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Abstract

Bias in the market for news is a well documented phenomenon. Based on the assumption that consumers want non-partisan, unbiased information, traditional economic theory cannot explain media bias in free societies as it suggests that competition forces media to be unbiased. Recent research in economics proposes an alternative theory assuming that consumers want to read (watch) news that is consistent with their tastes or prior beliefs rather than to seek information about the truth (Mullainathan and Schleifer, 2005). The present paper builds on this idea but recognizes the dual nature of news consumption. Specifically, in contrast to Mullainathan and Schleifer (2005), besides 'biased' consumers we also assume the presence of 'conscientious' consumers whose sole interest is in knowing the truth. Furthermore, consistent with reality, we assume that media bias is constrained by the truth. These two factors were expected to limit media bias in a competitive setting. Our results reveal the opposite. Specifically, we find that media bias increases when there are more conscientious consumers. However, this increased media bias does not necessarily hurt conscientious consumers who may be able to recover more information from multiple media outlets, the more these are biased.

Keywords: information goods, complements, media competition, media positioning.

1 Introduction

"The largest opinion is what we leave out."— CBS reporter Betsy Aaron.

In September, 2004, during the US presidential campaign, the Texans for Truth group began airing television ads questioning whether President Bush fulfilled his military obligations in the National Guard. Fox News reported:

Fox News, Tuesday, September 14, 2004— *President Bush's National Guard record is now under assault by a group calling itself Texans for Truth. The group is a branch of DriveDemocracy, an Austin-based organization that has received seed money from the liberal-leaning anti-Bush group, MoveOn.org. ...The group this week is releasing an ad in which a former lieutenant in the Alabama Air National Guard says neither he nor his friends saw Bush when he supposedly was with their unit in 1972. The president served as a pilot with the Texas Air National Guard and sought a transfer in 1972 to work on a political campaign.*

On the same day, CNN's report said:

CNN, Tuesday, September 14, 2004— *The founder of the group Texans for Truth said Tuesday that he is offering $50,000 to anyone who can prove President Bush fulfilled his service requirements, including required duties and drills, in the Alabama Air National Guard in 1972. ...the Texans for Truth group began airing television ads questioning whether Bush fulfilled his military obligations. Its name is a takeoff on Swift Boat Veterans for Truth, which has been airing ads questioning the military record of Democratic nominee Sen. John Kerry. That group's allegations are at odds with the official Navy records and Kerry's former crew mates.*

Examples like the above abound and cover a variety of topics. Gentzkow and Shapriro (2004), for instance, reports a similar case in the context of the Iraqi war, comparing reports on the

same event by Fox News, The New York Times and Al Jazeera. A common feature among these alternative reports is that, while they are factually correct they convey very different messages and stimulate radically different impressions about the events. This is achieved by selective omissions and differing emphasis. The different impressions created from an objective event by *slanting* information is what we call media bias, which is the subject of the present paper. In particular, we study media bias in the context of news provided by *competing* media outlets.

Media bias in the context of news is well-documented. In the domain of U.S. politics, Goldberg (2002) and Coulter (2003) document media bias on the left, while Alterman (2003) and Franken (2003) argue that the US media is biased towards the right. Apart from political news, media bias is also present in other domains. Sport game commentaries, for example, vary greatly across hosting cities.

The strong and visible existence of media bias is a challenge for marketing. The media - including news - constitute the central 'infrastructure' for marketing in that it has a key role in disseminating information about products and services. Media is where most advertising takes place, representing billions of dollars of business in the US alone. Besides marketing, the media (especially news) are the key source of information for society and, as such, are critical for a well functioning democracy. In this context, the existence of media bias raises several important questions. What consumer behavior drives media bias? How can it persist under media competition in a free society? What are the social costs of biased media? These are the general questions addressed in this paper.

We are not the first to ask these and similar questions. Media bias in the context of news has received increasing attention in recent years. In particular, Gabszewicz et al. (2001) and Mullainathan and Shleifer (2005) provide a simple explanation for its persistence. They point out that a great deal of news is describing events that are of little relevance to the audiences' daily decision making. Rather, their role is more to provide entertainment to the public. Furthermore, audiences spend little effort processing the information in the news. In this context, news providers can slant the news to attract audiences with preferences towards certain news content.

That news needs to be embellished in a "story" and needs to be explained and interpreted for the audience is broadly accepted and practiced by the media. It is commonly called the "narrative imperative" by the news industry (Hayakawa 1990, Jensen 1979, Graber 1984, Hamilton 2003, Severin and Tankard 1992).

If consumers look for entertainment in the news and their tastes vary for certain stories, then the narrative imperative results in media bias even under free media competition. In this framework, media bias is conceptually identical to media positioning. Under competition and heterogeneous consumer preferences for certain news, the outcome is media differentiation: each competing medium satisfies the preferences of different consumer segments. Anecdotal evidence is consistent with this view. Figure 1, for example, is adopted from a survey conducted by Pollingpoint in 2004, using online interviews with 73,969 US adults, aged 18 or older. It roughly describes the relationship between consumers' political identity (democrat vs. republican) and their valuations of different TV networks. Nine in ten Republicans say Fox News offers the best news coverage among television networks. Democrats divide their loyalty among PBS and CNN, with nearly 70% naming one of the two as the best news source. The chart suggests that different consumers prefer different news, i.e. there clearly seems to be demand for certain news by different segments of consumers. Media firms then slant and provide biased news to cater to this demand.[1]

While the above interpretation of media bias is consistent with anecdotal evidence it neglects two important factors. First, it does not consider the cost of slanting. In a free democracy however, such costs are not negligible. Media cannot outright lie about events to please its audiences. As such, media may not be able to always achieve the positioning desired by its target segment. Similarly, even if a biased view can be conveyed by appropriate slanting of the news, such bias should come at a cost to the media outlet. These costs should limit the extent of media bias.

[1] According to former Fox News producer, Charlie Reina,"The roots of Fox News Channel's day-to-day on-air bias are actual and direct. They come in the form of an executive memo distributed electronically each morning, addressing what stories will be covered and, often, suggesting how they should be covered (see PoynterOnline: www.poynter.org).

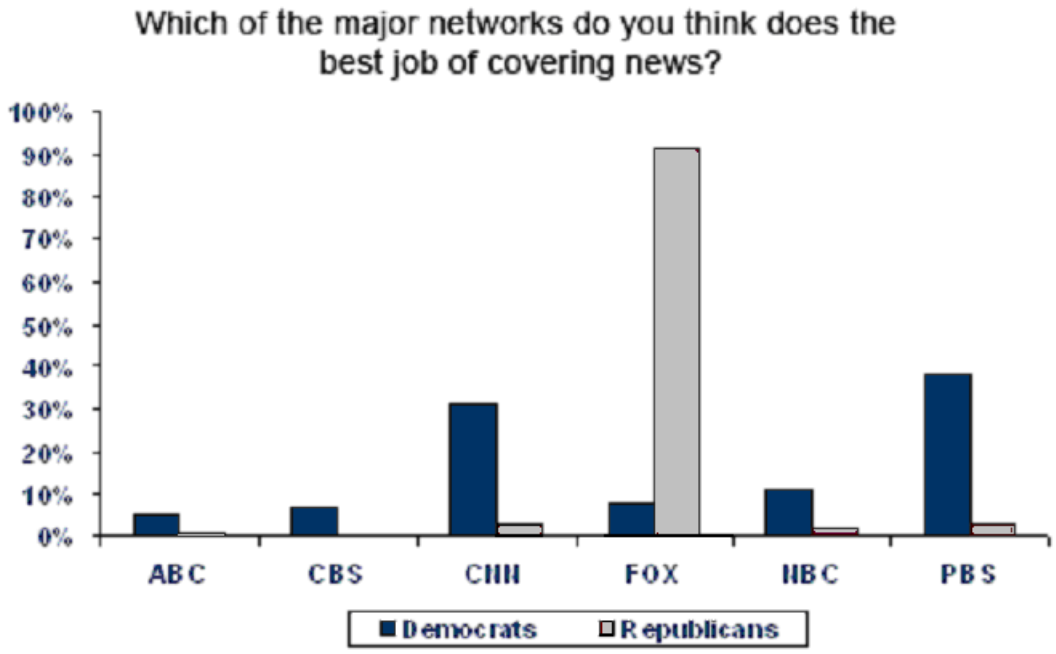

Figure 1: Consumer self-identity and liking of TV networks.

Second, and more importantly, the above view on media bias assumes that *all* people consume news for 'entertainment'. Empirical evidence clearly shows that this is not the case. In a careful study, for example, Vigna and Kaplan (2005) point out that the conservative Fox News has limited impact on its audience's voting decisions. This suggests that at least some people correct for media bias when it comes to decision making. There is also evidence that a substantial proportion - up to 20% - of consumers cross-check media with opposite political orientation.[2] One would assume that in the presence of these 'conscientious' consumers, the media has less incentive to slant in a competitive setting. One of our key findings is that this is not necessarily the case. In fact, under some conditions, higher proportion of conscientious consumers may actually *increase* media bias.

In sum, the main research questions asked in this paper are the following. What happens to media bias under competition if (i) slanting is costly and constrained by the truth and (ii) news

[2]This is confirmed by surveys from the Pew Research Center for People and Press, which regularly measures people's media consumption behavior as well as their attitudes towards the main media outlets in the US. Data source: Pew Media Consumption Survey 2000, 2002, 2004.

represents information for some consumers but entertainment for others? How will the relative proportions of these consumers affect the extent of bias in the news market and media prices? Finally, how will media bias in turn affect conscientious consumers' ability to recover the truth from the available news?

To answer these questions we develop a model with two competing media outlets, selling news to a dual market with two kinds of consumers. The first kind of consumer has heterogenous beliefs about the world and wants to read/watch news that is consistent with these beliefs. The second kind of consumer is conscientious and simply wants to know the truth. Media outlets are modeled as firms who package the available information about exogenous events in a news report that has finite length. Specifically, pieces of unbiased, independent (albeit noisy) information about events reach the media outlets at a constant rate. Media firms can choose how much of this information they want to acquire with more information being more costly. Subsequently, and only if they have enough information available, media outlets can strategically omit certain pieces of information to fill the news report. Biased consumers choose media outlets based on prices and the media's advertised media stance (i.e. the position that the media aspires to fulfill with slanting). Conscientious consumers also consider prices and media stances albeit they will use the latter to infer the truth from the slanted news.

Consistently with Mullainathan and Shleifer (2005), we find that media bias can be a result of biased consumers' heterogeneity in beliefs. However, we find that this consumer heterogeneity can increase media bias depending on the proportion of conscientious consumers and the media firms' cost of acquiring more information. Interestingly, we find that media bias increases when there are more conscientious consumers. However, it turns out that even with higher media bias, conscientious consumers may actually recover more information about the truth than with less biased media. Consequently, media bias may actually increase information efficiency although it may also increase media prices.

The paper is organized as follows. In the next section, we briefly review the relevant literature. Then, we present the model followed by its analysis. We explore three cases: a monopolist

medium, a competitive setting with a symmetric equilibrium where both media slant and an asymmetric equilibrium with only one biased medium. The paper ends with a discussion of the key results and concluding remarks. To ease the exposition, most mathematical details have been relegated to an appendix that is available from the authors.

2 Relevant Literature

The traditional view on news consumption is that people seek accurate and unbiased information. Historians, sociologists and economists traditionally view the consumption of news as satisfying a basic human impulse. Being aware of what is happening beyond people's direct experience engenders a sense of security, control, and confidence. Mass media, having emerged from satisfying this intrinsic human need, serves as the major channel for informing citizens. For example, journalists agree that "the central purpose of journalism is to provide citizens with accurate and reliable information they need to function in a free society."[3] Within this paradigm, media bias shouldn't exist in a free and competitive environment. Indeed, if accurate and reliable information is what consumers want from and what journalists provide in news, then the media will compete on these relevant dimensions (Coase 1974, Besley and Burgess 2004, Stromberg 2001, Dyck and Zingales 2002). Since any biased news will decrease information accuracy and consumers' capacity to estimate the underlying truth, classic economic theory suggests that media competition will eliminate biases in the news if media is free and not influenced by outside forces.[4]

Recently, media bias has been revisited by the economics literature.[5] In an earlier paper Gabszewicz et al. (2001) consider the demand for advertising in the press and study the political

[3]See "A Statement of Shared Purpose" on www.journalism.org.

[4]Of course, government influence or control is also an important source of media bias (Gentzkow et al. 2004) as is media ownership (Besley and Prat 2006, Djankov et al. 2003).

[5]Despite being an important topic, media bias has been largely neglected by marketing. In the relatively narrow domain of political marketing, the literature has mostly focused on issues related to the effectiveness/efficiency of campaign advertising (Sheinkopf et al. 1972, Rothschild 1978, Chapman and Palda 1984) and voter behavior (Newman and Sheth 1985). In a recent article, Crockett and Wallendorf (2004) study the impact of political ideology on consumer behavior.

opinions of competing newspapers in a Hotelling setting. More recent papers continued along this line by examining media bias under the core assumption that heterogenous consumer preferences are at the origin of the phenomenon. The most prominent among these is Mullainathan and Shleifer (2005) who assume that biased news is solely produced by slanting, i.e., the selective omission of certain information. Media bias then emerges from the optimal slanting strategies of news providers because consumers want certain (albeit different) degree and direction of slant. Thus, Mullainathan and Shleifer (2005) argue that the *extent* of media bias is mainly driven by consumer heterogeneity. This is intuitive. After all, if there is a need and demand for biased news, privately owned media will have an incentive to satisfy that need/demand. Their core result is that under media competition, while increased consumer heterogeneity may lead to increased media bias as compared to a monopoly, a hypothetical conscientious reader may be better off under media competition because by cross-checking the news s/he can obtain more accurate information. Apart from Mullainathan and Shleifer (2005), Gentzkow and Shapriro (2004) also argue that media bias may emerge from competing media catering to biased consumer beliefs but in their paper the mechanism is slightly different. In their model, consumers consider that news consistent with their prior expectations is of higher quality. In response, news providers slant news to earn a reputation for high quality.

Our work is closest to Mullainathan and Shleifer (2005) with two important differences. First, as opposed to Mullainathan and Shleifer (2005), where slanting is costless and the available information is unlimited, in our model, media doesn't have unlimited ability to slant in order to deliver news that exactly fits the preferences of certain consumers. While a medium may aspire to position news in certain ways, the truth about the underlying events may prevent an extreme positioning. For example, if losses are high in a war, then a medium can downplay them in the news but cannot claim them to be minimal. Furthermore, we assume that the more a medium is willing to support a position that is inconsistent with the truth the higher costs it has to incur to find supporting evidence. Second, and more importantly, our model considers the conscientious consumers as active economic agents in the marketplace. As we have argued above,

data shows that this segment is not negligible and may exert an important externality on media outlets competing for biased consumers. Our model therefore explicitly takes into account the dual nature of the news market by considering two segments: biased and conscientious consumers.

3 The Model

The model consists of three building blocks. First, we describe the data structure that relates to the events that the public wants to hear about and media reports. Next, we describe how media outlets construct news from this data, possibly by slanting some of the data. Finally, we describe how different consumers value the news and how media responds to their demand.

3.1 Data About Events

Assume that for an event the true state of the world is an underlying random variable θ, uniformly distributed over $[0, 1]$. For example, θ can be the benefit of a healthcare program; e.g. $\theta = 1$ means the program is excellent from every aspect while $\theta = 0$ means it doesn't do anything good.

The true state of the world is not directly observable, only data about θ is. These data are generated through an exogenous process. Specifically, in line with Hayakawa (1990) and Mullainathan and Shleifer (2005), we model the data as a string D consisting of '1's and '0's. This data string is a series of $i.i.d.$ random draws from a Bernoulli process with Prob$(D_i = 1)$=θ. In other words, a datapoint in position i of the string D is 1 with probability θ and 0 with probability $1 - \theta$. These '1's and '0's can be thought of as positive and negative signals about the truth. In the example of the health care program, a '1' could be the opinion of a retired worker suggesting that the program is excellent, while a '0' could be the opinion of an economist who argues that the program is a financial disaster. Therefore, '1's will push the inferred truth towards the right end of the continuum $[0, 1]$, while '0's will push it towards the left end. Assume that the data a media firm obtains looks like $\{1, 0, 0, 1, 1, 1, 0, 0, 1, 1\}$. There are six '1's and four '0's in d; then θ can be inferred from the string: $\hat{\theta} = \dfrac{6}{6+4} = 0.6$. More generally, if the string d

contains n_1 of 1s and n_0 of 0s, the unbiased estimate of the truth is $\frac{n_1}{n_1+n_0}$.

3.2 News, Data Collection and Slanting

The news reported by a media outlet comes from the string D and it conveys a message about the state of the world, denoted m. If a news report contains n_1 and n_0 of '1's and '0's respectively, then $m = \frac{n_1}{n_1+n_0}$. We assume that the length of the news, i.e., the total number of 1s and 0s in a reported piece of news is N, which can be thought of as the word limit of a news story, or the minute limit of a TV news program.

Collecting data is costly. For simplicity, we assume two cost levels and, without loss of generality, we normalize the low cost level to 0 while the high cost level is denoted C. More precisely, a medium can either spend 0 to collect N bits of information to satisfy the required word limit of the news or spend C to collect $2N$ bits of data. In the former case, the media outlet has to report its data integrally. If it spends C however, it can select what to report as it has more information available than what is needed for the news. Stated in another way, with low effort of collecting data a media outlet has to be honest, but with high effort it can slant the news. Notice that we assume that media outlets can not manufacture data. At first, sight, this seems to be inconsistent with reality as one could argue that media outlets can send reporters to collect biased data (e.g. interview a partisan witness). Our model is consistent with this setup, however. If we assume that the reporter randomly samples the witnesses until it finds the one with the desired point of view, then this setup is identical to our model's.

With $2N$ data a media outlet can slant the news but such slanting is constrained by the truth. At cost C, a media outlet can expectedly get $n_1 = 2N\theta$ and $n_0 = 2N(1-\theta)$ 1s and 0s respectively. However, if a media outlet slants with the objective to convey a message m, then its news should contains $n_1 = mN$ 1s and $n_0 = (1-m)N$ and 0s. But even with $2N$ data points, the medium may not have sufficient numbers of 1s or 0s to be able to report m. Specifically, m is constrained

by the truth θ the following way:

$$\begin{cases} mN & \leq & 2N\theta & \text{(reported news contains no more 1s than in the data)} \\ (1-m)N & \leq & 2N(1-\theta) & \text{(reported news contains no more 0s than in the data)} \end{cases} \tag{1}$$

These two inequalities determine the possible range of slanting by a media outlet: $2\theta - 1 \leq m \leq 2\theta$.[6]

3.3 Consumers

There are two kinds of consumers: "biased" and "conscientious". Biased consumers want to read/watch news that is consistent with their prior beliefs. One can consider that for these consumers, news essentially represents entertainment. We assume that biased consumers are heterogenous in their beliefs. More specifically, they are uniformly distributed over $[a, b]$ in their prior beliefs ($0 \leq a \leq b = 1 - a$) with their total number normalized to 1. Denote by x a biased consumer's belief location. Then, his/her utility from consuming a news report is:

$$u^b = R - t(x - m)^2 - p, \tag{2}$$

where R is the reservation price, t calibrates the biased consumer's disutility from consuming news different from x, $x - m$ measures the inconsistency between the news and the consumer's prior belief, and p is the price of the news. The term price here is used to crudely capture a rather wide range of revenue models (unit price, annual subscription fees or even consumers' willingness to read/whatch ads). Distinction between these revenue models is outside the scope of the present paper. For simplicity, we assume that every biased consumer will buy and consume at least one

[6] We assume that N is finite but large. While the truth is a continuous variable like the red liquid in a thermometer, the length N resembles the temperature scale. This means that consumers are satisfied with the amount of data reported in a news story and it also allows us to approximate m as on a continuum. The finiteness of N forbids a media outlet from limitless slanting and utilizing such reporting strategies as $m = m_b + \epsilon(\theta - m_b)$, where m_b is catered to biased consumers and ϵ is a very small scalar used to signal the truth to conscientious consumers.

piece of news, i.e. that their reservation price R is sufficiently high.[7]

In contrast to biased consumers, conscientious consumers consume the news to gain information about the truth. Thus, a conscientious consumer's utility for consuming the news is:

$$\begin{cases} u_i^c = R - k(\theta - E(\theta \mid m_i))^2 - p_i & \text{if she only consumes news } i, \\ \\ u_{1,2}^c = R - k(\theta - E(\theta \mid m_1,\ m_2))^2 - p_1 - p_2 & \text{if she consumes news 1 and 2,} \end{cases} \tag{3}$$

where $\theta - E(\theta \mid m_i)$ is the deviation from the truth by news report i, k measures the disutility of this deviation, and p_i is the price of news i.[8] We assume that the total number of conscientious consumers is α ($\alpha \geq 0$).

3.4 Media Reporting Stances

Notice that consumers don't know the content of the news story until they finish consuming it. They have to make a purchase decision before the consumption, i.e., before knowing the message m from a news report. Therefore, their purchase decisions are based on their expected utility, $E(u)$. A media outlet can claim that its news is an unslanted reflection of its data and hence an unbiased estimate of the truth, $m = E(\theta \mid D)$. Since the total number of data points, N is large, $E(\theta \mid D) \approx \theta$.[9] Therefore we will assume that when a media outlet reports honestly, $E(\theta \mid D) = \theta$, i.e., $m = \theta$. The media outlets can also influence consumers' expected utility by announcing their reporting stances, denoted s ($s \in [0, 1]$). The reporting stance is a claim about the numbers of '1's and '0's in the news that the medium will *aspire* to report. This reporting stance is used to crudely capture the long-term reputation of a media outlet (say for example, in

[7] We give detailed proof about the existence of such a reservation price in the technical appendix.

[8] In this utility structure, we have implicitly assumed that conscientious consumers incur no cost when they combine multiple pieces of news. Under this assumption, one could argue that, instead of using m_1 and m_2 they should cross-check the news bit-by-bit. While, this is not possible in our model (as the position of bits is not recorded), introducing this feature in the model would actually make our results stronger because cross-checking news reports would provide even more information.

[9] The assumption of a large N allows us to focus on the bias issue neglecting the statistical inference issues.

terms of political orientation). If the data allow, a media outlet will fulfill its reporting stance, i.e. it will slant the data till $m = s$. Since slanting is limited by the available data, a medium will not always be able to fulfill its reporting stance. If the data don't allow, a media outlet will slant the news so that m is closest to its reporting stance, s. This means that $m = 2\theta$ for a media outlet on the left and $m = 2\theta - 1$ for a media outlet on the right. Put more formally:

$$m(s) = \begin{cases} 2\theta & \text{if } s > 2\theta, \\ s & \text{if } s \leq 2\theta \text{ and } (1-s) \leq 2(1-\theta), \\ 2\theta - 1 & \text{if } (1-s) > 2(1-\theta). \end{cases} \tag{4}$$

Consider the following example. Assume that the data collected with high effort (i.e. representing $2N$ data points) is the following: $\{1, 0, 0, 1, 1, 1, 0, 0, 1, 1\}$.[10] Clearly, $E(\theta \mid D) = 0.6$. Notice that for no cost a media outlet would have received the first half of the data (N observations): $\{1, 0, 0, 1, 1\}$, which also leads to $E(\theta) = 0.6$. If a media outlet incurs low effort, it then has to report honestly: $m = E(\theta) = 0.6$. However, if it incurs high effort, it can slant its news story to cater to some consumers. Suppose the medium's reporting stance is $s = 0.4$. With a bigger data set, it can drop some '1's from the data string, and its news report will look like $\{1, 0, 0, 0, 1\}$, leading to $m = s = 0.4$. However, if its reporting stance were $s = 0$, then at most it could report a news story of $\{1, 0, 0, 0, 0\}$, hence, in this case $m = 0.2 \neq s$.

After the decision on reporting stance, media outlets announce their prices and consumers decide how much and which news to buy. Notice that consumers' purchase decision depends on two factors: reporting stances and prices. We will consider two cases: (i) a monopolist media outlet and, (ii) two competing media outlets, 1 and 2. Without loss of generality, we assume that media outlet 1 is positioned to the left of outlet 2, that is $s_1 < s_2$. The timing of the game is the following. The two media outlets simultaneously choose their effort for data collection (high or low). Next, they decide their reporting stances simultaneously, which become public knowledge. Prices are simultaneously announced. Finally, consumers (both biased and conscientious) make their purchase decisions.

[10] For the sake of the example, we use a small N.

3.5 Media Bias and Information Efficiency

We are interested in the level of media bias and the information efficiency of the industry. We define media bias in terms of the sum of expected differences between the truth and the message delivered by the media:

Definition 1 $MB = \sum_{i=1}^{2} E(|m_i(s_i) - \theta|)$.

Notice that MB is a function of the media outlets' choices of reporting stances. The more extreme those stances are, the more slanting is likely to be needed to meet each medium's reporting stance.

We are also interested in the efficiency of the media (as an industry) in recovering the truth from the data. We call this information efficiency. Obviously, this only concerns conscientious consumers as they are the only ones interested in the truth. Thus, information efficiency is defined as:

Definition 2 $IE = -E[(\theta - E(\theta \mid m_1, m_2))^2]$.

The measure of information efficiency is basically a conscientious consumer's expected loss when reading/watching both pieces of news. With these definitions, we can examine how the media performs on these measures in equilibrium. The computation of different equilibria is presented next.

4 Analysis

The game is solved by backward induction. In the fourth stage, consumers make their purchase decision before consuming the news, i.e., before knowing the message m from a news story. Therefore, we first calculate consumers' expected utility of consuming different news (slanted or unslanted). We then analyze media outlets' strategic variables, including prices, reporting stances and data collection effort. Before claiming their reporting stances, media outlets first have to decide their effort level in collecting data. With a high effort, a media outlet can either

claim a reporting stance at a fixed number ($s \in [0,1]$) or claim its honesty ($m = \theta$). With a low effort, however, it can only claim its unbiasedness and consequently its reporting stance is just the truth ($m = \theta$). Therefore, different effort levels will result in different strategic action sets in the subsequent stages.

4.1 Consumers' Expected Utility

Let us start with consumers consuming unslanted news. If a media outlet chooses to report the unslanted reflection of whatever data it gets, then the media outlet doesn't have a fixed reporting stance so its message m is always an unbiased estimate of the truth (i.e., $m = \theta$ since N is large). Before a biased consumer reads/watches this unslanted news, his/her expected utility is:

$$\begin{aligned} E(u_i^b) &= R - tE\left[(x - m_i)^2\right] - p_i \\ &= R - t\left[x^2 - 2xE(m_i) + E(m_i^2)\right] - p_i \\ &= R - t(x^2 - x + \frac{1}{3}) - p_i. \end{aligned} \tag{5}$$

Obviously, a conscientious consumer will have an expected utility of $E(u^c) = R - p_i$.

Next, let us take the case when consumers consume slanted news. Before their purchase, consumers know that the fulfillment of a reporting stance is constrained by the data and the underlying truth. From (4), the fulfillment requires $2\theta - 1 \leq s \leq 2\theta$, i.e. $\frac{s}{2} \leq \theta \leq \frac{s+1}{2}$. The expected utility of a biased consumer then becomes:

$$E(u_i^b) = R - tE[(x - m_i)^2] - p_i = R - t[x^2 - 2xE(m_i) + E(m_i^2)] - p_i, \tag{6}$$

where

$$E(m_i) = \int_0^{s_i/2} 2\theta f(\theta)d\theta + \int_{s_i/2}^{(s_i+1)/2} s_i f(\theta)d\theta + \int_{(s_i+1)/2}^{1} (2\theta - 1)f(\theta)d\theta = \frac{2s_i + 1}{4}, \tag{7}$$

and

$$E(m_i^2) = \int_0^{s_i/2} (2\theta)^2 f(\theta)d\theta + \int_{s_i/2}^{(s_i+1)/2} s_i^2 f(\theta)d\theta + \int_{(s_i+1)/2}^{1} (2\theta - 1)^2 f(\theta)d\theta = \frac{3s_i^2 + 1}{6}. \tag{8}$$

Therefore,

$$E(u_i^b) = R - t\left[\left(x - \frac{2s_i + 1}{4}\right)^2 + \left(\frac{2s_i - 1}{4}\right)^2 + \frac{1}{24}\right] - p_i. \tag{9}$$

A conscientious consumer is not interested in message m but rather the underlying truth, $E(\theta \mid m)$, that s/he can estimate from s and m. Specifically, when $m \neq s$, s/he knows that the media outlet can not fulfill its reporting stance because the data is not enough to support it. From this, s/he knows that the truth is on the left of the message if $m < s$ and on the right of the message if $m > s$. Understanding that the slanted news comes from $2N$ bits of data, a conscientious consumer knows $E(\theta \mid m_i) = m_i/2$ if $m_i < s_i$, and $E(\theta \mid m_i) = (m_i + 1)/2$ if $m_i > s_i$. However, when $m = s$, the conscientious consumer only knows that the data allow the fulfillment of the reporting stance, hence the truth is uniformly distributed between $\left[\frac{s_i}{2}, \frac{s_i+1}{2}\right]$ and his/her best estimate of the truth is the mean of this reduced uniform distribution: $\frac{2s_i+1}{4}$. Therefore,

$$E(\theta \mid m_i) = \begin{cases} \frac{m_i}{2} & \text{if } m_i < s_i, \\ \frac{2s_i+1}{4} & \text{if } m_i = s_i, \\ \frac{m_i+1}{2} & \text{if } m_i > s_i. \end{cases} \tag{10}$$

Substituting (4) into (10), we have:

$$\begin{aligned} E[(\theta - E(\theta \mid m_i))^2] &= \int_0^{s_i/2} 0 f(\theta) d\theta + \int_{s_i/2}^{(s_i+1)/2} (\theta - \frac{2s_i+1}{4})^2 f(\theta) d\theta + \int_{(s_i+1)/2}^{1} 0 f(\theta) d\theta \\ &= 1/96. \end{aligned} \tag{11}$$

As a result, a conscientious consumer's expected utility from consuming a biased news is:

$$E(u_i^c) = R - kE[(\theta - E(\theta \mid m_i))^2] - p_i = R - k/96 - p_i. \tag{12}$$

When the conscientious consumer consumes news from two biased media outlets, 1 and 2, with reporting stances $s_1 < s_2$, s/he knows that $m_1 < m_2$ since the two media outlets have the same data. Therefore,

$$E(\theta \mid m_1, m_2) = \begin{cases} \frac{m_2}{2} & \text{if } m_2 < s_2, \\ \frac{s_1+s_2+1}{4} & \text{if } m_1 = s_1 \text{ and } m_2 = s_2, \\ \frac{m_1+1}{2} & \text{if } m_1 > s_1. \end{cases} \tag{13}$$

His/her expected utility can be calculated using the same logic as before. After some algebra, we obtain:

$$E(u^c_{1,2}) = R - k\frac{(1+s_1-s_2)^3}{96} - p_1 - p_2.$$

Notice that in this case, the more the media are biased (the more their reporting stances are extreme), the better off the conscientious consumer is from the perspective of information efficiency (the middle term in $E(u^c_{1,2})$ is a negative number with higher absolute value). However, we can expect that in this case, media prices are also going to be higher because the media are more differentiated (reporting stances are further apart), which hurts the conscientious consumer.

4.2 Monopolist Media Outlet

To set a benchmark, let us first look at a monopolist media outlet. The following Lemma summarizes the analysis for this case.

Lemma 1 *Let $\underline{R_m}$, $\underline{s_m}$ and $\overline{s_m}$ be as defined in the Appendix. When $R > \underline{R_m}$, a monopolist media outlet will cover both the biased and conscientious markets, and its equilibrium data collection effort and reporting stance is:*

$$\begin{cases} \textit{High effort} \quad s_m = \dfrac{1}{2} & \textit{if } k \leq 96t\left[(\dfrac{1}{2}-a)^2 + \dfrac{1}{24}\right] \textit{ and } \dfrac{t(1+\alpha)}{12} > C, \\ \textit{High effort} \quad s_m \in [\underline{s_m}, \overline{s_m}] & \textit{if } k > 96t\left[(\dfrac{1}{2}-a)^2 + \dfrac{1}{24}\right] \\ & \qquad \textit{and } (1+\alpha)\left[t(a-\dfrac{1}{2})^2 + \dfrac{t}{12} - \dfrac{k}{96}\right] > C, \\ \textit{Low effort} \quad \textit{honest reporting} & \textit{if } \dfrac{t(1+\alpha)}{12} < C \textit{ or,} \\ & \dfrac{t(1+\alpha)}{12} > C > (1+\alpha)\left[t(a-\dfrac{1}{2})^2 + \dfrac{t}{12} - \dfrac{k}{96}\right] \\ & \qquad \textit{and } k > 96t\left[(\dfrac{1}{2}-a)^2 + \dfrac{1}{24}\right]. \end{cases} \tag{14}$$

Proof: See appendix.

Lemma 1 basically says that when the conscientious consumers' disutility for bias (k) is low, the monopolist will incur high effort in data collection so that it can slant its news to cater to the biased consumers. However, when the monopolist slants, its reporting stance will be in the middle of the biased consumers' preference continuum.[11] In contrast, when the conscientious consumers' disutility for bias (k) is high, the monopolist will incur low effort in data collection and report the truth so that the conscientious consumers buy the news. In sum, under a monopoly setting, as expected, the medium caters to the conscientious consumers when these become more relevant. We will see that this is not necessarily the case under competition.

4.3 Duopolist Media Outlets

Recall that media outlets first have to decide their effort levels in collecting data. With a high effort, a media outlet can claim its reporting stance at a fixed number between $[0, 1]$. With a low effort, however, it can only claim its unbiasedness and consequently its reporting stance is just the truth θ. Therefore, different effort levels will introduce different strategic action sets in the subsequent stages. To determine the full equilibrium, we need to calculate the equilibrium profits in three sub-games: (i) each media outlet incurs low effort (π_{LL}), (ii) one media outlet incurs low effort and the other incurs high effort (π_{LH} and π_{HL}) and, (iii) both outlets incur high effort, (π_{HH}). With these equilibrium profits we can calculate the equilibrium effort levels according to the following game:

Detailed calculations of these profits are available in the appendix. Obviously, when the cost of collecting data is very high, no media outlet will ever collect data and therefore, they will not slant either. To avoid this uninteresting case, in the following analysis, we will assume that the cost of collecting data (C) is not very high, such that when one media outlet chooses low effort, the other will choose high effort. In other words, slanting is always considered by at least one

[11] Under the second case of the Lemma, the monopolist media outlet is indifferent between the points of a segment that is centered on 1/2, i.e., qualitatively it is in the middle.

		Media outlet 2: Low	Media outlet 2: High
Media outlet 1	Low	π_{LL} , π_{LL}	π_{LH} , π_{HL}
	High	π_{HL} , π_{LH}	π_{HH} , π_{HH}

Table 1: Media outlets' equilibrium profits under different effort levels

media outlet. Thus:

Assumption 1

$$C < \frac{t(1-3\psi\omega)^2}{648\psi},$$

where $\psi = 1 - 2a$ *and* $\omega = 3 + 2\alpha$.

Under Assumption 1, $\pi_{HL} > 0$.[12] Consequently, depending on π_{HH} and π_{LH}, there are two possible equilibria:

$$\begin{cases} (H,H) & \text{if } \pi_{HH} \geq \pi_{LH}, \\ (H,L) \text{ or } (L,H) & \text{if } \pi_{HH} < \pi_{LH}. \end{cases} \tag{15}$$

In the first equilibrium, both media outlets incur high efforts in collecting data so as to cater to the biased consumers (albeit to different ones). In the second equilibrium, only one media outlet collects extra data, the other collects just enough data to report honestly. These two equilibria are analyzed in detail next.

4.3.1 Both Media Slant

The following proposition describes the equilibrium in which both media outlets slant the news.

Proposition 1 *Assume that the conscientious consumers' disutility for bias is large* ($k > 16t$). *There exist* $\underline{C}$, $\underline{\alpha}$ *and* $\overline{\alpha}$ *such that, when the cost of collecting extra data is low* ($C < \underline{C}$), *or when the cost is high* ($\underline{C} < C$) *and the number of conscientious consumers is high* ($\alpha > \overline{\alpha}$), *there exists*

[12] When $\pi_{HL} \leq 0$, there may exist mixed strategy equilibria where media outlets incur high effort or exit the market with some probability.

a unique sub-game perfect equilibrium where both media outlets incur high effort in collecting data and provide slanted news to fulfill the following reporting stances (assuming $s_1 < s_2$):

$$\begin{cases} s_1^* & = \max\left\{\dfrac{1}{2} - \dfrac{3\psi(\omega-2)}{4},\, 0\right\}, \\ \\ s_2^* & = \min\left\{\dfrac{1}{2} + \dfrac{3\psi(\omega-2)}{4},\, 1\right\}, \end{cases} \tag{16}$$

where $\psi = 1 - 2a$ and $\omega = 3 + 2\alpha$. In equilibrium, conscientious consumers buy both pieces of news.

Proof: See appendix.

The equilibrium described in Proposition 1 has several interesting characteristics. The first one concerns the cost of data collection. Intuitively, when this cost is low, slanting is cheap and media outlets are willing to collect extra data to slant.

The second characteristic concerns media outlets' reporting stances. It can be easily checked that $s_1 < a < 1-a < s_2$. This means that when both media outlets slant, they will claim reporting stances that are more extreme than the position of the most extreme biased consumers in the population. While this is intriguing, it is consistent with Mullainathan and Shleifer (2005) and relates to the standard Hotelling model. In Hotelling, price competition drives competitors away from each other, while firms want to stay with consumers and this demand factor draw competitors towards the center of the preference continuum. Our extreme reporting stance suggests that in this equilibrium, the effect of price competition largely overtakes the demand factor. This is intriguing and requires an explanation.

The third characteristic of the equilibrium concerns the impact of conscientious consumers on media bias, which is our major focus in this paper. Surprisingly, Proposition 1 suggests (see detailed analysis in section 4.3.3) that with more conscientious consumers, media outlets are more inclined to collect extra data and slant. This is related to the extreme reporting stances that they claim: the more these positions are extreme the more pressure news providers have to slant.

The intuition behind this outcome is the following. When the disutility for bias of conscientious consumers is high ($k > 16t$), they might buy both pieces of news. Then the media outlets only compete on price for the biased consumers. When the number of conscientious consumers increases, the biased consumer market becomes less important and media outlets are more willing to increase prices to exploit the captive conscientious consumer segment. To achieve this they claim extreme reporting stances, which in turn forces them to slant more. In sum, when the number of conscientious consumers is high and their disutility for bias is also high, media bias is high and there is little price competition between media outlets.

4.3.2 Only One Medium Slants

We next explore an equilibrium where one of the media outlets reports honestly. The following proposition summarizes the conditions for such an equilibrium.

Proposition 2 *Assume that the conscientious consumers' disutility for bias is large ($k > 16t$). There exist $\underline{C}$, $\underline{\alpha}$ and $\overline{\alpha}$ such that, when the cost of information collection is high ($C > \underline{C}$) and the number of conscientious consumers is small ($\alpha < \underline{\alpha}$), there exists a unique sub-game perfect equilibrium where one media outlet incurs high effort in collecting data and provides biased news while the other incurs low effort and reports honestly. The equilibrium reporting stance of the slanting medium is:*

$$s_H^* = \max\left\{\frac{1}{6}(3 - \psi\omega - \sqrt{\psi^2\omega^2 - 1}),\, 0\right\}, \qquad \textit{where } \psi = 1 - 2a \textit{ and } \omega = 3 + 2\alpha. \tag{17}$$

All consumers buy one piece of news with conscientious consumers buying from the honest medium.

Proof: See appendix.

As expected, when the cost of collecting extra data is high, slanting becomes less profitable than honest reporting. Then it may become interesting to choose this strategy. By choosing low effort, i.e. honest reporting, the media outlet also positions itself in the center of the biased

market.[13] This is similar to strategic commitment in positioning. In reaction, the media outlet with high effort has to position itself far away from the center of the biased market to decrease price competition. Thus, the honest media outlet gains an advantage of being close to demand. Here, however, the number of conscientious consumers has qualitatively different impact on the price competition between media outlets. Now, buying the honest news only always dominates buying both pieces of news for a conscientious consumer. This is because when the conscientious consumer buys the unslanted news, his/her disutility for media bias is minimized to zero and the slanted news adds no utility, while representing extra cost. The two media outlets then compete in both biased and conscientious markets. More specifically, a conscientious consumer's expected utility from the honest news is: $R - p_L$ and her utility from the slanted news is: $R - \frac{k}{96} - p_H$. Thus, the maximal price an honest media outlet can charge to the conscientious consumers is $p_L = p_H + \frac{k}{96}$. Therefore, the two media outlets are in harsh price competition. Understandably, this price competition increases with the number of conscientious consumers, which is in sharp contrast with the symmetric equilibrium.

4.3.3 Comparative Statics

In this section, we summarize the key results from the comparative statics.

Result 1 *When biased consumers' heterogeneity increases, media have more incentives to slant but reporting stances remain the same.*

Proof (sketch): The detailed proof is in the appendix. In the game described in Table 1, if $\pi_{HH} > \pi_{LH}$, then both media outlets will collect extra data to slant, while only one media outlet will collect extra data if $\pi_{HH} < \pi_{LH}$. Simplification yields:

- when $t > \underline{t}$, $\pi_{HH} > \pi_{LH}$;

[13] This is different from claiming a reporting stance $s = \frac{1}{2}$. A reporting stance $s = \frac{1}{2}$ gives a biased consumer an expected utility of $R - t\left[(x - \frac{1}{2})^2 + \frac{1}{24}\right] - p$, while honest reporting gives the biased consumer an expected utility of $R - t\left[(x - \frac{1}{2})^2 + \frac{1}{12}\right] - p$.

- when $t < \underline{t}$, $\pi_{HH} < \pi_{LH}$.

The parameter t captures the biased consumers' disutility of reading/watching news that is inconsistent with their beliefs. Thus t measures those consumers' preference for bias. It is then clear that when these consumers' preference for bias is high $t > \underline{t}$, both media outlets collect extra data and slant. When these consumers' preference for bias is low $t < \underline{t}$, only one media outlet collects extra data to slant, the other reports honestly. However, it can be easily checked in Propositions 1 and 2 that all reporting stances are independent of the parameter t. □

Result 2 *When there are more conscientious consumers, media bias is higher (reporting stances are more extreme) and thus, the media slant more.*

Proof (sketch): We need to show that more media outlets will slant and their reporting stances become more extreme as the number of conscientious consumers increases. In the appendix, we show that $\underline{\alpha} \leq \overline{\alpha}$. This means that, when there are more conscientious consumers, media outlets' slanting strategies move from equilibrium 2 to equilibrium 1. Thus, more media outlets will slant when there are more conscientious consumers.

When both media outlets slant (equilibrium 1), taking the derivative of the equilibrium reporting stances with respect to α (i.e. the number of conscientious consumers) we obtain (for the case when media outlets are not at the extreme, i.e., their reporting stances are not 0 or 1):

$$\begin{cases} \dfrac{\partial s_1^*}{\partial \alpha} = \dfrac{3(2a-1)}{2} < 0, \\ \\ \dfrac{\partial s_2^*}{\partial \alpha} = \dfrac{3(1-2a)}{2} > 0. \end{cases} \tag{18}$$

The above inequalities show that, as α increases, s_1^* will become smaller and s_2^* larger. Thus both media outlets will have reporting stances further away from the mean of the truth. Also, the total media bias in the industry is $MB = \frac{13}{16} + \frac{9}{4}[\alpha(1+\alpha) - a(1+2\alpha)^2 + a^2(1+2\alpha)^2]$. Consistently with the above discussion, one can see that MB is increasing in α, as $\dfrac{\partial MB}{\partial \alpha} = \frac{9}{4}(1-2a)^2(1+2\alpha) > 0$.

Similarly, when only one media outlet slants, only this media outlet claims a reporting stance s_H. It can also be checked that in this case $\dfrac{\partial s_H^*}{\partial \alpha} < 0$. Since $s_H < \dfrac{1}{2}$, the slanting media outlet's

reporting stance also becomes more extreme when there are more conscientious consumers. The total media bias in the industry is

$$MB = \frac{4 + \psi\omega(\psi\omega + \sqrt{\psi^2\omega^2 - 1})}{36}, \tag{19}$$

where $\psi = 1 - 2a$ and $\omega = 3 + \alpha$. It is easily checked that

$$\frac{\partial MB}{\partial \alpha} = \frac{\partial MB}{\partial \omega} \cdot \frac{\partial \omega}{\partial \alpha} = \frac{\psi(2\psi^2\omega^2 - 1 + 2\psi^2\omega^2\sqrt{\psi^2\omega^2 - 1})}{36\sqrt{\psi^2\omega^2 - 1}} > 0.\square \tag{20}$$

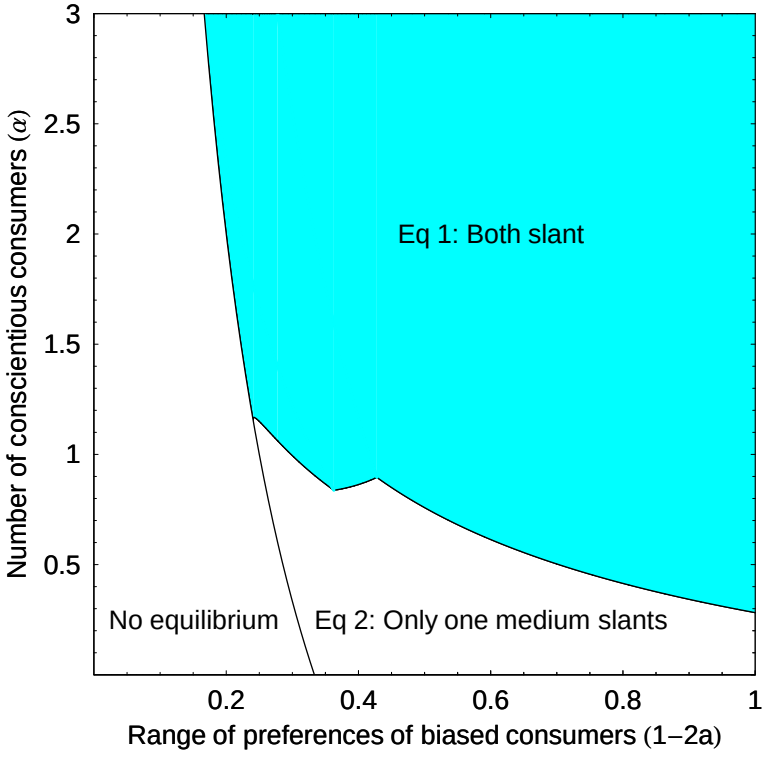

Figure 2: Equilibria in the parameter space of $\{a, \alpha\}$, $(t = 1, C = 0.2)$.

Figure 2 shows the two equilibria in the parameter space of $\{a, \alpha\}$ at $(t = 1, C = 0.2)$. It is obvious that given any a, t, C, equilibrium 1 happens only when α is high, and equilibrium 2 only happens when α is low. Thus, in equilibrium more media outlets will slant when there are more conscientious consumers.

With respect to prices, we have already seen that:

Result 3 *In the symmetric equilibrium (Proposition 1), more conscientious consumers leads to more price competition. In the asymmetric equilibrium (Proposition 2), more conscientious consumers leads to less price competition.*

The conscientious market's qualitatively different impact on price competition shed some light on entry. The introduction of FOX News Channel in 1996 caused CNN to shift to the left. CNN's move indicates that competing media firms prefer the symmetric equilibrium where both firms slant as a way to differentiate their news products and to decrease price competition. Result 3 also provides some intuitive answer with respect to the possible entry of an unbiased media outlet. As we mentioned in Proposition 2, a slanting media outlet can only attract conscientious consumers by lowering its price. When a media outlet enters the news market with unbiased news, and when the conscientious market becomes bigger, slanting firms will have stronger incentive to attract the conscientious consumers. However, they can only do so by lowering prices. Consequently, the price competition among the three firms (the two incumbents and the new entrant) will become really harsh. Media outlets that slant then have stronger incentive to slant more as a way to differentiate themselves.

Result 4 *Given the effort levels of the media outlets, when media bias is higher, information efficiency is also higher, i.e. conscientious consumers can better recover the truth from the biased news.*

Proof: Recall from Section 3 that in the symmetric equilibrium, information efficiency is:

$$IE = -E[(\theta - E(\theta \mid m_1, m_2))^2] = -\frac{(1 + s_1 - s_2)^3}{96}, \tag{21}$$

which represents the conscientious consumers' expected error of consuming both pieces of news. It is then straightforward to see that when media bias increases (s_1 decreases or s_2 increases), information efficiency becomes higher. □

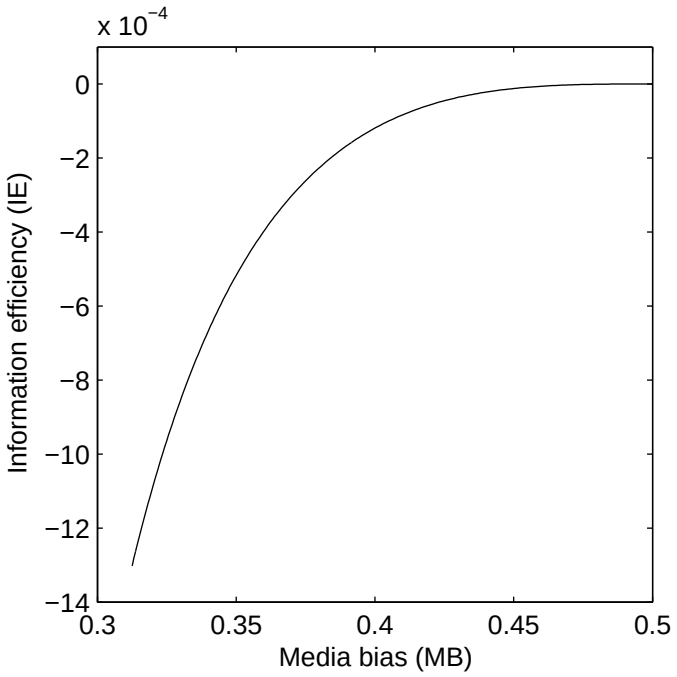

Figure 3: Information efficiency as a function of media bias when both media slant ($a = 1/3$, $t = 1, C = 0.1$).

Figure 3 shows Information Efficiency as a function of media bias when both media slant when $a = 1/3$, $t = 1, C = 0.1$. The underlying intuition is illustrated in figure 4. When consuming only one slanted news, say news 1, a conscientious consumer can precisely figure out the truth when $\theta < \frac{s_1}{2}$ or $\theta > \frac{s_1+1}{2}$. When $\frac{s_1}{2} < \theta < \frac{s_1+1}{2}$, the conscientious consumer only knows that the truth is between $\left[\frac{s_1}{2}, \frac{s_1+1}{2}\right]$. The same applies to consuming news 2 alone. However, when consuming both slanted news, the conscientious consumer can precisely figure out the truth when $\theta < \frac{s_2}{2}$ or when $\theta > \frac{s_1+1}{2}$. When $\frac{s_2}{2} < \theta < \frac{s_1+1}{2}$, the conscientious consumers only know that the truth is between $\left[\frac{s_2}{2}, \frac{s_1+1}{2}\right]$. In other words, $\left[\frac{s_2}{2}, \frac{s_1+1}{2}\right]$ is the area where the conscientious consumer can not figure out the truth. Obviously, this area decreases as s_1 decreases or s_2 increases. That is, when the media outlets' reporting stances are more extreme, the conscientious consumers can better figure out the truth. In particular, when $s_1 = 0$ and $s_2 = 1$, the conscientious consumers can always figure out the truth. This increased information

efficiency with higher media bias underlines a very basic phenomenon in our model related to the assumption that media outlets do not have an unlimited capacity to slant.[14] If a media outlet wants to slant its news, it has to collect more information. When the available information is limited (high effort in data collection gives a media outlet only $2N$ data points in our model), a media outlet can no longer freely report its reporting stance. The bounded report then enables the conscientious consumers to calibrate the underlying truth.

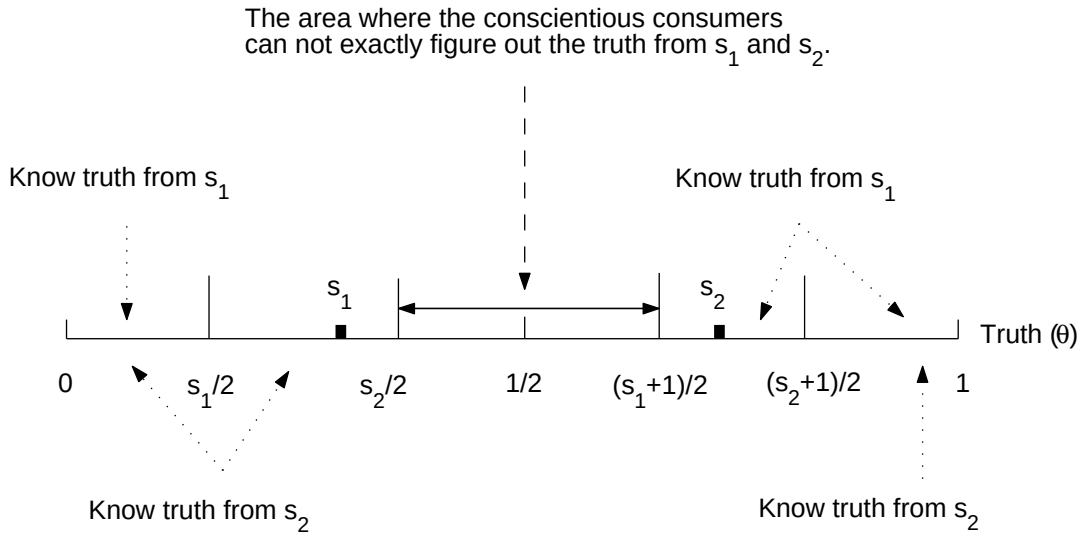

Figure 4: Conscientious consumers' truth revealing as a function of reporting stances.

5 Discussion and Conclusion

Recent explanations for the visible and persistent phenomenon of media bias consider that it is primarily driven by demand from consumers who seek confirmation of their beliefs in the news (e.g. Mullainathan and Shleifer (2005)). We have challenged this perspective by studying competing media under two key conditions. First, we assumed that slanting news is costly for media and it has limits. Second, we have assumed that a significant number of consumers are conscientious, in the sense that they are solely interested in finding out the truth. We

[14]This result is also consistent with Dewatripont and Tirole (1999).

thought that these two assumptions will eliminate or at least mitigate media bias in a competitive setting. Surprisingly, we found the opposite. Media bias may well increase when there are more conscientious consumers and if these consumers' dislike for bias is larger. Our results are based on the fact that conscientious consumers purchase multiple news to combine their content to recover the truth. In response, media outlets who essentially hold this segment captive, will try to increase their prices by avoiding competition on the biased consumer market. This leads to extreme positions in a Hotelling sense, which translates to increased media bias. However, we also showed that this increased media bias does not necessarily mean information inefficiency for the media industry as a whole. Conscientious consumers may actually recover more information from multiple, increasingly biased news than from a single non-partisan news provider. We also examined media prices, which generally increase with more conscientious consumers.

Our theoretical results represent a number of interesting hypotheses for more empirical work on media bias in the news industry. As stated above, there is evidence that a significant number of news consumers cross-check media with opposite orientations. The interesting question for empirical research is however, what is the relationship between the proportion of these consumers and the extent of media bias. While answering this question is not easy given the extensive data requirements and measurement challenges, casual analysis of the data set from the Pew Research Center supports a positive relationship between the proportion of conscientious consumers and the extent of media bias. For example, between 2000 and 2004 there is a significant increase (roughly 2.5%) in consumers who cross-check CNN and Fox News. In the same time period, the data indicate that both news outlets became more extreme when measured by the political orientation of viewers who state that they "only believe that medium".[15] More empirical research in this area is certainly warranted.

The stylized model of our paper is limited in several ways. All along, we have assumed that consumer heterogeneity in preferences for the biased segment are exogenous and given. Other

[15]Data source: Pew Media Consumption Survey and Pew Media Believability Survey 2000, 2002, and 2004.

research in political science and communication (e.g., Ansolabehere and Iyengar (1995), George and Waldfogel (2002), Kull et al. (2003), Lazarsfeld et al. (1944), Zaller (1996)) explores how media may change consumers' beliefs and preferences. In a recent paper, for instance, Glaeser (2005), builds a model where political entrepreneurs exploit the demand for hatred by creating biased stories about certain events. While he doesn't mention media bias per se, he allows for media to influence (as opposed to simply inform) consumers. It would be interesting to investigate how these two phenomena (media bias and political entrepreneurship) interact in the news market.

Finally, Dewatripont and Tirole (1999) is also related to our results. In the context of advocacy, they show that biased advocates generate more information about an uncertain event than a single unbiased judge. This result is consistent with our finding about the effect of media bias on information efficiency. Specifically, we also find that the more media bias one observes in equilibrium, the more information may be revealed for conscientious consumers. In sum, there are multiple opportunities to further explore media bias both from a theoretical as well as from an empirical perspective.

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