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Unbiased Media

Ole-Andreas Elvik Naess

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Ole-Andreas Elvik Naess*

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Abstract

A large literature has analyzed media bias, but the question of identifying unbiased media behavior has received less attention. I address the topic of unbiasedness in a setting where a media firm engages in journalism that may affect the electoral outcome for political parties. I provide a characterization of the set of unbiased media strategies. I find that there are multiple strategies for unbiased media coverage, and that the choice of unbiased strategy will have electoral consequences. Because the electoral game is zero-sum, political parties will prefer different unbiased strategies. This paper rationalizes partisan differences in views about media bias.

Keywords: Media bias, Unbiassedness

JEL Codes: D72, D83, L82

*Centre for Applied Research at NHH, Ole-Andreas.Naess@snf.no.

1 Introduction

American voters have polarized views about media bias. Recent surveys show that a large majority of Republican voters believe the mainstream media is biased, whereas Democratic voters generally do not believe the media is biased.[1] Surveys asking about whether or not the media is biased implicitly assume the existence of unbiased media behavior. There is a large literature on media bias, but these papers typically define media bias using sufficient conditions, which means that they do not address the topic of unbiasedness.[2] The primary goal of this paper is to understand unbiased media behavior and the observed differences in views about media bias.

Certain principles for unbiasedness are uncontroversial. An unbiased media firm should arguably not produce fake news or distort information. More generally, media firms face space and monetary constraints and must choose how to allocate scarce resources. This paper studies unbiased media behavior in such settings. My first contribution is to establish a benchmark for the set of potentially unbiased media strategies. I analyze a media firm that engages in a journalistic strategy that may influence the electoral outcome. I provide a characterization of the set of strategies that can be perceived as unbiased. A media firm needs to decide an investigation strategy as a function of some observed features of the political parties. I show that all strategies that are reversed for the opposite set of observed features will lead to the same expected electoral outcome when the features of the parties are drawn from the same distribution. All functions that do not satisfy this symmetry requirement may favor one of the parties. When the features of the political parties are *not* drawn from the same distribution, the choice of unbiased strategy will influence the electoral outcome. I show that there will always exist multiple strategies belonging to the set of unbiased strategies that will have different electoral consequences.

A main insight arising from this paper is that unbiasedness is a difficult concept to

[1]See e.g., Pew Research Center (2017) or Gallup (2019).

[2]Reviews of the literature are given by Prat and Strömberg (2013), Puglisi and Snyder Jr (2015), Strömberg (2015) and Gentzkow et al. (2015).

identify uniquely. When a biased strategy is identified, it is sometimes implicitly perceived as a deviation from some unbiased strategy, but in this paper I show that there generally does not exist *one* unbiased strategy. Any involvement in a zero-sum game creates winners and losers.

I also show that there is not necessarily a clear separation between the set of biased and unbiased media strategies. Any unbiased strategy satisfies some principle of bias. I show that the converse result does not hold. There will generally exist biased strategies that do not satisfy any principles of unbiasedness. Although many strategies can be defended as unbiased, this does not imply that *all* strategies are unbiased.

This paper also relates the polarization in views about media bias to polarization more generally. Differences between parties are necessary for the selection of an unbiased strategy to have electoral consequences, which means that differences in other dimensions may spread to differences in views about media bias.

If it were possible to identify a unique unbiased strategy, then views about the level of media bias would be reduced to a factual question. This paper shows that there may be different unbiased strategies, which may rationalize the observed differences in views about media bias. The concept of media bias may be more related to views about fairness than to deviations from some unique unbiased behavior. Suppose one party has an electoral advantage by having earned more money that may be used to provide media firms with additional information. Kamenica and Gentzkow (2011) show that the information sender may influence the receiver in such a setting through the choice of information structure.[3] A media firm must choose whether to take the difference in resources into account. Arneson (1989) and Roemer (1993) argue that outcomes should not depend on circumstances that are not controlled by the individual.[4] The views unbiased media behavior may then be related to views about how income and wealth differences are controlled by individual effort.

[3]Alonso and Câmara (2016) analyze persuasion of voters.

[4]A summary of the equality of opportunity literature is provided by Roemer and Trannoy (2013).

Related literature Different approaches are taken in the literature to identify media bias. A media firm trying to shift the preferences of the voters in favor of a particular party can naturally be defined as biased. Gentzkow et al. (2015) use this approach. They define a strategy σ to be biased to the right of another strategy σ' if a voter believing σ would shift her belief to the right if the firm deviated to σ'. They do not claim that this is a necessary condition for bias; i.e., a media firm that does not satisfy this condition is not necessarily unbiased. A large list of sufficient conditions for media bias are identified in the literature. Bias may arise because of political capture (Besley and Prat, 2006) or because readers have confirmatory bias (Mullainathan and Shleifer, 2005). Satisfying the preferences of journalists (Baron, 2006) or owners (Anderson and McLaren, 2012) or catering to voters' beliefs (Gentzkow and Shapiro, 2006) may lead to biases. Groseclose and Milyo (2005) provide an empirical measure of the partisan positioning of US media firms by using the ideology of think tanks quoted by the media firm. Gentzkow and Shapiro (2010) use the similarity between the language of media firms and Congress as a measure of bias, and find that media firms respond to the preferences of voters. Gentzkow and Shapiro (2010) state that their index does not allow for comparisons between biased and unbiased reporting. In some settings, the concept of unbiasedness is nonproblematic. Prat (2018) defines unbiased media behavior as reporting all the signals that are received, but I focus on settings where the media firm is forced to take some active actions, such as allocating scarce resources. This paper also relates to the literature analyzing the polarization of reality (Alesina et al., 2020) and individuals disagreeing about facts (Gentzkow et al., 2018).

Media bias papers typically model a media firm as biased (B) if it satisfies some condition $P_1, P_2 ... P_n$. This structure implies that $P_1 \Rightarrow B$, $P_2 \Rightarrow B$ and $P_n \Rightarrow B$. I want to identify conditions for $unbias(\neg B)$. Identifying sources of bias only leads to an understanding of unbiasedness if $\neg[P_1 \vee P_2 .. \vee P_n] \Rightarrow \neg B$ is satisfied. However, this statement is not true unless there are no more than n sources of bias. I take a different approach to identify unbiased media behavior, and I will rather identify $\neg B$ directly.

2 Example

2.1 Unbiased media behavior without *ex ante* differences

There are two political parties (or alternatively two different politicians), l and r, that are either corrupt or non-corrupt. The voters want to elect a non-corrupt party, and the probabilities of corruption are equal and given by $\frac{2}{3}$. A media firm engages in investigative journalism, which reveals the type of the party. The media firm has limited resources and chooses an investigation strategy, given by $\sigma \in [0, 1]$. This strategy can be interpreted as the probability of investigating l. Given that the features of the parties are equal, a natural suggestion for an unbiased strategy is given by $\sigma_1 = \frac{1}{2}$.[5]

If l is investigated, the probability of finding evidence of corruption is $\frac{2}{3}$ and then r is elected. Otherwise the type of l is revealed to be non-corrupt and then l is elected. This means that the expected winning probability of l is given by $\sigma_1 \frac{1}{3} + (1 - \sigma_1)\frac{2}{3} = \frac{1}{2}$. In this case $\sigma_1 = \frac{1}{2}$ is the only strategy that ensures equal winning probabilities. If any $\sigma \neq \sigma_1$ is chosen, the winning probability of party l is given by $\frac{1}{3}[2 - \sigma] \neq \frac{1}{2}$.

2.2 Unbiased media behavior with *ex ante* differences

Now I modify the example and let a share $\frac{1}{5}$ of the voters support party r. These voters do not read the reports from the media firm and vote for r regardless of the outcome of the investigation. The other voters only care about electing a non-corrupt party. I assume, in this example only, that the pivotal voter is randomly drawn from the population of voters. The winning probability of l using the unbiased strategy $\sigma_1 = \frac{1}{2}$ is given by $\frac{4}{5}[\sigma_1 \frac{1}{3} + (1 - \sigma_1)\frac{2}{3}] = \frac{2}{5}$.

The concept of unbiased media behavior is no longer uniquely defined. A media firm may claim that unbiasedness is only a feature of investigating the party most likely to be corrupt, and that parties with equal probabilities of corruption should be treated equally.

[5] In Section 3, I provide a characterization of the set of potentially unbiased strategies, and I show that $\sigma = \frac{1}{2}$ is the only strategy belonging to the set of unbiased media strategies for these particular parameter values.

This claim corresponds to defining unbiasedness in terms of equal treatment ($\sigma_1 = \frac{1}{2}$), and will on average favor the party whose voters do not read the reports from the media firm. Alternatively, unbiased media behavior can be understood as trying to equalize the winning probabilities of the two parties. This strategy is given by the solution to $\frac{4}{5}[\sigma_2\frac{1}{3}+(1-\sigma_2)\frac{2}{3}] = \frac{1}{2}$, which leads to $\sigma_2 = \frac{1}{8}$. In this particular situation at least two strategies (σ_1 and σ_2) can be understood as unbiased, which means that unbiasedness is not uniquely defined. The winning probability of l is either $\frac{2}{5}$ or $\frac{1}{2}$, which means that the selection of an unbiased strategy will have consequences for the electoral outcome.

This example provides some understanding of the topics I want to address. The example shows that it is difficult to find *one* unbiased strategy, because there may exist several different principles underlying unbiased strategies. The parties engage in a zero-sum game, so the selection of an unbiased strategy will affect the electoral outcome, and the parties will prefer different strategies.

3 A general benchmark for unbiased media behavior

In this section, I establish a benchmark for the set of potentially unbiased media strategies. I consider a setting with two parties that are labeled l and r.[6] A party $i \in \{l, r\}$ is characterized by some possibly stochastic features. This means that there may be some uncertainty related to the realized features of the two parties when the media firm chooses its strategy. I model the features of party i, X_i, as a random variable with a finite number of finite outcomes given by $x^1, x^2, ..., x^k$ with probabilities $p_i^1, p_i^2 ..., p_i^k$.[7] This distribution satisfies $\sum_{j=1}^{k} p_i^j = 1$ and $p_i^j \geq 0 \forall j \in \{1, 2, .., k\}$. The outcome contains all information about party i that is relevant for the electoral outcome. I define the parties to be *ex ante* equal if the features of the parties

[6] All the results hold if there are more than two parties or if the strategic actors are politicians rather than political parties.

[7] In the example from Section 2.1, both parties are characterized by the degenerate distribution where the outcome that a party is corrupt with probability $\frac{2}{3}$ is assigned a probability of 1. In Section 2.2, the outcome where r is corrupt with probability $\frac{2}{3}$ *and* has a share $\frac{1}{5}$ of supporters is assigned a probability of 1. In the example in Section 3.4, I analyze a more interesting distribution of features.

are drawn from the same distribution, which means that $p_l^j = p_r^j \quad \forall j \in \{1, 2, .., k\}$.

The media firm needs to decide an investigation strategy $\sigma(X_r, X_l)$, which specifies an action for all possible realizations of X_r and X_l. The strategy $\sigma(X_r, X_l)$ is a function mapping the two features into a number between zero and one. This implies that the strategy is interpreted as the share of resources spent on a given party, defined as the share spent on party l, or alternatively the probability of taking a certain action. The timing is given as follows.

1. The media firm chooses an investigation strategy $\sigma(X_r, X_l)$.

2. The realized features of the two parties are drawn from their distributions.

For a given realization of features, x' and x'', I model the winning probability of party i, $P_i[x', x'', \sigma(x', x'')]$, as a function of the strategy $\sigma(x', x'')$ as well as the features of the parties. The expected winning probability of party i when the media firm chooses the investigation strategy $\sigma(X_r, X_l)$ is then given by

$$\mathbb{E}[P_i(X_r, X_l, \sigma(X_r, X_l))] = \sum_{m=1}^{k} \sum_{n=1}^{k} p_r^m p_l^n P_i[x^m, x^n, \sigma(x^m, x^n)]. \tag{1}$$

Assumption 1 states that the choice of strategy influences the electoral outcome.

Assumption 1. *For realized features x' and x'', $P_i[x', x'', \sigma'(x', x'')] \neq P_i[x', x'', \sigma''(x', x'')]$ if $\sigma'(x', x'') \neq \sigma''(x', x'')$.*

Informally, Assumption 1 ensures that the strategy of the media firm has an impact on the electoral outcome. Given features x' and x'', $\sigma(x', x'')$ can be interpreted as the share of resources spent investigating l. Assumption 1 states that increasing or decreasing this share affects the expected winning probability of party l. In the example from Section 2, the expected winning probability of party l is decreasing in the probability of investigation.

3.1 Characterizing the set of symmetric strategies

I now characterize the set of symmetric strategies. If a share $\sigma(x', x'')$ of resources are used to investigate l when the realized features of parties r and l are given by x' and x'' respectively, then a symmetric strategy requires that a share $\sigma(x'', x') = 1 - \sigma(x', x'')$ of resources are used to investigate l when the features are given by x'' and x'.

Definition 3.1. *Φ is the set of all strategies that satisfy $\sigma(x', x'') = 1 - \sigma(x'', x') \quad \forall x', x''$.*

A strategy given by equal treatment regardless of features is given by $\sigma_1(X_r, X_l) = \frac{1}{2}$, and this strategy belongs to Φ. Many other strategies also belong to Φ. For example, if x_i^1 is the number of non-competent politicians in party i, then the strategy $\sigma_3(X_r, X_l) = \mathbf{1}_{x_r^1 < x_l^1} + \frac{1}{2}\mathbf{1}_{x_r^1 = x_l^1}$ investigates the party that has most non-competent politicians, and $\sigma_3(X_r, X_l) \in \Phi$. Another strategy belonging to Φ is to investigate the party with most non-competent politicians if the difference in the number of non-competent politicians is larger than δ, while otherwise treating the parties similarly. This strategy is given by $\sigma_4(X_r, X_l) = \mathbf{1}_{x_r^1 < x_l^1 - \delta} + \frac{1}{2}\mathbf{1}_{x_l^1 - \delta < x_r^1 < x_l^1 + \delta}$. The set Φ may be large, but I now show that all these strategies share certain attractive properties when the parties are *ex ante* equal.

3.2 Comparison of unbiased strategies with *ex ante* equal parties

Here I analyze the electoral outcome under strategies belonging to Φ when the parties are *ex ante* equal, which means that the features of the parties are drawn from the same distribution.

Proposition 1. *If the parties are* ex ante *equal, then*

$$\mathbb{E}[P_i(X_r, X_l, \sigma'(X_r, X_l))] = \mathbb{E}[P_i(X_r, X_l, \sigma''(X_r, X_l))] = \frac{1}{2}$$

for any i and any $\sigma'(X_r, X_l) \in \Phi$, $\sigma''(X_r, X_l) \in \Phi$.

Proposition 1 states that the expected winning probabilities are equal for both parties for all strategies belonging to Φ. The intuition is straightforward. The media firm needs to choose a strategy as a function of the features of the parties. Because these features are drawn from the same distribution, there is no way of choosing $\sigma(X_r, X_l)$ that on average will favor one of the parties.

All strategies that belong to Φ are symmetric and lead to the same expected winning probability for both parties. I want to investigate whether other strategies also may lead to similar expected outcome for the two parties, but I now show that such strategies do not exist.

Proposition 2. *If the parties are* ex ante *equal, there does not exist a strategy $\hat{\sigma}(X_r, X_l) \notin \Phi$ such that*

$$\mathbb{E}[P_i(X_r, X_l, \hat{\sigma}(X_r, X_l))] = \mathbb{E}[P_{-i}(X_r, X_l, \hat{\sigma}(X_r, X_l))]$$

for all possible distributions of features.

Proposition 2 shows that only the strategies belonging to the set Φ, which consists of all symmetric strategies, lead to equal expected winning probabilities for all distributions of *ex ante* equal parties. All strategies that do not belong to Φ are not symmetric, and may lead to different expected winning probabilities for certain prior features. This means that the set Φ can be interpreted as a candidate for the set of possible unbiased strategies when the two parties are *ex ante* equal.

3.3 Comparison of unbiased strategies without *ex ante* equal parties

In this section, I analyze the effect of different strategies when the parties are not *ex ante* equal. In this case, the prior features of the parties are not drawn from the same distribution, which means that there is some difference between the parties when the media firm chooses its unbiased strategy. I show that the choice of unbiased strategy will have electoral consequences in this case.

Proposition 3. *If and only if the parties are not* ex ante *equal, there are strategies* $\sigma'(X_r, X_l) \in \Phi$, $\sigma''(X_r, X_l) \in \Phi$ *such that*

$$\mathbb{E}[P_i(X_r, X_l, \sigma'(X_r, X_l))] \neq \mathbb{E}[P_i(X_r, X_l, \sigma''(X_r, X_l))].$$

When there is some *ex ante* difference between the two parties, there are strategies belonging to Φ that will lead to different expected winning probabilities. The intuition behind Proposition 3 can intuitively be explained as follows. When there are differences between parties (for example if one party is richer or more likely to be corrupt), then the media firm can choose to take this difference into account when choosing an unbiased strategy, but the media firm can alternatively choose to treat the parties similarly. This choice will influence the expected winning probabilities of the parties.

3.4 Example continued

Section 2 deliberately constructed a simple example by letting the features be drawn from a degenerate distribution where both parties are corrupt with probability $\frac{2}{3}$. In this version of the example, I analyze unbiased strategies for more involved distribution of features.

***Ex ante* equal parties** After the media firm chooses its investigation strategy, new information about the parties' probability of corruption is revealed. Each party i is revealed to either be corrupt with probability $\frac{1}{4}$ or to be corrupt with probability $\frac{2}{3}$. These events are equally likely. I let x_i denote the probability that party i is corrupt.

I have shown that all strategies belonging to Φ will lead to equal expected winning probabilities in such settings, and here I will provide some examples. Using the strategy $\sigma_3(X_r, X_l) = \mathbf{1}_{x_r < x_l} + \frac{1}{2}\mathbf{1}_{x_r = x_l}$, the expected winning probability of l can be computed as $\frac{1}{4}[\frac{1}{3} + \frac{1}{2} + \frac{1}{2} + \frac{2}{3}] = \frac{1}{2}$.[8] Following the strategy $\sigma_1(X_r, X_l) = \frac{1}{2}$ also leads to equal winning

[8] If $x_r = \frac{1}{4}$ and $x_l = \frac{2}{3}$, party l is investigated and wins with probability $\frac{1}{3}$. If $x_r = \frac{1}{4}$ and $x_l = \frac{1}{4}$, the party l is investigated with probability $\frac{1}{2}$. After l is investigated, this party wins with probability $\frac{3}{4}$, and after r is investigated party l wins with probability $\frac{1}{4}$. Hence party l wins with probability $\frac{1}{2}$ for these

probabilities. Both $\sigma_1(X_r, X_l)$ and $\sigma_3(X_r, X_l)$ belong to Φ.

I have also shown that strategies that do not belong to Φ will not lead to the same expected winning probabilities for all distributions of features. Consider the strategy given by $\sigma_5(X_r, X_l) = \mathbf{1}_{x_r < x_l} + \frac{1}{2}\mathbf{1}_{x_l \leq x_r}$. This strategy defines unbiasedness as a combination of the principles of equal treatment and investigating the most likely to be corrupt. Separately, both of these principles belong to Φ. However, this combination does not belong to Φ and increases the expected winning probability for party l to $\frac{49}{96}$.

Not *ex ante* equal distributions I here consider the case where the features are not drawn from the same distribution. The distribution of r is similar to the previous paragraph, but I modify the distribution of party l. Rather than letting x_l be given by $\frac{1}{4}$ and $\frac{2}{3}$ with equal probabilities, I let x_l be equal to the expected value of this distribution, which means that $x_l = \frac{1}{2}[\frac{1}{4} + \frac{2}{3}] = \frac{11}{24}$. Following $\sigma_1(X_r, X_l)$ still leads to equal winning probabilities, while $\sigma_3(X_r, X_l)$ means that party l wins with probability $\frac{1}{2}[\frac{13}{24} + \frac{2}{3}] = \frac{29}{48}$. Because the features of the parties are not drawn from the same distribution, there are different strategies belonging to Φ that lead to different expected winning probabilities.

3.5 Biased versus unbiased media strategies

I have shown that there may exist multiple strategies that satisfy unbias. This raises the question of whether there is a clear separation between biased and unbiased strategies. Biased media behavior can be understood as a $\sigma''(X_r, X_l)$ satisfying the following definition.

Definition 3.2. *A strategy $\sigma''(X_r, X_l)$ is biased to the left of $\sigma'(X_r, X_l)$ if*

$$\mathbb{E}[P_l(X_r, X_l, \sigma''(X_r, X_l))] > \mathbb{E}[P_l(X_r, X_l, \sigma'(X_r, X_l))]. \tag{2}$$

features. A similar reasoning holds for the other sets of realized features.

A strategy $\sigma'''(X_r, X_l)$ *is biased to the right of* $\sigma'(X_r, X_l)$ *if*

$$\mathbb{E}[P_l(X_r, X_l, \sigma'''(X_r, X_l))] < \mathbb{E}[P_l(X_r, X_l, \sigma'(X_r, X_l))]. \tag{3}$$

Proposition 4. *Any strategy belonging to* Φ *may be interpreted as biased to the left or right if the parties are not* ex ante *equal.*

Proposition 4 shows that there is not necessarily a clear separation between the set of unbiased and biased strategies. Proposition 3 ensures that there are two unbiased strategies that lead to different winning probabilities. Definition 3.2 says that these two strategies are biased relative to each other. The underlying reason is again that an involvement in a zero-sum game creates winners and losers. Although all unbiased strategies may be interpreted as biased, this does not mean that all biased strategies can be interpreted as unbiased. The strategy $\sigma_5(X_r, X_l)$ from the example in Section 3.4 is biased and does not belong to Φ.

3.6 Preferences for unbiased media strategies

I have established that there may be several unbiased strategies, and that the choice of unbiased strategy may have electoral consequences. If both parties want to maximize the probability of winning the election, it intuitively follows that the two parties will prefer different unbiased strategies.

Corollary 1. *Suppose each party wants to maximize the expected probability of winning the election. Unless the parties are* ex ante *equal, they prefer different strategies belonging to* Φ.

Given a zero-sum electoral game, Corollary 1 immediately follows from Proposition 3, which shows that there are strategies belonging to Φ that lead to different expected winning probabilities when the two parties are not *ex ante* equal. An implication is that differences in preferences about media bias may occur if there are other differences between the parties. Increasing political polarization in other dimensions may then increase the polarization in views about media bias, because these other differences imply that the choice of unbiased strategy may affect the electoral outcome.

4 Conclusion

The usage of the word *bias* indicates that media bias is a departure from some unbiased media behavior. In this paper, I have argued that any type of intervention in a zero-sum game may create winners and losers, which makes it difficult to define *one* unbiased strategy. A media firm that wants to support a certain party can choose an unbiased strategy to increase the winning probability of this party relative to other unbiased strategies. If there are multiple unbiased strategies, and the media firm chooses a strategy that benefits a given party relative to other unbiased strategies, then the supporters of the other party may interpret this strategy as biased. Hence it is possible that the same strategy may be defined as both biased and unbiased, which may cast some light on the large partisan differences in views about media bias in the US.

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A Proofs for Section 3 (A general benchmark for unbiased media behavior)

Proposition 1. *If the parties are* ex ante *equal, then*

$$\mathbb{E}[P_i(X_r, X_l, \sigma'(X_r, X_l))] = \mathbb{E}[P_i(X_r, X_l, \sigma''(X_r, X_l))] = \frac{1}{2}$$

for any i and any $\sigma'(X_r, X_l) \in \Phi$, $\sigma''(X_r, X_l) \in \Phi$.

Proof. I will show that the expected winning probability of party i equals $\frac{1}{2}$ for all $\sigma(X_r, X_l) \in \Phi$, which means that there cannot be two strategies belonging to Φ that lead to different expected winning probabilities.

I find the expected winning probability by taking a weighted average of the winning probability for all realizations of features. I will separately analyze the cases where the realized features are equal ($x' = x''$) and different ($x' \neq x''$).

Suppose the features are realized to be equal. Then $\sigma(x', x') = \frac{1}{2}$ is the only strategy belonging to Φ, which means that the winning probabilities are equal.

Suppose the realized features are given by x' and $x'' \neq x'$. Because $\sigma(X_r, X_l) \in \Phi$, we know that $\sigma(x', x'') = 1 - \sigma(x'', x')$. Because x' and x'' contain all information about the parties, this means that $P_i[x', x'', \sigma(x', x'')] = P_{-i}[x'', x', 1 - \sigma(x'', x')] = 1 - P_i[x'', x', 1 - \sigma(x'', x')]$. The opposite realization given by x'' and x' is equally likely to occur.

For this pair of outcomes, the winning probability of i is given by

$$\frac{1}{2}[P_i[x', x'', \sigma(x', x'')] + 1 - P_i[x'', x', 1 - \sigma(x'', x')]] = \frac{1}{2}.$$

The expected winning probability is the weighted average of the winning probability for all outcomes. Because all terms are given by $\frac{1}{2}$, the weighted average is given by

$$\mathbb{E}[P_i(X_r, X_l, \sigma(X_r, X_l))] = \frac{1}{2}.$$

The expected winning probability then equals $\frac{1}{2}$ for all $\sigma(X_r, X_l) \in \Phi$.

□

Proposition 2. *If the parties are* ex ante *equal, there does not exist a strategy $\hat{\sigma}(X_r, X_l) \notin \Phi$ such that*

$$\mathbb{E}[P_i(X_r, X_l, \hat{\sigma}(X_r, X_l))] = \mathbb{E}[P_{-i}(X_r, X_l, \hat{\sigma}(X_r, X_l))]$$

for all possible distributions of features.

Proof. Suppose $\hat{\sigma}(X_r, X_l) \notin \Phi$ such that $\mathbb{E}[P_i(X_r, X_l, \hat{\sigma}(X_r, X_l))] = \mathbb{E}[P_{-i}(X_r, X_l, \hat{\sigma}(X_r, X_l))]$ for all distributions of features. This means that $\mathbb{E}[P_i(X_r, X_l, \hat{\sigma}(X_r, X_l))] = \frac{1}{2}$ for all distributions of features. By assumption, there are realized features $\{x'_r, x'_l\}$, such that $\hat{\sigma}(x'_r, x'_l) \neq 1 - \sigma(x'_l, x'_r)$. This means that $P_i[x'_r, x'_l, \hat{\sigma}(x'_r, x'_l)] \neq 1 - P_i[x'_l, x'_r, 1 - \hat{\sigma}(x'_l, x'_r)]$.[9] The prob-

[9]Because x_i is defined as the realization of all features of i that are relevant for the electoral outcome, it follows that the winning probability of i given x'_r and x'_l using the strategy $\sigma'(x'_r, x'_l)$ equals the winning probability of $-i$ given x'_l and x'_r using the strategy $1 - \sigma'(x'_l, x'_r)$ if $\sigma'(x'_r, x'_l) = 1 - \sigma'(x'_l, x'_r)$.

ability that the features are given by $\{x'_r, x'_l\}$ can be labelled $\frac{\lambda}{2}$. The expected winning probability of l is given by

$$\mathbb{E}[P_l(X_r, X_l, \hat{\sigma}(X_r, X_l))] = (1-\lambda)P'_l() + \lambda[\frac{P_l[x'_r, x'_l, \hat{\sigma}(x'_r, x'_l)] + P_l[x'_l, x'_r, (1 - \hat{\sigma}(x'_l, x'_r))]}{2}] = \frac{1}{2}.$$

Here $P'_l()$ is the expected probability of l winning the election if the features are *not* given by $\{x'_r, x'_l\}$ or $\{x'_l, x'_r\}$. Because $P_l[x'_r, x'_l, \hat{\sigma}(x'_r, x'_l)] \neq 1 - P_l[x'_l, x'_r, 1 - \hat{\sigma}(x'_l, x'_r)]$, it follows that $P'_l() \neq \frac{1}{2}$ given that the weighted average of these terms equals $\frac{1}{2}$.

Because $\mathbb{E}[P_i(X_r, X_l, \hat{\sigma}(X_r, X_l))] = \frac{1}{2}$ for all distributions of features, then this must also hold for a modified distribution of features where $\{x'_r, x'_l\}$ occurs with probability $\frac{\lambda+\Delta}{2}$. The expected winning probability of i is then given by

$$(1 - \lambda - \Delta)P'_l() + (\lambda + \Delta)[\frac{P_l[x'_r, x'_l, \hat{\sigma}(x'_r, x'_l)] + P_l[x'_l, x'_r, (1 - \hat{\sigma}(x'_l, x'_r))]}{2}].$$

We know that $P'_l() \neq \frac{1}{2}$ and $[\frac{P_l[x'_r, x'_l, \hat{\sigma}(x'_r, x'_l)] + P_l[x'_l, x'_r, (1 - \hat{\sigma}(x'_l, x'_r))]}{2}] \neq \frac{1}{2}$. Because a weighted average of these terms with a weight $1 - \lambda$ on the first term equals $\frac{1}{2}$, it follows that a weighted average with weight $1 - \lambda - \Delta$ on the first term cannot equal $\frac{1}{2}$ when $\Delta \neq 0$.

This means that there cannot exist a strategy $\hat{\sigma}(X_r, X_l) \notin \Phi$ such that $\mathbb{E}[P_i(X_r, X_l, \hat{\sigma}(X_r, X_l))] = \frac{1}{2}$ for all distributions of features.

□

Proposition 3. *If and only if the parties are not* ex ante *equal, there are strategies* $\sigma'(X_r, X_l) \in \Phi$*,* $\sigma''(X_r, X_l) \in \Phi$ *such that*

$$\mathbb{E}[P_i(X_r, X_l, \sigma'(X_r, X_l))] \neq \mathbb{E}[P_i(X_r, X_l, \sigma''(X_r, X_l))].$$

Proof. The "only if"-part is shown in Proposition 1.

If the features of the parties are not drawn from the same distribution, this means that there are some features, x' and x'', that occur with different probabilities for the two parties. The probability that $x_r = x'$ and $x_l = x''$ is labeled λ_1, while the probability that $x_r = x''$ and $x_l = x'$ is labeled λ_2.

The expected winning probability of party i for a strategy $\sigma(X_r, X_l)$ can be written as

$$\mathbb{E}[P_i(X_r, X_l, \sigma(X_r, X_l))] = \lambda_1 P_i[x', x'', \sigma(x', x'')] + \lambda_2 P_i[x'', x', \sigma(x'', x')] + (1 - \lambda_1 - \lambda_2)P''_i().$$

Here $P''_i()$ is defined as the probability that party i wins the election if the features are not given by $\{x_r = x', x_l = x''\}$ or $\{x_r = x'', x_l = x'\}$.

Consider the set of strategies given by $\sigma_\alpha(X_r, X_l) = \alpha \mathbf{1}_{x_r = x', x_l = x''} + (1 - \alpha)\mathbf{1}_{x_r = x'', x_l = x'} + \frac{1}{2}\mathbf{1}_{x_r = x_l \cup x_r, x_l \neq x', x''}$. For all values of $\alpha \in [0, 1]$, $\sigma_\alpha(X_r, X_l) \in \Phi$.

Following a strategy belonging to $\sigma_\alpha(X_r, X_l)$, party i wins with probability

$$\mathbb{E}[P_i(X_r, X_l, \sigma_\alpha(X_r, X_l))] = \lambda_1 P_i(x', x'', \alpha) + \lambda_2 P_i(x'', x', 1 - \alpha) + (1 - \lambda_1 - \lambda_2)P''_i().$$

Assumption 1 states that varying α affects the winning probability. As long as $\lambda_1 \neq \lambda_2$, it follows that $\mathbb{E}[P_i(X_r, X_l, \sigma_\alpha(X_r, X_l))]$ depends on α, which means that Proposition 3 is satisfied.

□

Proposition 4. *Any strategy belonging to* Φ *may be interpreted as biased to the left or right if the parties are not* ex ante *equal.*

Proof. By Proposition 3 there exist strategies $\sigma'(X_r, X_l)$ and $\sigma''(X_r, X_l)$ such that

$$\mathbb{E}[P_i(X_r, X_l, \sigma'(X_r, X_l))] \neq \mathbb{E}[P_i(X_r, X_l, \sigma''(X_r, X_l))].$$

This means that $\mathbb{E}[P_i(X_r, X_l, \sigma'(X_r, X_l))] > \mathbb{E}[P_i(X_r, X_l, \sigma''(X_r, X_l))]$ or $\mathbb{E}[P_i(X_r, X_l, \sigma'(X_r, X_l))] < \mathbb{E}[P_i(X_r, X_l, \sigma''(X_r, X_l))]$. □

A large literature has analyzed media bias, but the question of identifying unbiased media behavior has received less attention. I address the topic of unbiasedness in a setting where a media firm engages in journalism that may affect the electoral outcome for political parties. I provide a characterization of the set of unbiased media strategies. I find that there are multiple strategies for unbiased media coverage, and that the choice of unbiased strategy will have electoral consequences. Because the electoral game is zero-sum, political parties will prefer different unbiased strategies. This paper rationalizes partisan differences in views about media bias.

SNF

Samfunns- og næringslivsforskning AS
Centre for Applied Research at NHH

Helleveien 30
NO-5045 Bergen
Norway

P +47 55 95 95 00
E snf@snf.no
W snf.no

Trykk: Allkopi Bergen