News Sources and Media Bias

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Abstract

In this paper, we propose a new channel for supply-driven media bias: the relation between news sources and journalists. We argue that this relation is like an informal contract based on non-economic exchange, trust, negotiation, punishment, threats, confidentiality and secrecy. We show that media sources have a significant impact on the level of media bias in the news market. In particular, contrary to other supply driven media bias channels, competition does not necessarily reduce media bias.

Keywords: News Sources, Media Bias, Informal Contracts.

JEL Classification: L14; L82.

"You cannot hope
to bribe or twist,
thank God! the
British journalist.
But, seeing what
the man will do
unbribed, there's
no occasion to."
"Over the Fire" by Humbert Wolfe ("The Uncelestial City", 1930).

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1 Introduction

In this paper, we investigate a channel for supply-driven media bias and media pluralism that has been disregard in the economics literature: the relation between news sources and newspapers[1]. To be more precise, the economics literature has so far looked to three supply-driven forces and one demand-driven force for media bias and media pluralism. The supply side channels rest on the journalists' private information (Baron, 2006), media capture by interest groups (Besley and Prat, 2006) and advertisers' pressure (Gabszewicz et al., 2001)[2]. In turn, the demand side channel is based on the consumers' prior beliefs (Mullainathan and Shleifer, 2005)[3].

Our focus on news sources is due to the importance that they have in the news market. In fact, the production of news, like the production of other commodities, depends to a great extent on inputs, and in the media market the inputs are obtained via news sources. Political scientists estimate that between half and three-quarters of political news copy originates from news sources (Sigal, 1999 and Manning, 2001). Furthermore, this dependence

[1] Media bias refers to the bias of the press in the selection of which events are reported and how they are covered (see Mullainathan and Shleifer, 2005). Note that in this sense, media bias is not only about left and right politics. For instance, a newspaper that gives more favorable reports to firms that advertise in the newspaper, is not necessarily taking a political stance on the right or on the left. This case can also apply to news sources. In turn, media pluralism can be defined as the diversity of political opinions with a voice in the news market. Media pluralism is sometimes associated with media bias, but they are not necessarily synonymous. The idea is that the larger the media pluralism, the lower the media bias, since there are more chances that the "truth" is reported in the news (even if "less-truth" news are also broadcast). Also, according to McManus (1999) news sources are "the providers of the raw material of news (and) they include anyone reporters turn to for information - government and business officials, bureaucrats, witnesses of events, parties to the issues, persons on the street".

[2] Journalists' private information contributes to a problem of asymmetric information. In this sense, journalists can for instance manipulate the privileged information they have to sell more newspapers or for career promotion objectives. Interest groups can use the media firms they control for propaganda and electoral aims. In turn, advertisement mirrors the two-sided nature of the news sector. From one side, advertisers prefer newspapers that sell more and that do not give them "bad" publicity. From the other side, news firms need the ad revenues, which are maximized when they cover a larger audience and they do not hurt the sensibility of advertisers.

[3] The idea is that, since consumers' incur in a disutility cost in reading news that go against their prior beliefs, news firms have incentives to slant news to consumers' ideological preferences in order to maximize sales.

seems to have increased in the last years, due to the crisis in the media sector that has forced staff cuts in news organizations and a reduction in the time and money allocated to investigative reporting (Gans, 1999; Manning, 2001; Berkowitz, 2009; Dinan and Miller, 2009; Entman et al., 2009; Couldry, 2010 and Phillips, 2010).

Differently from other commodities, however, in the news market the relation between input suppliers and producers is not usually mediated by the market. Newspapers and news sources based their relationship on informal agreements and unwritten rules. For instance, for Gans (1999) the interaction between news sources and journalists seems like a "tug of war". According to him, "while news sources try to 'manage' the news, putting the best light on themselves, journalists concurrently 'manage' the sources in order to extract the information they want".

In the same vein, Manning (2001) describes in the following way the relation between spin doctors[4] and journalists: "the crucial art for a spin doctor is to understand how to bargain with information: how much to release, when it should be released to optimize its value and what can be secured in return for the release of information. Journalists will value those press officers whom they come to trust sufficiently to bounce ideas off or "try out" new interpretations of developments. Although there are never any guarantees, spin doctors may hope that if journalists come to regard them as useful sources of 'insider' information, in return journalists may acknowledge certain obligations regarding the way in which they construct their copy". For this reason Sigelman (1999) also argues that the key to understand media bias, in what concerns news sources and media firms, lies "not in conspiracies but in cooperation and shared satisfaction".

In this sense, the relationship between news sources and newspapers can give rise to a problem of media bias and media plurality (Manning, 2001), if newspapers provide positive spinning to the sources they collaborate with (media bias) or if some sources have more favorable access to the media market to express their views (media pluralism).

Motivated by the issues raised above, we investigate how the nature of the exchange between news sources and journalists affects media bias and media

[4]Spin doctors (or public relations, PR) are a special type of news sources. Spin doctors develop spin to the people they represent. Spin is a form of propaganda campaign in the media developed with the objective to persuade public opinion. Governments, private firms and other organizations or public figures are usually represented in the media by spin doctors.

pluralism. In particular, we develop a model based on the approach by Klein and Leffler (1981) to informal contracts. The choice of this modeling set-up is due to the fact that as we have discussed above and as argued by many media experts (see also the next section), the relationship between newspapers and news sources can be characterized as an informal contract.

In order to introduce the informal contract nature of the relationship between news sources and newspapers, we have in our model that news sources supply information to news organization but have a strong opinion about what can be published. If the newspaper publishes something that the news source dislikes, the latter can stop to supply more information in the future. Both parties involved in the relationship (the news source and the newspaper) know about this informal agreement. In turn, readers have a preference for "truth", and a deviation from it reduces demand. Since newspapers maximize profits, they face a trade-off between supplying the truth to increase demand *versus* not publishing the full truth in order to maintain in the future a flow of news from the source.

Under this set-up, we present several new insights concerning news sources, media bias and media plurality. The most important result in our paper relates to the debate on the relation between competition and media bias and media plurality. Gentzkow and Shapiro (2008), reviewing this topic, say that this has been the central research question in the literature, given the different threats to media bias and media plurality in the news market (i.e.: supply or demand side forces). They argue that while competition might have no effect on reducing the distortions that are driven by demand side forces, the contrary occurs with supply-driven forces[5]. In contrast, to the existing literature (Gentzkow and Shapiro, 2008), in the context of the supply-driven media bias and media plurality channel analyzed in this paper (news sources), we show that competition does not necessary decreases media bias, even when consumers have a preference for truth. This is so because with competition, a news sources always have an outside option absent in monopoly: going to a competing newspaper, if the newspaper does not collaborate (i.e.: if

[5]Accordingly, in the presence of demand side forces (like consumers' prior beliefs), competition might increase media bias and reduce media plurality because newspapers can see a reduction in profits if they do not cater to the preferences of the majority, which are not necessarily close to the "truth". In turn, when distortions in news content are supply-side driven (like journalist private information, pressure of interest groups and advertisers), competition can restrain media bias and increase media plurality because it is more costly for firms to deviate from the "truth".

the newspaper does not want to publish what the source wishes). Therefore, a newspaper has stronger incentives to collaborate with a source under competition than under monopoly.

Other results are the following. First, the size of media outlets can be correlated with media bias, given that larger newspapers have relatively less to gain than smaller newspaper in terms of demand by publishing news that sources disapprove. Second, libel laws (i.e.: laws that punish untruthful reports of newspapers) might reduce media bias, since they help to discipline journalists to not disclose false information that favors sources relatively to other groups[6]. Third, the ability of the media organization to influence public opinion can increase media bias, once newspaper do not loose many readers even when they do not publish the "truth". Fourth, more sources only decrease media bias if the different sources are antagonists (i.e.: they disagree on what can be published), but not when they are complementary (i.e.: they agree on what can be published), given that newspapers are able to publish what is more close to the truth without alienating all the sources in the future. Fifth, the access of secondary sources (in opposition to primary sources) to the news market does not guarantee *per se* less media bias, but can increase the diversity of opinions in the news market[7]. Sixth, sources with ideological leaning (left *versus* right) have more chances to increase media bias when ideological demand bias is stronger. Seventh, media bias tends to increase when the demand for news is higher, since newspapers have less to lose even if they alienate some readers due to less accurate reports. Eight, media bias is not necessarily reduced when readers have higher preference for truth, once newspapers weight this against the long term relationships with the sources.

The rest of the paper is organized as follow. In the next section, we review the related literature on media sources, media bias and media plurality. In section 3, we introduce the basic model. In section 4, we analyze

[6]Libel (or defamation) occurs when a newspaper writes something as factual but that is false, and this affects negatively the image of an individual or an organization.

[7]Examples of primary sources are the government, ministers, elected politicians and industry lobbies. In turn, the unions, environmental pressure groups and the public in general are examples of secondary sources. For Hall et al. (1999) primary sources gain predominance over secondary ones for two reasons. First, primary sources are viewed as authoritative, and therefore are more easily "sold" as impartial, balanced and objective. Second, primary sources can communicate journalistic material very frequently, which is very important for news agencies once they are under the pressure of time and need this constant flow of information.

the influence of news sources on media organizations under different market structures cases (monopoly, duopoly, asymmetries in size between news outlets and influence of news agencies on the readers' view of truth). In section 5, we look to different contexts concerning the news sources (uncertainty about media sources trustfulness, number of sources, antagonist *versus* non-antagonist sources, political oriented media sources and primary *versus* secondary sources). We conclude discussing our main results.

2 Related Literature

While the economics literature on media bias has not paid a lot of attention to news sources, the contrary has been the case in political science. As we have discussed above, the main idea that comes from political science literature is that news sources and newspapers are tied together by informal contracts. This is so since the relation between media sources and newspapers tends to be based on the grounds of exchange and negotiation (Ericson et al., 1999 and Manning, 2001), trust (Golding and Elliot, 1999 and Schlesinger, 1999), punishment and threats (Molotch and Lester, 1999) and confidentiality and secrecy (Ericson et al., 1999). We review these arguments next.

The relationship between news sources and journalists is described by political scientists as a non-economic "exchange relationship", because each side recognizes certain (unwritten) rights and obligations (Manning, 2001). For instance, journalists expect that news sources "understand the criteria defining 'good copy', the importance of speed and accuracy in responding to inquires, the value of an 'exclusive' to individual journalists and the nature of intelligence or 'contextual information'". In turn, news sources expect that journalists "will write balance accounts which at least acknowledge their point of view" and that "listen to suggestions put to them for particular news items or features".

In what concerns trust, the argument goes that news agencies pressed by short deadlines, very often have no time to check all the information passed by the news sources. In this sense, it is important for the journalists to trust the sources they have. In other words, media organizations prefer to work with sources that guarantee the communication of true facts in a regular basis. In this sense, primary sources tend to have more access to media organization than secondary ones. Trust also plays a role for economic reasons. A newspaper that publishes untruthful news loses credibility, and this can

reduce the newspaper circulation (Soloski, 1999). Furthermore, the newspaper can also be subject to a libel action in courts, which can conduce to high fines and penalties for journalists and media organizations (see Schlesinger, 1999).

In an informal agreement trust is, however, not sufficient to protect parties from all the eventualities of the relationship. In this sense, and given that courts can also not enforce the type of informal contract agreed between news sources and journalists, political scientist also defend that punishments and threats play a central role. The evidence shows that when a news source proves to be not trustful and provides too many inaccurate, false or uninteresting information, newspaper tend to drop this informant (Manning, 2001). Similarly, when a journalist or a newspaper constantly gives a non-favorable view of a given source, the source will also tend to stop passing information to the newspaper (Gans, 1999 and Manning, 2001). Even when the rupture is not at sight, powerful sources try to influence journalists' coverage with threats (see Molotch and Lester, 1999). Some of this sanctions are direct (like advertising boycotts or anti-trust suits) others are more subtle (like journalism awards or leaks that reward collaboration)[8].

Other argument that surfaces in the political science literature is that the problems of media bias and media pluralism can become even more blurred, since journalists have the right to protect the identity of their sources. In fact, even in court the journalist can deny to disclose all the information provided by sources, due to professional confidentiality issues. The most well-known example involving the secrecy of news sources is the anonymous source for the Watergate scandal (nicknamed Deep Throat). Only in 2005 (thirty years later after the scandal came to the newspapers), the source was revealed as being William Mark Felt, Sr., the former Deputy Director of the FBI.

Contrary to the political science literature, in economics only a few notable exceptions have looked to the role of news sources on media bias and media plurality. In particular, we can name the theoretical work of Baron (2005) and the empirical exercise of Dyck and Zingales (2003).

In Baron (2005) two media sources (activists and industry) compete for getting their views passed onto the public via newspapers. In this sense, in Baron (2005), the media sources can be seen as interest groups. The two

[8]For instance, Molotch and Lester (1999) point out that all television networks in the US abandon the custom of 'instant analysis' of presidential speeches after pressure from the White House.

interest groups/media sources have opposing views: activists are in favor of regulation of an externality and the industry is against it. Therefore, media sources have incentives to conceal information that goes against their views. Knowing this, media firms can also do private investigation to obtain more information. Then, as in Baron (2006), at the heart of Baron's (2005) approach is a story of journalists' private information. Since in Baron (2005) the function of the media sector is to serve the public, the news firms tend to favor the views of the activists. As a result, only the activists conceal information but not the industry.

Dyck and Zingales (2003), in turn, investigate empirically the relation between media reporting and assets prices. In particular, they try to explain media bias on the reporting of assets prices from the relation between news sources and journalists. The main hypothesis is that in order to induce a source to reveal information, the journalists have incentives to give a positive spin to the source's views. Dyck and Zingales (2003) find evidence that this positive spin tends to be greater, when there is a high demand for the information and there are no alternative sources of information.

Relatively to Baron (2005) and Dyck and Zingales (2003) some points need to be highlight. First, and as we have seen in the introduction, the angle in our paper is different from Baron (2005), given that we base our analysis on the informal nature of the relations between news sources and journalists. Second, although our theoretical predictions agree with the results of Dyck and Zingales (2003), we also complement them with new insights that can inform further empirical analysis on media sources and media bias. Furthermore, we present a new cause of media bias not yet identified in the economics literature: the informal nature of the relationship between newspapers and news sources.

3 The Model

The model considers three types of agents: news agencies, news sources and readers. News agencies are in the business of selling news to readers. News sources supply news, in particular scoops, to newspapers, which can increase demand for newspapers above the regular editions. Sources have a strong preference about what they like to be published, which might not coincide exactly with the "truth". If a newspaper publishes something that the source does not like, the latter cuts the relationship with the former. Readers have

a preference for the "truth". Deviations from the "truth" decreases demand for newspapers. We take the extreme case where readers have a preference for truth, because otherwise newspapers would have a further incentive to bias news[9]. Consumers' prior (distorted) beliefs about the truth, has been before shown to contribute to media bias (see for instances Mullainathan and Shleifer, 2005). With the assumption that consumers have a preference for truth, we can demonstrate that if media bias arises is not just as a result of consumers' prior views.

From the above set-up, we can then see that a newspaper faces a trade-off. From one side, publishing the whole truth increases demand, but at the cost of no more collaboration by the news source in the future. From the other side, publishing just what the news source wants guarantees more information in the future, but at the cost of reducing demand.

At the base of the model is the repeated game of informal contracts by Klein and Leffler (1981). The idea is that when a source and a newspaper collaborate, they follow an informal contract. With this informal contract it is common information for the news agency and for the source that the latter only collaborates in the future (i.e.: continues to give information) if the former just publishes what the source wants. The focus of the paper is then to analyze how the special relation of exchange relation between sources and newspapers affect media bias (i.e.: the reporting of the "truth").

We assume that if a newspaper prints no scoops from the sources (regular editions), its payoff is π. If a newspaper prints a scoop based on a source's information, the profits are instead $\pi + \Pi$. The profits realized in an edition with a scoop depend on the nature of competition in the media market and on the relation between sources and media firms. Below we define Π for different cases.

When a source passes information to a newspaper, the source communicates to the newspaper that what can be published is just $v > 0$. However, the newspaper can get information V, with $V > v$ (see figure 1). We do not model explicitly how the newspaper obtains V, however, the media literature on news sources discusses at least two channels through which this can occur (see Manning, 1999). First, it is very common that sources release more information than what they wish to see printed. This can be so because sources need to signal to newspapers that the information they transmit is

[9] We relax this assumption in a subsequent section, by looking to a case where some readers have a left-wing orientation and others a right-wing orientation.

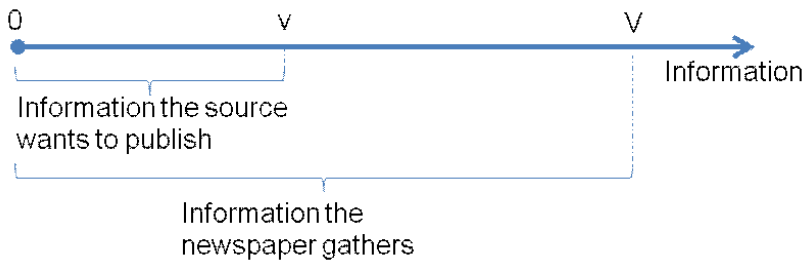

Figure 1: Information to be published: Newspaper *versus* source

truthful, or they need to frame the story to give a full picture of the issues involved[10]. Second, journalists can use the information they get from the source as a lead to collect more information via private investigation. In the first case the source transmits to the newspaper V, but asks that it only publishes v. In the second case the source only transmits information v, but the newspaper with this clue can gather $V > v$.

We define v^{Pub} as the amount of information published by the newspaper. We can then define media bias as $b = V - v^{Pub}$, since b indicates how far from the whole truth are the news published.

We model the readers' demand for editions with scoops as:

$$Q = \alpha - \beta b. \tag{1}$$

From equation 1, we can see that readers have a preference for "truth", given that the lower the media bias, the higher the demand[11]. In this sense, the demand parameters, α and β, can be interpreted as the demand for news without media bias (α) and the level of the preference for truth (β).

Given the above, the newspaper has then to decide how much information publishes, v^{Pub}. In particular, the only options for the newspaper are: (1) to

[10]In this respect, a press officer for a larger union in England is quoted in Manning (1999): "so in order to convince the journalist that they were getting something that was important for them, we provided additional information from other areas as well... and we service the history very thoroughly. Now the unwritten rule is that person will help me in other stories as well".

[11]In other words, newspapers that do not tell the whole truth have lower demand. This effect is similar to reputation effects in Gentzkow and Shapiro (2006). Though, contrary to Gentzkow and Shapiro (2006), we do not formalize explicitly reputation. Furthermore, the effects of not reporting the whole truth are contemporaneous on profits. Note however that results are not change if these effects are lagged.

publish the whole information it has acquired, $v^{Pub} = V$; or (2) only publish what the source wants to publish, $v^{Pub} = v$. It can be easily seen that for a newspaper it is not optimal to just publish $v < v^{Pub} < V$, since for $v^{Pub} > v$, the source will anyway not collaborate more in the future. Therefore, if the newspaper decides to break the relationship, the only optimal strategy is to publish the whole information it has acquired, V. Similarly, the newspaper has no incentives to publish $v^{Pub} < v$, once then it would reduce demand below the strictly necessary.

Without loss of generality, we assume that newspapers do not incur any marginal or fixed costs of production. Then, if a newspaper publishes V, profits in this period equal $Q_V = \alpha$, since $v^{Pub} = V$. While if they publish v, we have $Q_v = \alpha - \beta b$, since $v^{Pub} = v$. Furthermore, the newspaper weights the future profits prospects with the discount parameter $0 < \delta < 1$.

In this way, the newspaper has to decide if it publishes v or V. If it publishes v, the source continues to collaborate with the newspaper in the future, while if it publishes V, the collaboration stops. A news source prefers that V is never published. Therefore it might be optimal (or not) for the source to allow the newspaper to publish a little more than it would otherwise prefer, in order to deter the publication of V. This idea is expressed in figures 2 and 3. Figure 2 depicts the benefit for the source of sharing information with the newspaper as a function of v (the information that the source allows the newspaper to publish). Figure 3 adds to figure 2 the profits of the newspaper as a function of v. In figure 2 we convey the idea that the source gains if some, but not all, information is published. In particular, the source benefits are maximized for v^*. In turn, if newspaper publishes $v^{Pub} = V > v^*$, the source loses. Interacting this with what the newspaper gains from collaborating with the news source, we can obtain something like in figure 3. The profits of the newspaper if it collaborates with the source, Π_v, obviously increase with v. However, as can be seen from equation 1, the profits of the newspaper if it does not collaborate with the source, Π_V, do not depend on v. Figure 3 then shows a threshold level of information, $\bar{v}$, which promotes cooperation of the newspaper with the source. In fact, for $v < \bar{v}$, the newspaper has incentives to publish all the information it has acquired (V) and break the relationship with the source in the future. While the opposite occurs for $v \geq \bar{v}$.

In this sense, the news source might have incentives to allow the newspaper to publish $v = \bar{v} > v^*$ so that the newspaper does not publish V. Note however, that we do not model this in our paper. We just analyze how the

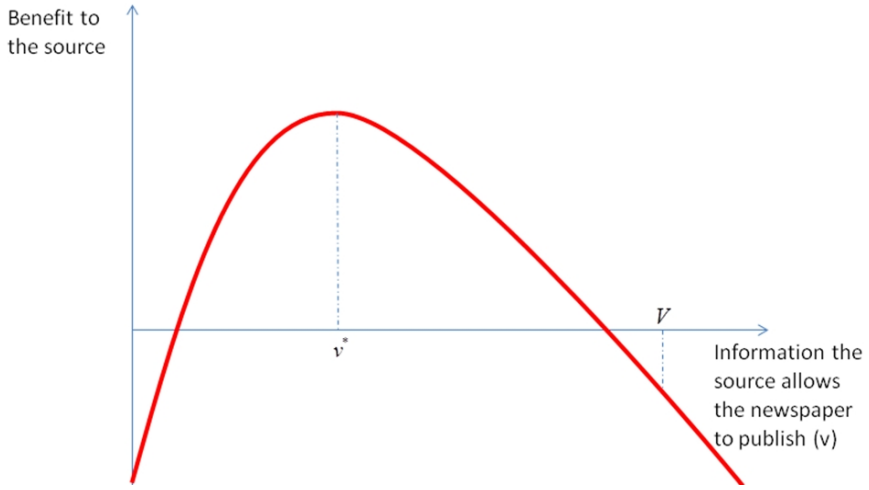

Figure 2: Benefit to the source for providing information

threshold level of cooperation ($\bar{v}$) changes under different scenarios. Accordingly, when $\bar{v}$ is lower the source can more easily guarantee the cooperation of the newspaper, since the former needs to release less information to guarantee that the newspaper does not publish V. In this sense, when cooperation between the newspaper and the source arises due to a low $\bar{v}$, media bias is also higher, given that the difference between V and v^{Pub} is higher. When $\bar{v}$ is higher the opposite occurs.

In the next sections, we analyze how media bias is affected by market structure in the media market (monopoly, duopoly and differences in size between newspapers and the ability of the media firms to influence public opinion) and the particularities of the news sources (uncertainty about the accuracy of the information passed by the news sources, number of sources, sources with antagonist and non-antagonist objectives, sources with different political leanings, and primary and secondary sources).

4 Media Market

In this section we look to the issues that arise from market structure in the news market. In particular we look at the monopoly case, at the duopoly case, at asymmetries between media outlets and to the ability of the media

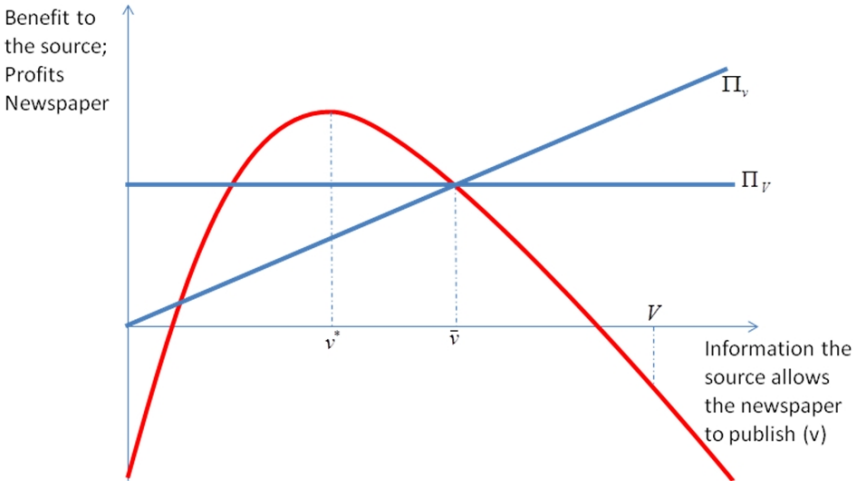

Figure 3: Benefit to the source *versus* profits of the newspaper

firms to influence public opinion.

4.1 Monopoly in the news sector

In the case of a monopoly in the news sector and just one source, we have that the monopolist profit if it reports $v^{Pub} = V$ equals:

$$\Pi_V = \pi + \alpha + \tfrac{\pi\delta}{1-\delta}. \tag{2}$$

In turn, if the newspaper just publishes $v^{Pub} = v$:

$$\Pi_v = \tfrac{\pi+\alpha-\beta(V-v)}{1-\delta}. \tag{3}$$

The newspaper then cooperates with the source if:

$$\tfrac{\pi+\alpha-\beta(V-v)}{1-\delta} > \pi + \alpha + \tfrac{\pi\delta}{1-\delta}. \tag{4}$$

Or solving equation 4 for v:

$$\bar{v}_{Mon} > V - \tfrac{\alpha\delta}{\beta}, \tag{5}$$

where $\bar{v}_{Mon}$ stands for the threshold level of information that promotes the newspaper to cooperate with the source under monopoly. From equation 5,

since $v > 0$, we can observe that cooperation is always assured if $(V\beta - \alpha\delta) < 0$. In turn, cooperation is not always guaranteed if $(V\beta - \alpha\delta) > 0$, which occurs for $\bar{V} > \frac{\alpha\delta}{\beta}$. The following proposition can then be stated.

Proposition 1 *Under monopoly, the newspaper cooperates with a media sources (i.e.: media bias increases) when: the source allows the newspaper to publish a lot of information (high v); the total available information is not very large (low V), the readers' preference for truth is low (low β), the demand for news is high (high α) and the newspaper is very patient (high δ).*

4.2 Duopoly in the news sector

In the monopoly case the source and the newspaper are stuck with each other, since none of them has an outside option. With competition in the news sector, the source might gain an upper-hand, once if a newspaper breaks the informal agreement, the source can punish this newspaper by going to rivals.

In this section, we look to the case of a duopoly in the media sector, but continue with the case of just one source. We analyze the case of more than one source in a subsequent section. We assume that if the newspaper publishes V, instead of v, it suffers a negative shift on future payoffs equal to $D\pi$. This is so because the source can start to cooperate with the rival newspaper. In this sense, $0 < D < 1$ is a proxy for how close substitutes the two newspapers are (with $D = 0$ if newspapers are no substitutes and $D = 1$ if newspapers are perfect substitutes). Note that given the symmetry, we can just focus in one of the duopolists. Equations for the rival firm are similar.

As a result, we have that the profit of the newspaper if it reports v is like in the case above (equation 3). However, now if the newspaper publishes V, the profits are:

$$\Pi_V = \pi + \alpha + \tfrac{\pi(1-D)\delta}{1-\delta}. \tag{6}$$

The newspaper cooperates with the source if:

$$\tfrac{\pi+\alpha-\beta(V-v)}{1-\delta} > \pi + \alpha + \tfrac{(\pi(1-D))\delta}{1-\delta}. \tag{7}$$

The source can therefore encourage cooperation with the newspaper when (solve equation 7 for v):

$$\bar{v}_{Duo} > V - \frac{(\alpha+\pi D)\delta}{\beta}, \tag{8}$$

where $\bar{v}_{Duo}$ stands for the threshold level of information that promotes the newspaper to cooperate with the source under duopoly. From equation 8, we have that cooperation can always be assured if $\beta V - (\alpha + \pi D)\,\delta < 0$. In turn, cooperation is not always guaranteed if $\beta V - (\alpha + \pi D)\,\delta > 0$. The following proposition then arises.

Proposition 2 *Under duopoly, a newspaper cooperates with a media source in the same way as under monopoly in what respects the parameters V, β, α and δ. The difference in the duopoly case is that cooperation with the source is promoted (i.e.: media bias tends to increase) when the two newspapers are very close substitutes (high D) and the profits from regular editions are high (high π).*

In other words, if newspapers target very similar audiences (i.e.: they are close substitutes), the likeness of cooperation with the source is also higher. Similarly, when the revenues from regular editions are large, newspaper can lose a lot to rivals if they do not cooperate with the sources.

We can also compare the cooperation incentives under monopoly and duopoly:

$$\bar{v}_{Mon} - \bar{v}_{Duo} = \frac{\delta D\pi}{\beta} > 0. \tag{9}$$

The next proposition can then be stated.

Proposition 3 *A newspaper incentive to cooperate with a media source is larger (i.e.: media bias is potentially higher) under duopoly than under duopoly, since $\bar{v}_{Mon} - \bar{v}_{Duo} > 0$.*

In this sense, under duopoly, a source can provide less information than under monopoly. Under competition in the media sector, cooperation with sources is easier to be sustained, because newspapers can lose more. However, as a result, the media bias is larger. Competition in the media sector can then undermine media bias when sources are important suppliers of journalistic information.

4.3 Newspapers with asymmetric size

In the duopoly case above, the two newspapers were symmetric in size. However, in the real world media outlets are very often asymmetric in size. In this section, we investigate if size asymmetries between newspapers have any consequences for cooperation between sources and newspapers, and in the end media bias.

We then assume that newspaper 1, N_1, reaches more readers than newspaper 2, N_2. N_1 is then the larger newspaper. Due to this, N_1 has less potential to increase income than N_2, since it is closer to cover the entire market. In this sense, we define $0 < a < 1$, which represents how much less N_1 can increase income than N_2 when the latter uses news sources. In particular, we assume that when N_2 (the smaller newspaper) publishes the information from the source (either v or V), the profits are fully realized. In turn, when N_1 (the larger newspaper) publishes the information from the source (either v or V), the profits are discounted by a.

For N_1 and N_2, the profits from cooperation with the source equal:

$$\begin{aligned} \Pi_{v,1} &= \tfrac{\pi+a(\alpha-\beta(V-v))}{1-\delta} \\ \Pi_{v,2} &= \tfrac{\pi+(\alpha-\beta(V-v))}{1-\delta}. \end{aligned} \tag{10}$$

In turn, if N_1 and N_2 do not cooperate with the source their payoffs are:

$$\begin{aligned} \Pi_{V,1} &= \pi + a\alpha + \tfrac{(\pi(1-D))\delta}{1-\delta} \\ \Pi_{V,2} &= \pi + \alpha + \tfrac{(\pi(1-aD))\delta}{1-\delta}. \end{aligned} \tag{11}$$

N_1 and N_2 then cooperate with the source if, respectively:

$$\begin{aligned} \tfrac{\pi+a(\alpha-\beta(V-v))}{1-\delta} &> \pi + a\alpha + \tfrac{(\pi(1-D))\delta}{1-\delta} \\ \tfrac{\pi+(\alpha-\beta(V-v))}{1-\delta} &> \pi + \alpha + \tfrac{(\pi(1-aD))\delta}{1-\delta}. \end{aligned} \tag{12}$$

Solving the two previous equations for v, we obtain:

$$\begin{aligned} \bar{v}_1 &> V - \tfrac{(a\alpha+\pi D)\delta}{a\beta} \\ \bar{v}_2 &> V - \tfrac{(\alpha+\pi aD)\delta}{\beta}, \end{aligned} \tag{13}$$

where $\bar{v}_1$ and $\bar{v}_2$ stand for the threshold levels of information that promotes the larger (N_1) and the smaller (N_2) newspaper to cooperate with the source, respectively. From equation **??** it comes out that for N_1 cooperation is always assured if $a\beta V - (a\alpha + \pi D)\,\delta < 0$. In turn, cooperation is not always guaranteed if $a\beta V - (a\alpha + \pi D)\,\delta > 0$. For N_2 (equation 13) cooperation is assured if $\beta V - (\alpha + \pi aD)\,\delta < 0$. For $\beta V - (\alpha + \pi aD)\,\delta > 0$, cooperation of N_2 is not always guaranteed. The following proposition then holds.

Proposition 4 *In a duopoly with newspapers with asymmetric sizes, the larger (N_1) and the smaller (N_2) newspaper behave in the same way as in the previous cases in what concerns v, V, α, δ, β, D and π. However, in what relates to a (how much less N_1 can increase income than N_2, when the latter uses news sources), the two newspapers behave asymmetrically. For N_1, cooperation with the source is promoted for low a, while for N_2 cooperation is promoted for high a.*

The above is so, since for high a, when the larger newspaper publishes the information obtained from the source (v or V) it gains a lot (see Π_{v1} and Π_{V1}) while at same time makes the smaller newspaper to lose more (see Π_{V2}). The opposite is the case for low a.

We can also compare the cooperative incentives of N_1 and N_2:

$$\bar{v}_1 - \bar{v}_2 = -\frac{(a+1)(1-a)\pi D\delta}{a\beta} < 0. \tag{14}$$

The next proposition then follows.

Proposition 5 *In a duopoly with newspapers with asymmetric sizes, the larger newspaper has more incentives to cooperate with the source than the smaller one, since $\bar{v}_1 - \bar{v}_2 < 0$.*

In this way, asymmetries in size make it easier to discipline the larger newspapers[12]. Accordingly, the larger newspaper has more to lose and less

[12]The above can suggest that news sources might prefer to look for larger than smaller newspapers, because the former are more willingly to cooperate. This result however rests on the assumption that there is only one source. As we are going to show below, with more than one source, and if sources have conflicting objectives, a source that wishes to release more information than another one might go to a smaller newspaper. This is so since the source has more chances with the smaller than with the larger newspaper to see the information published (the larger newspaper does not want to alienate the source

to gain by breaking the cooperation with the source. This means that we expect greater media bias when a newspaper is larger. On the contrary, asymmetries in size make it more difficult to discipline the smaller newspaper. The rationale is that the smaller newspaper has more to gain and less to lose by breaking cooperation. In this sense, we should anticipate smaller media bias when a newspaper is smaller.

4.4 Manufacturing consent

So far we have assumed that readers can perfectly identify the truth (V) and that nothing can change their views. We have argued about the convenience of this assumption, since if anything it reduces the chances of media bias. However, one of the most debated topics in media economics is the ability of media firms to change consumers' views. For instances, Herman and Chomsky (1998) argue that news agencies and news firms are in the business of "manufacturing consent".

In order to capture this view we make $0 < c < 1$ a variable that represents how much the newspaper can change readers' views about the truth (V) when it just publishes what the sources want (v)[13]. The choice between to cooperate and to not cooperate with the source is now:

$$\frac{\pi+(\alpha-\beta(cV-v))}{1-\delta} > \pi + \alpha + \frac{\pi\delta}{1-\delta}. \tag{15}$$

The newspaper writes v and therefore cooperates with the source if (solve equation 15 for v):

$$\bar{v}_{Cons} > cV - \frac{\alpha\delta}{\beta}, \tag{16}$$

that wants less information to be published). We can argue that this is the case with WikiLeaks. In fact, some of the newspapers that WikiLeaks passed information admitted that every time they plan to publish something from WikiLeaks, they first consult the US authorities, to check if the information can be published (see The Economist, 2010). In this way, the WikiLeaks' sources have higher chances that their information is made public if they share the information with WikiLeaks than directly with the newspapers. In fact, even if the newspapers do not publish the information, at least it is made available in the WikiLeaks website.

[13]The results are qualitatively the same, if we assume that the newspaper can also change the views of the readers when it publishes V (and not only when it releases v). To see this compute $\frac{\pi+(\alpha-\beta(cV-v))}{1-\delta} > \pi + (\alpha + \beta V(1-c)) + \frac{\pi\delta}{1-\delta}$ for v. It can be easily checked that the resulting relation is similar to the one that follows from equation 15.

where $\bar{v}_{Cons}$ stand for the threshold level of information that promotes the newspaper to cooperate with the source, when the newspaper can influence the consumers' vision of the truth. It results that for $(Vc\beta - \alpha\delta) < 0$, cooperation with the source is always assured. While for $Vc\beta - \alpha\delta > 0$, cooperation is not always guaranteed. The following proposition can then be stated.

Proposition 6 *When the newspaper can influence the readers' views about the truth, the cooperative behavior of the newspaper with the source is the same as in the previous cases in relation to v, V, β, α and δ. However, cooperation with sources is promoted when the newspaper has a higher ability to change the readers' views about one topic (i.e.: low c).*

In fact, if we compare the thresholds levels of v under the monopoly case (equation 5) and under the manufacturing consent case (equation 16) we obtain:

$$\bar{v}_{Mon} - \bar{v}_{Cons} = V(1 - c) > 0. \tag{17}$$

The next proposition can then be written.

Proposition 7 *A newspaper incentive to cooperate with a media source is larger (i.e.: media bias is potentially higher) when it can influence readers' views about the truth, since $\bar{v}_{Mon} - \bar{v}_{Cons} > 0$.*

The above means that, as argued by Herman and Chomsky (1998), if media firms have higher persuasive behavior, media bias tends to be higher.

5 News Sources

In this section, we look to the issues that arise from the news sources' side. In particular, uncertainty about the accuracy of the information passed by the news sources, ability of the media firms to influence public opinion, antagonist and non-antagonist sources, sources with different political leanings and primary and secondary sources.

5.1 Uncertainty about the "trustfulness" of the sources' information

One issue that is central for the relation between newspapers and sources is trust. When a source passes some information to a newspaper, the newspaper many times cannot or has no time to confirm the information received. Some other times, however, when a source and a newspaper have a very close relationship, the trust can be transformed in "coziness". The consequence can be that the newspaper becomes sloppier in double-checking the information of the source. In both cases, if after the publication of a scoop, it is found that the information was false, the newspaper can suffer two types of punishment. The first is loss of credibility in the media market and associated reduction in circulation. The second is to face a libel action, which if proved in court can carry considerable monetary costs for the newspaper.

Consider then that the information given by the source to the newspaper has probability $0 < p < 1$ of being accurate and probability $(1-p)$ of being false. If the information is true, the newspaper realizes the associated payoff (if it cooperates with source $p(\alpha - \beta(V - v))$ and if it does not $p\alpha$). If the information is false the newspaper payoffs are penalized in $(1-p)P$ (if it either cooperates or not with the source). A high p might indicate that the source is trustable and a low P shows the existence of a not very severe libel law. We then have that the choice between to cooperate or not with the source is:

$$\frac{\pi + p(\alpha - \beta(V-v)) - (1-p)P}{1-\delta} > \pi + p\alpha - (1-p)P + \frac{\pi\delta}{1-\delta}. \tag{18}$$

The newspaper writes only v if (solve equation 18 for v):

$$\bar{v}_{Trust} > \frac{p(V\beta - \alpha\delta) + (1-p)\delta P}{\beta p}, \tag{19}$$

where $\bar{v}_{Trust}$ stands for the threshold level of information that promotes the newspaper to cooperate with the source, when the newspaper is uncertain about the trustfulness of the information obtained from the source. Cooperation always arises if $(p(V\beta - \alpha\delta) + (1-p)\delta P) < 0$. In turn, cooperation with the source is not always guaranteed if $(p(V\beta - \alpha\delta) + (1-p)\delta P) > 0$. The following proposition can then be stated.

Proposition 8 *When there is uncertainty about the accuracy of the source's information, the newspaper cooperative incentives in relation to the parameters α, V and v are the same as for the previous cases. The same is not the*

case in what relates with β and δ. Now, a low preference for truth (high β) and a high discount parameter (high δ) do not necessarily promote cooperation. A higher β only means a higher $\bar{v}$ (i.e.: cooperation more difficult), only for high p (high probability that the source speaks the truth) and low P (the punishment of publishing false information is low), since $\frac{d\bar{v}_{Trust}}{d\beta} = \frac{(p\alpha-(1-p)P)\delta}{p\beta^2} \gtrless 0$. Similarly, a higher δ only conduces to a lower $\bar{v}$ (i.e.: cooperation more easy), if P is low and p is high, since $\frac{d\bar{v}_{Trust}}{d\delta} = \frac{((1-p)P-p\alpha)}{p\beta} \gtrless 0$. Furthermore, high p and low P promotes cooperation.

The above results indicate that readers' preference for truth is not enough to guarantee low media bias in the market. The newspaper weights readers' preference for truth with the punishment of publishing information that is not truth and the trust that it has in the source. The same occurs with the discount parameter, δ. In this way, cooperation with the source is promoted (i.e.: media bias is increased) when the newspaper trusts the source and the punishment for false reports is not very high.

5.2 Non-antagonist sources

In the above cases, we have restricted ourselves to a set-up with just one source. Though, newspapers and journalist work regularly with more than one source. In what follows, we look at a scenario where a newspaper can have access to two sources: source 1 (S_1) and source 2 (S_2). In this section, we assume that the two sources provide different information, which is complementary to each other. However, the information supplied by one source does not conflict with the information given by the other source. The two sources also agree in relation to what they would not like to see the newspaper to publish (V). In the next section, we relax these assumptions. Note however that the scenario in this section is very common in the news media (see Manning, 2001).

In order to model the case above, we need a little change of wording. Now we have two sources that together are willing to allow the newspaper to publish v. To information v, S_1 contributes with v_1 and S_2 with v_2, i.e.: $v_1 + v_2 = v$. The information from both sources $v_1 + v_2$, then complement each other and give a better story. S_1 does not oppose to the publication of v_2. Similarly, S_2 has nothing against the newspaper to publish v_1. However, both S_1 and S_2 do not want newspaper to write V. Due to this, we say that

under this case the two sources are non-antagonists. They have a common objective of not publishing V, and they agree about what the newspaper can publish. Consider then that: $V > v_1 + v_2$. We can as such model the newspaper decision to cooperate with S_1 and S_2 as:

$$\frac{\pi+(\alpha-\beta(V-(v_1+v_2)))}{1-\delta} > \pi + \alpha + \frac{\pi\delta}{1-\delta}. \tag{20}$$

Given the symmetry, we can just analyze the newspaper decision to cooperate with S_1. The decision in relation to S_2 is just symmetric. We can demonstrate that the newspaper cooperates with S_1 and writes v_1 if (solve equation 20 for v_1):

$$\bar{v}_1 > (V - v_2) - \frac{\alpha\delta}{\beta}, \tag{21}$$

where $\bar{v}_1$ stand for the threshold level of information that promotes the newspaper to cooperate with S_1, when there are two non-antagonist sources in the market (S_1 and S_2). It can be seen that the newspaper always cooperates with S_1 if $\beta(V - v_2) - \alpha\delta < 0$. In turn, for $\beta(V - v_2) - \alpha\delta > 0$, cooperation is not always guaranteed. The next proposition follows.

Proposition 9 *In a set up with two non antagonist sources, the newspaper's cooperative incentives are similar to the previous cases in relation to v_1, V, β, α and δ. In turn, the newspaper's cooperation with S_1 is promoted the more information S_2 provides (high v_2).*

The above shows that, contrary to a very accepted view, the existence of more sources do not necessarily reduces media bias, at least when they are non-antagonists.

5.3 Antagonist sources

In the previous sub-section, we have assumed that the sources were non-antagonists in what respects the messages they wished to pass to the newspaper. Sometimes, however, the sources might oppose what the other source wants the newspaper to publish. Imagine then that again we have two sources, S_1 and S_2. S_1 provides information v_1, while S_2 supplies v_2. We assume that in the set of the information provided by S_1, v_1, includes some of the information provided by S_2, v_2, which S_1 does not want to see published. The same occurs with S_2: in the set of information provided by S_2,

v_2, there is some information provided by S_1, v_1, which S_2 does not want to see published[14]. In this sense, S_1 just wants the newspaper to publish $\hat{v}_1 = v_1 - v_2$, and S_2 just wants the newspaper to publish $\hat{v}_2 = v_2 - v_1$. In other words, when the newspaper decides to collaborate with one of the sources it has to abdicate from the other source. In any case, with the information collected from S_1 and S_2, the newspaper can gather information $V > v_1 + v_2$.

In this set-up, the newspaper has first to decide with which source it collaborates and afterwards if it just publishes what this source wants or the full information available. The decision to cooperate with S_1 or S_2 is:

$$\frac{\pi+(\alpha-\beta(V-(v_1-v_2)))}{1-\delta} > \frac{\pi+(\alpha-\beta(V-(v_2-v_1)))}{1-\delta}. \tag{22}$$

The newspaper writes v_1 if (solve equation 22 for v_1):

$$\bar{v}_1 > v_2, \tag{23}$$

where now $\bar{v}_1$ stands for the threshold level of information that promotes the newspaper to cooperate with S_1, and not S_2. In other words, cooperation with S_1 is more likely the higher v_1 is relatively to v_2. The following proposition can then be stated:

Proposition 10 *When two sources are antagonist (i.e.: they do not want the other source's information to be published), cooperation with one source is more likely the more information the source allows the newspaper to provide relatively to the other one.*

Assume that $\bar{v}_1 > v_2$. The analysis is just symmetric if the opposite occurs. The newspaper's choice to cooperate with S_1 is then:

$$\frac{\pi+(\alpha-\beta(V-(v_1-v_2)))}{1-\delta} > \pi + \alpha + \frac{\pi\delta}{1-\delta}. \tag{24}$$

The newspaper writes v_1 if (solve equation 24 for v_1):

$$\bar{v}_1^{'} > V + v_2 - \frac{\alpha\delta}{\beta}, \tag{25}$$

where $\bar{v}_1^{'}$ represents the threshold level of information that promotes the newspaper to cooperate with S_1 or not. The previous relation is always

[14] One example is when a newspaper gives a positive spin to the views from one source in detriment of another one.

satisfied (i.e.: cooperation is always assured) if $\beta(V + v_2) - \alpha\delta < 0$. In turn, cooperation might not be guaranteed if $\beta(V + v_2) - \alpha\delta > 0$. The next proposition then follows.

Proposition 11 *When two sources are antagonist, the newspaper's cooperative incentives are similar to the previous cases in relation to V, β, α and δ. The only difference relatively to the case where the sources are non-antagonists is that cooperation with one source is less likely the more information the other source supplies (v_2).*

With more sources, newspapers find it hard to please all sources. So they have to make a choice between sources. But it is difficult to choose the more valuable source. This in the end might reduce media bias since the relationship with sources is more unstable and newspapers have more incentives to release all information they have independently of what the sources want them to publish.

5.4 Left-wing and right-wing sources

So far we have considered that the demand is homogenous in terms of preferences and that sources have no ideological leaning. However, one of the main debates in the media bias literature concerns the heterogeneity of political preferences of both sources and readers. Let us define that the demand for news from left-wing readers when there is no media bias is α_L. For right-wing readers the demand in the absence of media bias equals α_R. We assume that left-wing readers do not consume right-wing news and *vice-versa*. Total potential demand in the media market when there is no media bias is then $\alpha = \alpha_L + \alpha_R$. In what concerns the sources, the left-wing source (S_L) is willing that the newspaper publishes v_L, but the information that the newspaper gathers is V_L. As before, if the newspaper publishes V_L, the left oriented source stops to collaborate with the newspaper. In turn, the right-wing source (S_R) only wants v_R to be made available to the public, but the newspaper can get hold to V_R. The central assumption is that if the newspaper chooses to position itself in the left (either because it chooses S_L or publishes news with left-wing leaning), it will alienate the right-wing source in the future.

Without loss of generality, we analyze the newspaper decision to collaborate with S_L. The decision to collaborate with S_R is just symmetric. The newspaper then collaborates with S_L and not S_R if:

$$\frac{\pi+(\alpha_L-\beta(V_L-v_L))}{1-\delta} > \frac{\pi+(\alpha_R-\beta(V_R-v_R))}{1-\delta}. \quad (26)$$

The newspaper writes v_L if (solve equation 26 for v_L):

$$\bar{v}_L > V_L - (V_R - v_R) + \frac{\alpha_R-\alpha_L}{\beta}, \quad (27)$$

where $\bar{v}_L$ stands for the threshold level of information that promotes the newspaper to cooperate with S_L, and not with S_R. We then have that the newspaper always collaborates with S_L if $V_L - (V_R - v_R) + \frac{2(\alpha_R-\alpha_L)}{\beta} < 0$. In turn, for $V_L - (V_R - v_R) + \frac{2(\alpha_R-\alpha_L)}{\beta} > 0$, cooperation is not always assured. The following proposition can be stated.

Proposition 12 *In a market with right-wing and left-wing readers, cooperation with S_L in relation to S_R is promoted for: small V_L relatively to v_L (the difference between available and publishable information from S_L is not very large); high α_L (high demand for S_L news); low α_R (low demand for S_R news); low v_R relatively to V_R (the difference between available and publishable information from S_R is very large). In turn, contrary to most of the cases above, low β (low preference for truth) only promotes cooperation with S_L if $\alpha_R < \alpha_L$, since $\frac{d\bar{v}_L}{d\beta} = -\frac{2(\alpha_R-\alpha_L)}{\beta^2}$. If there is more demand for right-wing news, the newspaper only chooses S_L, if the preference for truth is high.*

In other words, media bias is influenced by the amount of information released by each source and the ideological bias of the readers. Furthermore, readers' preference for truth can be balanced by demand patterns.

Without loss of generality, consider that the newspaper decides to choose S_L to S_R. The opposite case is just symmetric. The decision to collaborate with S_L (i.e.: publish v_L) and not collaborate (i.e.: publish V_L) is then:

$$\frac{\pi+(\alpha_L-\beta(V_L-v_L))}{1-\delta} > \pi + \alpha_L + \frac{\pi\delta}{1-\delta}. \quad (28)$$

The newspaper then writes v_L if (solve equation 28 for v_L):

$$\bar{v}_L^{'} > V_L - \frac{\delta\alpha_L}{\beta}, \quad (29)$$

where $\bar{v}_L^{'}$ represents the threshold level of information that promotes the newspaper to cooperate with S_L or not. We then have that for $V_L - \frac{\delta\alpha_L}{\beta} < 0$, cooperation with S_L is always assured. In turn, for $V_L - \frac{\delta\alpha_L}{\beta} > 0$, cooperation is not always guaranteed. The following proposition can be stated.

Proposition 13 *In a market with right-wing and left-wing readers, the newspaper has higher incentives to cooperate with S_L when: S_L allows a lot of information to be published relatively to the total information available (high v_L in relation to V_L); when the newspaper is patient (high δ); when the demand for left-wing news is large (high α_L); and when the preference for truth is low (small β).*

It can be easily noted that the condition 29 is the same as for the central case (see equation 5). The only difference is that now what counts is the demand for news from a particular political area (i.e.: α_L), and not total demand in the market (α). In a market with right-wing and left-wing readers, then, a newspaper's incentives to cooperate with a source with a certain political leaning (i.e.: higher media bias) increases with the demand for news with this political orientation.

5.5 Primary *versus* secondary sources

In the sociology of news literature, the sources are usually divided between primary and secondary sources (see Manning, 2001). Primary sources are defined as the sources that newspapers rely more frequently in order to write news. Due to this, the primary sources have preferable access to the news organizations. In turn, secondary sources are characterized for not having such easy access to the news media, but once in a while provide important scoops and information to newspapers. In this sense, news media do not rely so often in secondary sources for their daily news routines.

The importance of secondary sources is that if newspapers only rely in the primary sources to obtain information, then as discussed in the introduction a problem of media pluralism arises (and not only media bias). In this section, we then analyze the role of primary and secondary sources on the relation between news agencies, sources, media bias and media pluralism.

We assume two sources: the primary source (S_P) and the secondary source (S_S). S_P generates important information for the newspaper in a regular basis (like unemployment rates, economic growth figures, crime rates and so on). The demand for the news obtained from S_P without media bias is α_P. S_P only wishes the newspaper to publish v_P, however, the newspaper can have access to information of value V_P. In turn, the information obtained from S_S some of the times is very valuable, since it generates high demand α_{SH}. Other times S_S supplies newspapers with information with very low

demand, α_{SL} (with $\alpha_{SH} > \alpha_P > \alpha_{SL}$). The probability of the high demand state is x, while that of low demand is $(1-x)$. In either case (of low demand or high demand), the secondary source's information allows the newspaper to obtain V_S, but S_s only desires that just v_S is published.

Let us first take a scenario where if the newspaper decides to collaborate with the S_P it alienates S_S, and *vice-versa*. If this is so, the decision of the newspaper to collaborate with S_S is:

$$\frac{\pi+(x\alpha_{SH}+(1-x)\alpha_{SL}-\beta(V_S-v_S))}{1-\delta} > \frac{\pi+(\alpha_P-\beta(V_P-v_P))}{1-\delta}. \tag{30}$$

The newspaper then writes v_S if (solve equation 30 for v_s):

$$\bar{v}_S > V_S - (V_P - v_P) + \frac{\alpha_P-(x\alpha_{SH}+(1-x)\alpha_{SL})}{\beta}, \tag{31}$$

where $\bar{v}_S$ stands for the threshold level of information that promotes the newspaper to cooperate with S_S and not S_P. We can easily see that cooperation is always assured if $V_S - (V_P - v_P) + \frac{\alpha_P-(x\alpha_{SH}+(1-x)\alpha_{SL})}{\beta} < 0$. In turn, cooperation is not guaranteed if $V_S - (V_P - v_P) + \frac{\alpha_P-(x\alpha_{SH}+(1-x)\alpha_{SL})}{\beta} > 0$. The following proposition can then be stated.

Proposition 14 *In a news market with a primary (S_P) and a secondary (S_S) source, the newspaper incentives to cooperate with S_S is promoted if: high v_S relatively to V_s (S_s allows the newspaper to publish a great part of the information available); high V_P in relation to v_P (S_P only wishes that the newspaper prints a small part of the existing information); high α_{HS} and α_{LS} (the demand for information from S_S is high in both the low and the high states of demand); low α_P (the demand for news from S_P is low); and high x (high probability of the high state of demand). In what concerns the preference for truth parameter, again β has an ambiguous effect on the collaborative decision of the newspaper. In fact, high β (high preference for truth) only discourages cooperation with S_S if $\alpha_P < x\alpha_{HS}+\alpha_{LS}(1-x)$, since then $\frac{d\bar{v}_S}{d\beta} > 0$.*

The above shows that the access of secondary sources to the news market depends on how much these sources allow the newspaper to publish relative to primary sources and on the demand for news from secondary sources relatively to the one from primary sources. Furthermore, in the presence of primary and secondary sources, newspapers can downplay truth for demand.

Let us look now to a case where the newspaper only considers if it should collaborate with the S_S or not (i.e.: we now disregard S_P). This decision can be defined as:

$$\frac{\pi+(x\alpha_{SH}+(1-x)\alpha_{SL}-\beta(V_S-v_S))}{1-\delta} > \pi + x\alpha_{SH} + (1-x)\,\alpha_{SL} + \frac{\pi\delta}{1-\delta}. \quad (32)$$

The newspaper writes v_S if (solve equation 32 for v_s):

$$\bar{v}_S^{'} > V_S - \frac{\delta((x\alpha_{SH}+(1-x)\alpha_{SL}))}{\beta}. \quad (33)$$

where $\bar{v}_S^{'}$ stands for the threshold level of information that promotes the newspaper to cooperate with S_S (independently of S_P). From the previous equation we have that cooperation is always assured if $V_S - \frac{\delta((x\alpha_{SH}+(1-x)\alpha_{SL}))}{\beta} < 0$. However, cooperation is not guaranteed for $V_S - \frac{\delta((x\alpha_{SH}+(1-x)\alpha_{SL}))}{\beta} > 0$. The next proposition follows.

Proposition 15 *In a news market with a secondary source, the newspaper's incentive to cooperate with S_S is more likely for: low β (low preference for truth); high v_S in relation to V_s (S_S allows the newspaper to publish a great deal of the available information); high α_{HS} and α_{LS} (the demand for news from S_S is high in both the high and the low demand states); high δ (newspaper is patient); and high x (high probability of the high state of demand).*

It can be easily checked that the case where the newspaper always collaborates with S_P, whatever or not it collaborates with S_S, is the same as the previous case. In fact, under this case the newspaper would compare:

$$\frac{\pi+(x\alpha_{SH}+(1-x)\alpha_{SL}-\beta(V_S-v_S))+(\alpha_P-\beta(V_P-v_P))}{1-\delta} > x\alpha_{SH} + (1-x)\,\alpha_{SL} + \frac{\pi+(\alpha_P-\beta(V_P-v_P))}{1-\delta}. \quad (34)$$

Solving the previous equation for v_S, we obtain the same equation as equation 33.

The above cases, however, ignore that primary and secondary sources are sometimes also complementary. In other words, newspapers publish information from both primary and secondary sources. If this is so, the newspaper decision to collaborate or not with a source is the following:

$$\frac{\pi+(x\alpha_{SH}+(1-x)\alpha_{SL}-\beta(V_S-v_S))+(\alpha_P-\beta(V_P-v_P))}{1-\delta} > \pi + x\alpha_{SH} + (1-x)\,\alpha_{SL} + \alpha_P + \frac{\pi\delta}{1-\delta}. \quad (35)$$

Given the symmetry, we can just analyze the decision to collaborate with S_S. The choice to collaborate with S_P is just symmetric. The newspaper writes v_S if (solve equation 35 for v_s):

$$\bar{v}_S'' > V_S + (V_P - v_P) - \frac{\delta(\alpha_P+x\alpha_{SH}+(1-x)\alpha_{SL})}{\beta}. \quad (36)$$

where $\bar{v}_S''$ stands for the threshold level of information that promotes the newspaper to cooperate with S_S, when S_S is complementary to S_P. It results that the newspaper always cooperates with S_S if $V_S + (V_P - v_P) - \frac{\delta(\alpha_P+x\alpha_{SH}+(1-x)\alpha_{SL})}{\beta} < 0$. Cooperation, however, is not guaranteed if $V_S + (V_P - v_P) - \frac{\delta(\alpha_P+x\alpha_{SH}+(1-x)\alpha_{SL})}{\beta} > 0$. We can then write the next proposition.

Proposition 16 *When S_P and S_S are complementary, the newspaper's incentive to cooperate with S_S is promoted for: low β (low preference for truth); high v_s in relation to V_s and high v_P in relation to V_P (both sources are willing to allow the newspaper to publish a significantly amount of the information released); high α_P, α_{HS} and α_{LS} (the demand for the news from S_P and for the news from S_S in both the high and the low demand states is high); high δ (newspaper is patient); and high x (low probability of the high state of demand).*

When this is the case, the decision to cooperate with the secondary source is then reinforced by the existence of the primary source.

6 Discussion

In this paper, we have analyzed how the relation between news sources and media organizations affects media bias and media pluralism. We have argued that the main characteristic of this relation is one based on non-economic exchange, trust, negotiation, punishment, threats, confidentiality and secrecy.

We have explored the informal nature of contracts between news sources and journalists in different contexts: monopoly *versus* duopoly; size asymmetries between media organizations; uncertainty about the accuracy of the

information passed by the news sources; ability of the media firms to influence public opinion; number of sources; antagonist *versus* non-antagonist sources; sources with different political leanings (left- *versus* right-wing); and primary *versus* secondary sources.

In this sense, we have introduced in the literature a new source for media bias: news sources. As discussed in the introduction the focus in the literature has been in supply side media bias, such as journalists private information (Baron, 2005, 2006), interest groups (Besley and Prat, 2006) and advertisers' pressure (Gabszewicz et al., 2001), and demand side media bias, like readers' prior beliefs (Mullainathan and Shleifer, 2005). The study of news sources in the context of media bias is particularly important since news agencies are very dependent on the information they provide.

We have showed that cooperation with news sources is more likely (and media bias potentially higher) when: competition in the media market for sources increases; a newspaper is dominant in the news market; penalties for false news are extremely low and sources have a reputation of providing accurate information (or news sources have a cozy relationship with the newspapers); the media organizations can influence readers' opinions; news sources are non-antagonists; the political leaning of a source is met with higher demand. Also, access to the media by secondary sources is promoted (i.e.: medial pluralism can increase) when they can provide relevant information to newspapers relative to primary sources.

Given that public intervention is difficult or not desirable in what concerns news sources, these results show that: competition in the news market does not guarantee a solution for media bias originated from news sources; in turn, small players in the news market, libel laws, less malleable audiences and secondary sources can be salutary to deter media capture by news sources.

In what concerns the fundamentals of the model, we have seen that higher demand for news independently of the truthfulness of reports (for example, sensationalist news) tend to increase media bias, given that news organizations lose less by concealing information that hurts the news sources. In turn, while consumers' preference for truth and newspapers' discount of the future tend to decrease media bias, this is not always the case. In particular, preference for truth and a high discount parameter might not reduce media bias, when the probability of penalties for false reports is high. Also, preference for truth also loses the power to reduce media bias, when readers have biased political preferences.

In terms of future work, there are some issues that need to be further

explored. In particular, the role of other supply and demand side forces for media bias, such as media owners' political preferences and advertisers' pressures and readers' political priors. For instances, media owners' political preferences might give an advantage to primary official sources over secondary sources, or vice-versa. Similarly, advertisers' pressures might reinforce the seclusion of information from sources if these affect the commercial interests of the advertisers. In turn, readers' political priors can either lead to a more fragmented or more homogenous media market in terms of the political views that have a voice in the news market via media sources. Finally, given that the role of competition in the media market is substantial different from that in other conventional industries, further work should be done on the role of competition policy and regulation in the news market.

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