta$.[23] Finally, we consider a situation in which media outlet x covers a fraction α_x of the consumers, while media outlet y covers a fraction α_y, and their intersection $\alpha_{x \cap y}$ is non–empty.[24]

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

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

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

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. At the same time, 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 was 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.

[23] 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.

[24] Contrarily to the case of a single media outlet and for the sake of brevity, we take these fractions as exogenous. Nevertheless, these fractions could be generally endogenized assuming that every consumer is heterogeneous in the utilities u_x^i and u_y^i that she gets from each media independently, and that these utilities are not perfectly correlated across consumers; in this way α_x and α_y would follow endogenously, and also the size of $\alpha_{x \cap y}$ would depend positively on the degree of correlation between u_x and u_y.

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 not to be financed by advertising fees (e.g., as in the case of *Consumer Report, Zagat* or a public news media entirely financed through 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 $p_{na} \neq p_a$ (where the subscript "*na*" stands for "*no ads media outlet*" while the subscript "*a*" stands for "*ads-sponsored media outlet*"). Moreover, without loss of generality, we assume that the ads-free media outlet does not provide any generic (e.g., entertainment) contents, i.e., $u^i_{na} = 0 \ \forall i$. Finally, as in the case with two symmetric media outlets, the two outlets observe exactly the same signal $\mathbf{z}$ and independently decide what to report to their viewers.[25]

Consumers have no limits in the number of reports they may access: they can choose either none, one, or two reports. In particular, consumers face a simple trade-off between buying more accurate information about products from an ads-free (and no-entertainment) 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 does not fully resolve the problem of commercial media bias.

Proposition 4. *Let $\Delta = U^I_{na} - p_{na} > 0$ represent the value added of an ads-free media outlet for the viewers, in a market with ads-sponsored and ads-free media outlets. Then, if $U^I_a > \Delta$ 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 as 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 this case.

5.2 Asymmetric producers

In this section we consider how the reporting strategy of the media outlet 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.

[25] If they observed different signals the ads-sponsored media outlet may even provide an added value—with respect to the ads-free media outlet—to consumers in terms of information on products' qualities. 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. Nevertheless, the results would not be substantially affected.

Imagine that an incumbent can use its customers' loyalty to offer good quality products yielding a higher utility. In our environment we can consider this feature by assuming that producer 1 is an incumbent and its product, when of high quality, leads to $v_H^1 = v_H + \gamma$ (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 $v_H^1 = v_H + \gamma$ with $\gamma > 0$, and $v_H^2 = v_H$. Let L_N be the number of negative signals observed by the media outlet, given its signal $\mathbf{z}$, and let $D^* \leq B$ be the number of negative signals disclosed by the media outlet in equilibrium given its news report $\mathbf{m}^*$. Then, there is a unique* perfect bayesian equilibrium *of the game, with low reputation concerns for the media outlet, that depends on the value of ρ. Specifically there exist 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 who 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 $L_N = 3$. 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 $L_N = 2$ and $\rho > \bar{\rho}$. That is, advertisers face a public good contribution situation where each firm has an incentive to free-ride on each other upon whom has to bid η to induce the media outlet not to 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 $L_N = 1$ the "bad" quality firm is willing to bid up to $\alpha^*/3$ in order 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 low quality firm who may easily overbid each of the "good" quality firms. Hence, in this case $D^* = 0$. Instead, if $L_N = 2$ the two bad quality firms compete to win the auction and have the media outlet hiding their own negative signal while revealing the one 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 low quality firms will win the auction and then $D^* = 1$. Now, suppose that $\bar{D} = 2$. If $L_N = 1$, the situation is exactly the same as when $\bar{D} = 1$ and $L_N = 1$. Instead, for $L_N = 2$ the "good" quality producer will be willing to bid up to $\alpha^*/2$ to have the media outlet disclose all the negative signals on its rivals. Hence, $D^* = 2$. Finally, for any $\bar{D} > 0$ when $L_N = 3$ 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 $L_N \geq 3$ correlation remains a crucial determinant of news accuracy. That is, a higher degree of correlation in products quality translates into a (weakly) lower the number of signals disclosed by the media outlet in equilibrium. More generally, while in the presence of $L_N \geq 3$ 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, in Blasco, Pin, and Sobbrio (2012) we 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 $L_N \geq 3$.

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 (2) 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.[26] 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 through 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

[26] 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).

not affect negatively the media outlet's viewership.[27]

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, and Peitz 2009). More generally, while a firm may use comparative advertising to "go negative" it cannot use this instrument to "avoid negative".[28] 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 high quality product may pay a media outlet to broadcast (comparative) negative ads (*paying positive to go negative*) while a firm with a low quality product may pay a media outlet to broadcasts its own "neutral" ads and not to broadcast the (comparative) negative ads of the high 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.

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 the media ultimately affects 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 on firms' products) 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 and/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

[27] 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.

[28] Moreover, as observed by Gambaro and Puglisi (2009) "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 2009, page 9)

competition over media contents depends on the degree of correlation among the firms' products. When the correlation in products' qualities is high, all 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., low quality firms want to *pay positive to avoid negative* and high quality 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 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.

More generally, the analysis suggests that "commercial media bias" might represent a 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 A

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

Proof. We start by writing down, for future reference, the joint density of the possible states of the world in our economy:

$$\Pr\{q_1 = q_2 = L\} = [1 - \nu(1-\rho)](1-\nu)$$

$$\Pr\{q_1 = q_2 = H\} = [\nu + (1-\nu)\rho)]\nu$$

$$\Pr\{q_1 \neq q_2 = L\} = \Pr\{q_1 \neq q_2 = H\} = (1-\nu)\nu(1-\rho)$$

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 viewers 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. By assumption 1, viewers will always purchase a product whenever the news report showed no evidence of any low-quality product, $\mathbf{m} = (\varnothing, \varnothing)$. In this case, because of *ex-ante* symmetry, producers will equally divide sales in the market of viewers: $\alpha_1 = \alpha_2 = \alpha^*/2 > 0$.

Suppose instead that $\mathbf{m}$ contains one negative signal, and without loss of generality we focus on $\mathbf{m} = (L, \varnothing)$. Viewers will obviously not purchase product 1 and, by the chain rule, will purchase product 2 if

$$v_{2|\mathbf{m}} = \frac{\Pr\{m = (L,\varnothing)|q_2 \neq q_1 = L\}\Pr\{q_2 \neq q_1 = L\}}{\Pr\{m = (L,\varnothing)\}} \cdot v_H \geq v_0$$

Let $\sigma_{k,j} = \Pr\{D = k|L_N = j\}$ denote the beliefs that viewers assign to the media outlet reporting $k \leq j$ negative signals on firms' products conditional upon having found j negative signals. Then, the above expression can be written as:

$$\frac{\sigma_{1,1}\theta\Pr\{q_1 \neq q_2 = L\}}{\sigma_{1,1}\left[\theta\Pr\{q_1 \neq q_2 = L\} + \theta(1-\theta)\Pr\{q_1 = q_2 = L\}\right] + \sigma_{1,2}\frac{\theta^2}{2}\Pr\{q_1 \neq q_2 = L\}} \cdot v_H \geq v_0 \quad . \tag{8}$$

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 $\hat{v}_0 = v_0/v_H$.

Assume (9) is verified. If there are no bids from producers, the media outlet will report the true signals, (i.e., $\sigma_{k,j} = j$) and so, $\alpha_1 = 0$, $\alpha_2 = \alpha^* > r$ (or viceversa) when $L_N = 1$, otherwise $\alpha_1 = \alpha_2 = 0$ when $L_N = 2$. However, for sufficiently small reputation costs η, this cannot be sequentially rational. Indeed, if $L_N = 1$, a low quality producer (say producer 1) submits a positive bid (i.e. $b_1 \geq \eta$) to conceal any negative info about its product. A high 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 content 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 $V_1 = V_2$ in equilibrium and producer 2 wins the auction (because of the media outlet's reputation concern, given by $\eta > 0$). As a result, it is the producer of an high-quality product who wins the auction and $D^* = 1$ turns out to be sequentially rational. For the same reason, if $L_N = 2$, 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 $\alpha_1 = \alpha_2 = 0$. If so, producers face a problem of public good contribution, where the public good consists of inducing the media outlet to conceal any negative information about products' quality. 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, in this case, 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 beliefs and the media outlet's reporting strategy (σ^*, D^*) in equilibrium, let us now characterize the equilibrium fraction of viewers α^*. Note, the expected utility levels of the consumers upon viewing $\mathbf{m}$ are given by:

$$U_{l|\mathbf{m}} = \begin{cases} v_0 & \text{with } \Pr\{\mathbf{m} = L, L\} \text{ or } \Pr\{\mathbf{m} = \varnothing, L\}, \Pr\{\mathbf{m} = L, \varnothing\} \text{ and (9) is not verified} \\ v_{l|\mathbf{m}=\varnothing,L} & \text{with } \Pr\{\mathbf{m} = \varnothing, L\}, \Pr\{\mathbf{m} = L, \varnothing\} \text{ and (9) is verified} \\ v_{l|\mathbf{m}=\varnothing,\varnothing} & \text{with } \Pr\{\mathbf{m} = \varnothing, \varnothing\} \end{cases}$$

We have seen that $\Pr\{\mathbf{m} = L, L\} = 0$ at all times and, when inequality (9) does not hold, $\Pr(\mathbf{m} = \varnothing, \varnothing) = 1$. In this case, the news report is not informative for consumption $\hat{U} = \nu v_H$ and therefore $\alpha^* = r$. If instead inequality (9) holds, then the media outlet ends up reporting at most one negative signal and the expected value of the news report is

$$\begin{aligned} \hat{U} &= 2\Pr\{\mathbf{m} = \varnothing, L\} v_{l|\mathbf{m}=\varnothing,L} + \Pr\{\mathbf{m} = \varnothing, \varnothing\} v_{l|\mathbf{m}=\varnothing,\varnothing} \\ &= (1 - \Pr\{\mathbf{z} = \varnothing, \varnothing\}) v_{l|\mathbf{m}=\varnothing,L} + \Pr\{\mathbf{z} = \varnothing, \varnothing\} v_{l|\mathbf{m}=\varnothing,\varnothing} \\ &= v_H \nu + v_H \theta (1 - \nu)\nu(1 - \rho) \ . \end{aligned}$$

So that

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

□

Proof of Proposition 3

Proof. 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 $\alpha_{x\cap y} = 0$ then we are considering two separate games already analyzed in that proof, so we consider always that $\alpha_{x\cap y} > 0$. Let us call $b_{i\to j}$ the bid from producer i to media outlet j.

In the case in which $\rho > \bar{\rho}$ viewers in α_x and α_y would (respectively) not buy any product if $D_x > 0$ and $D_y > 0$. 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 $j \in \{x, y\}$, results in an equilibrium.

When $\rho \leq \bar{\rho}$ we distinguish two cases. First of all let us assume that $L_N = 1$ (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 $j \in \{x, y\}$, because otherwise the higher one could be profitably reduced;
- $b_{i\to x} + b_{i\to y} = (\alpha_x + \alpha_y - \alpha_{x\cap y})/2$, 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;
- $b_{2\to j} \geq (\alpha_j - \alpha_{x\cap y})/2$, 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 $(\alpha_j - \alpha_{x\cap y})/2$.

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

Finally, when $\rho \leq \bar{\rho}$ and $L_N = 2$, 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

Proof. 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

Proof. 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 $L_N = 2$ 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 $\hat{v}_0 = v_0/v_H$ with $\frac{v_0}{v_H+\gamma}$. 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 $\hat{v}_0 = v_0/v_H$ with $\frac{v_0}{v_H+\gamma}$.

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 viewers will be minimal). □

Appendix B Fraction of viewers with truthful reporting strategy

Here we report how we constructed α^{truth}. That is, the fraction of consumers that would watch the report in equilibrium if the media outlet was to disclose all signals to its viewers. Recall that, if inequality (4.2) is verified (i.e., $\rho \leq \rho^{truth}$), we have:

$$\hat{U} = \Pr\{z_1 = z_2 = L\}v_0 + 2\Pr\{z_1 \neq z_2 = L\}\hat{u}_{l|m=\varnothing,L} + \Pr\{z_1 = z_2 = \varnothing\}\hat{u}_{l|m=\varnothing,\varnothing} \ .$$

Note, the last two summands are such that:

$$2\Pr\{z_1 \neq z_2 = L\}\hat{u}_{l|m=\varnothing,L} + \Pr\{z_1 = z_2 = \varnothing\}\hat{u}_{l|m=\varnothing,\varnothing} = v_H\nu + v_H\theta(1-\nu)\nu(1-\rho)$$

and so,

$$\hat{U} = \theta^2(1-\nu(1-\rho))(1-\nu)v_0 + v_H\nu + v_H\theta(1-\nu)\nu(1-\rho) \ .$$

Consequently, when the degree of correlation is sufficiently low (i.e., $\rho \leq \rho^{truth}$), the equilibrium fraction of viewers is:

$$\alpha^{truth} = r + \frac{1}{\bar{u}}\left[\theta^2(1-\nu(1-\rho))(1-\nu)v_0 + v_H\theta(1-\nu)\nu(1-\rho)\right]$$

which is clearly above α^* for any ρ. Note, for $\rho = 0$ the above expression becomes that of (6).

By contrast, if the inequality (4.2) is not verified (i.e., $\rho > \rho^{truth}$), then we have:

$$\hat{U} = \left(1 - \Pr\{z_1 = z_2 = \varnothing\}\right)v_0 + \Pr\{z_1 = z_2 = \varnothing\}\hat{u}_{l|m=\varnothing,\varnothing} \ ,$$

which can be simplified to obtain:

$$\hat{U} = \left(1 - \Pr\{z_1 = z_2 = \varnothing\}\right)v_0 + v_H\nu - v_H\theta(1-\nu)\nu(1-\rho)$$

and since $\left(1 - \Pr\{z_1 = z_2 = \varnothing\}\right) = (1-\nu)\left[(2-\theta)\theta + \nu\left(1-\theta+\theta^2\right)(1-\rho)\right]$ we get:

$$\alpha^{truth} = r + \frac{1}{\bar{u}}\left\{(1-\nu)\left[(2-\theta)\theta + \nu\left(1-\theta+\theta^2\right)(1-\rho)\right]v_0 - v_H\theta(1-\nu)\nu(1-\rho)\right\} \ .$$