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Abstract

This paper assesses the normative and positive claims regarding the consequences of biased media using a political agency framework with a strategic voter, polarized politicians, and news providers. My model predicts that voters are always better informed with unbiased than biased outlets even when the latter have opposite ideological preferences. However, biased media may improve voter welfare. Contrary to several scholars' fear, partisan news providers are not always bad for democracy. My theoretical findings also have important implications for empirical analyses of the electoral consequences of changes in the media environment. Left-wing and right-wing biased outlets have heterogeneous effects on electoral outcomes which need to be properly accounted for. Existing empirical studies are unlikely to measure the consequences of biased media as researchers never observe and can rarely approximate the adequate counterfactual: elections with unbiased news outlets.

JEL Classification: D72, D78, D82.

Keywords: biased news, counterfactual, welfare, information

1   Introduction

There is a broad consensus that news outlets are politically biased. President Trump continuously asserts it, as did President Obama (Wenner, 2010). The broader public in the U.S (Newseum Institute, 2017; Pew Research Center, 2013) and elsewhere (Reuters Institute, 2015) believes it. And multiple academic studies have confirmed it (see Puglisi and Snyder, 2015a). But are biased news providers harmful for democracy?

Some argue so (see among others Entman, 1989; McChesney, 2004; Ladd, 2012). Their reasoning can be described as such. Through omission or presentation biases (Groeling, 2013), partisan outlets—newspapers, television channels, or radio stations—reduce the information available to the electorate. As information is key to hold politicians accountable, democracy faces "a political crisis of the highest magnitude" (McChesney, 2004 p. 18). In a time of high political polarization when politicians are often misaligned with the electorate, this problem appears especially acute. As Prior puts it (2013, 123), "[t]he median voter has never been so bored."

This paper assesses the normative claims regarding the consequences of biased media. Unlike previous works on the subject, I consider a political agency framework in which a strategic representative voter ('she') faces the dual problem of controlling and selecting polarized politicians ('he') while being informed by strategic news outlets. Further, I suppose that news reports can suffer from both presentation and omission biases when others have focused on one or the other. In this setting, I compare the voter welfare in different media environments: unbiased (in which outlets share the voter's policy preferences), balanced (in which the voter is exposed to outlets with a right-wing and left-wing leaning), and right/left-wing biased. Two consistent findings emerge. First, compared to unbiased news providers, biased outlets reduce the information available to the voter even when they support opposite policies. Second, lower level of information does not generate lower welfare. Quite the contrary, in this article's setting, it makes the voter better off.

The theoretical framework consists of politicians who are on average to the right or left of the voter and can either be extremists—who always (non-strategically) choose the most right-wing or left-wing policy—-or moderates—who are willing to implement the voter's preferred policy if they have sufficient electoral incentives to do so. The voter must decide whether to reelect a right-wing incumbent or replace him by a left-leaning challenger. As it is common in agency models, after the election, the office-holder faces no electoral constraint and always chooses his preferred policy. As a result, the voter elects the politician she believes to be the most moderate.

To make her electoral decision, the voter can use two distinct pieces of information. First, the incumbent's policy choice which may reveal information about his type. Second, a news report from one or two outlets depending on the media environment. This report contains both an editorial which takes the form of falsifiable information about the incumbent's political ideology (moderate or extreme) and (possibly) a news story which takes the form of verifiable information about the quality of the incumbent's decision. Outlets can thus engage in presentation bias with editorials (lying about type) and omission bias with news story (hiding information).

As a benchmark, first consider outcomes with an unbiased media outlet. Since the outlet shares the voter's preferences, it wants to maximize the likelihood that a moderate incumbent is reelected and an extreme incumbent replaced. To do so, the media outlet truthfully discloses all its information. The voter is perfectly informed about the incumbent's type and perfectly screens politicians at the time of the elections. Since the outlet's editorial reveals his type, an incumbent's action has no impact on his reelection chances. A moderate right-wing incumbent then always implements his preferred policy which may differ from the voter's. Unbiased outlets are thus associated with good selection, but a loss of control.

Let us now turn to biased media. The right-wing news provider would like to maximize the incumbent's electoral chances, the left-wing outlet to minimize it. In a balanced media environment, can the voter play the outlets against each other to elicit all their private information? Editorials, I show, always suffer from presentation biases and cannot be trusted by the voter. To encourage truth telling, the voter must punish one media outlet if she observes conflicting editorials. But to punish the left-leaning news provider, she must reelect the right-wing incumbent with high probability encouraging the right-wing news outlet to lie in the first place. Truth telling in editorials is never an equilibrium outcome because elections are a coarse instrument where one outlet's punishment is always the other's reward. The voter, however, is not completely uninformed. The left-wing outlet always publishes news stories that hurt the incumbent, the right-wing outlet always reports news stories that raise the office-holder's electoral chances.

Reduced information entails some loss in term of selection since lacking information about the incumbent's type, the voter may wrongly reelect an extremist and sanction a moderate. Everything else equal, this would harm the voter. However, a moderate incumbent also changes his first-period policy choice. To distinguish himself from an extremist, a moderate tends to choose a policy closer to the voter's preferences. That is, the voter gains in term of control. As even moderates

often implement policies distinct from the voter's preferred options when reelected, better control dominates worse selection, and the voter benefits from less information.

While the paper establishes that the voter is better off with biased compared to unbiased news outlets, this does not imply that a biased media environment is without cost. The voter welfare (in term of policy choices) is maximized in a balanced media environment. The outlets' reporting strategy again explains this result. As explained above, the left-wing outlet hides good news for the incumbent, the right-wing outlet bad ones. When both are present, there is no omission bias, the voter is able to recover all news stories and minimize the loss in term of selection. In a biased media environment, some news stories are omitted which leads to too few moderates (with a left-wing outlet) or too many extremists (with a right-wing outlet) being reelected.

The results above show that the often expressed opinion that biased media are unambiguously bad for democracy needs to be qualified. Changing the media environment does not just change the information available to voters, it also modifies politicians' behavior. This may entail a trade-off between better selection with unbiased media and better control with biased media. In a polarized political environment, this trade-off is resolved in favor of biased media as the benefit induced by the changes in policy choices dominates the loss associated with increased electoral mistakes.

My framework also serves to highlight issues in the empirical literature on biased media as well as to suggest some possible remedies. First, empirical studies are unlikely to measure the impact of biased media. To do so requires to compare elections with biased and unbiased news outlets. But researchers do not observe an unbiased media environment, their baseline is a balanced media system. Due to the possibility of presentation bias, the reportings of biased outlets and unbiased outlets are markedly different even when biased news providers have opposite ideological preferences. As a result, my model suggests that a balanced media environment may well be a poor approximation for an unbiased media environment. While current empirical studies may yield unbiased estimates of the electoral consequences of changing the media environment from balanced to biased or vice versa (especially if using exogenous variations in media availability as in DellaVigna and Kaplan, 2007; Barone et al., 2015), they may not provide much information about the impact of biased media vis-a-vis unbiased media.

The theory also emphasizes that right-wing and left-wing outlets do not hide the same type of news. Hence, the electoral impact of moving from a balanced to a left-wing biased media environment need not be the same as switching from a balanced to a right-wing biased environment. These

heterogeneous effects complicate the interpretation of estimates of the effect of changes in media environments, which may be driven by part of the sample (e.g., right-wing outlets help right-wing incumbents, but have no effect on the electoral fortune of left-wing office-holders). The electoral consequences of news outlets are thus likely to depend on the combination of media environment (balanced, right-wing, or left-wing biased) as well as the political situation (the partisan identity of the office-holder). This paper thus recommends that researchers provide richer descriptions of both factors to facilitate the comparison of findings across studies.

Before connecting my work with the literature, describing the model and its implications, a word of caution is in order. This paper does not claim to be the last word on media bias (not even in political agency frameworks). It does not argue that biased media are unambiguously good nor that empirical studies of media bias are inherently flawed.[1] Its claims are more modest, but nonetheless necessary. The present work highlights substantial flaws in the normative and positive conclusions on the impact of biased news outlets. Under the current body of evidence, any policy recommendation appears counterproductive, if not misguided. Before doing so, we need a better understanding of the particular circumstances under which biased media may harm the electorate.

2   Literature Review

The literature on biased media is divided into three broad themes: (i) an empirical literature which measures the extent of media bias (reviewed in Puglisi and Snyder, 2015a), (ii) an economic literature which tries to uncover its origin (reviewed in Gentzkow et al., 2015), and (iii) a political economy literature which assesses the impact of media bias (reviewed in Strömberg, 2015), to which this paper belongs.

Several theoretical works on the political consequences of media bias consider settings with fixed alternatives in which voters only face a selection problem (e.g., Bernhardt et al., 2008; Duggan and Martinelli, 2010; Shapiro, 2016). Biased media then tend to diminish voter welfare. This negative effect, however, no longer holds when there is sufficient competition (Anderson and McLaren, 2012), media outlets need to collect information (Chen, 2007; Sobbrio, 2011; Warren, 2012) or some citizens demand biased news (Mullainathan and Shleifer, 2005). A few papers in turn focus on the impact of media bias in models of electoral competition (Chan and Suen, 2009; Chakraborty

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[1]Indeed, biased media outlets may hurt the electorate when politicians take more extreme rather than moderate actions to signal their type (e.g., Fox and Stephenson, 2011; Acemoglu et al., 2013; Kartik and Van Weelden, 2017).

and Ghosh, 2016; Miura, 2016; see also Pan, 2014, for a model with non-strategic media). The central problem for the median voter is then one of control and these studies overall establish that biased news outlets tend to generate platform divergence and, thus, to be detrimental to the electorate.

As argued by Fearon (1999) and many after him (e.g., Ashworth and Bueno de Mesquita, 2014), the electorate rarely faces a pure control or pure selection problem. Voters use politicians' past actions to infer their future behavior. In such political agency framework, scholars have long been interested in the (possibly negative) effect of transparency (e.g., Prat, 2005; Fox, 2007; Fox and Van Weelden, 2012). There, voter information is always exogenous and these important works cannot tell us much about the consequences of biased media. The present fills this gap by assuming that a representative voter is informed by strategic news outlets.

As such, my work is in close conversation with Ashworth and Shotts (2010), Gratton (2015), and Hafer et al. (2016) which all study political agency models with a strategic media outlet (Adachi and Hizen, 2014, assume that biased outlets exogenously garble information). There are, however, three major differences with the present manuscript. First, news providers do not share the same objective. Ashworth and Shotts consider a truth-motivated news outlet, Gratton and Hafer et al. a profit-maximizer news provider, none incorporates biased media. Second, outlets' reporting is distinct. Ashworth and Shotts focus on presentation bias (the news outlet is unable to fully convey to voters all the subtleties of its information), Gratton on omission bias, Hafer et al. on costly news production. In turn, my framework is unique in incorporating both presentation and omission biases. Finally, I derive empirical implications, absent (to the best of my knowledge) from all theoretical works on the subject, which highlight limitations in empirical studies of the electoral consequences of change in the media environments.

3   The model

My framework consists of a two-period game ($t \in \{1, 2\}$) with strategic news outlets, politicians, and (representative) voter. Each period, the office-holder chooses a policy $x_t \in \{-1, 0, 1\}$, where -1 (1) can be understood as the left-wing (right-wing) policy and 0 as a centrist policy. I assume (without loss of generality) that the first-period incumbent (R) leans right and his challenger (L) left. At the end of period 1, the voter decides to (re)elect politician R or L. She can make use of

two pieces of information: (i) the first-period policy choice (x_1) and (ii) one or two news outlets' report depending on the media environment. The rest of the section provides more details on the different aspects of the model starting with the impact of policy choices.

Each period, the impact of the policy choice on players' utility depends on an underlying state of the world $\omega_t \in \{l, c, r\}$, $t \in \{1, 2\}$. The distribution of policy preferences is adapted from Morelli and Van Weelden (2013). The voter prefers policy 0 in state $\omega = c$, -1 in state l, 1 in state r. A politician's preferences depend on his type τ which is unobserved by the voter. Politician $J \in \{R, L\}$ is either moderate $\tau = m$ or extremist $\tau = e$. The common prior is that J is a moderate with probability κ: $Pr(\tau_J = m) = \kappa$. An extremist politician is non-strategic and always implements the right-wing policy 1 (left-wing policy) if $J = R$ ($J = L$). In turn, a moderate politician, like the voter, prefers the left-wing policy -1 in state $\omega = l$ and the right-wing policy 1 in state $\omega = r$ (all results hold if a moderate R and L prefer $x = 0$ in state $\omega = l$ and $\omega = r$, respectively). In state c, the voter and a moderate politician's preferences diverge. A moderate incumbent R (challenger L) prefers the policy $x = 1$ ($x = -1$) rather than the centrist policy 0.

News outlets also have policy preferences. An outlet is unbiased if it shares the preference of the voter. In turn, an outlet exhibits a right-wing (left-wing) bias if it shares the preferences of a moderate politician R (moderate challenger L). From the onset, I emphasize that all conclusions remain unchanged when biased outlets always prefer extreme policies. I use the label N^U for the unbiased outlet, N^R for the right-wing outlet, and N^L for the left-wing outlet.

Table 1 provides a point of reference by summarizing the ideal policies of all strategic players as a function of the state ω.

Players/States	l	c	r
Voter	-1	0	1
Moderate R	-1	1	1
Moderate L	-1	-1	1
Unbiased outlet N^U	-1	0	1
Right-wing outlet N^R	-1	1	1
Left-wing outlet N^L	-1	-1	1

Table 1: Players' preferred policies as a function of the state ω

It is common knowledge that the state is drawn i.i.d. each period. Since ideologically distinct

players agree on policies in states $\omega = l$ and $\omega = r$, I assume that those states are relatively rare. That is, ω is distributed according to the following distribution: $Pr(\omega_t = l) = Pr(\omega_t = r) = \pi \in (0, 1/3)$, $t \in \{1, 2\}$. (The assumption of symmetry is meant to simplify the exposition.) The office-holder always learns the state before making his policy choice in period $t \in \{1, 2\}$. The voter never observes directly the state (or the incumbent R's type). Finally, outlets know both the state and incumbent's type, with distinct reporting technology for each.

A news outlet's reports contain two items. First, outlet N publishes an editorial or opinion piece $o^N \in \{m, e\}$, which contains falsifiable and non verifiable (soft) information about politician R's type (Online Appendix E shows that the substance of the normative results is unaffected when editorials reveal information about the state of the world). Second, outlet N decides whether to publish a news story $s^N \in \{\emptyset, d^N\}$, which possibly contains non falsifiable and verifiable (hard) information about the state of the world. Outlets uncover a news story probabilistically. This is captured by the variable d^N which takes value $d^N = \omega$ with probability $\rho \in [0, 1]$ if a news story is uncovered and $d^N = \emptyset$ otherwise. The parameter ρ can be interpreted as the quality of the media environment. To guarantee that the media environment only changes outlets' strategic reporting (and simplify the exposition), I assume that outlets simultaneously uncover news stories: $d^{N^U} = d^{N^L} = d^{N^R} = d \in \{\emptyset, \omega\}$. Observe that the theoretical framework allows for two distinct types of reporting biases: presentation bias (also referred to as news distortion) with editorials and omission bias (also referred to as news filtering) with news story. In turn, the model ignores the cost of uncovering news story or the production of other news such as entertainment news. Incorporating these important aspects would, however, not change the main conclusions.

I can now qualify the ideological leaning of the media environment. The media environment is said to be unbiased if outlet N^U makes a report. It is balanced if N^L and N^R each publishes a report (e.g., many U.S. states according to Puglisi and Snyder, 2015b). It exhibits a right-wing (resp. left-wing) bias if only the pro-incumbent outlet N^R (pro-challenger outlet N^L) is the voter's news provider (e.g., Italy after Berlusconi's election in 1994, see Durante and Knight, 2012). A biased media environment also corresponds to an environment in which the voter can only read one outlet due to time or cognitive constraints, though it is harder then to identify the partisan leaning of the environment.

A moderate politician as well as news outlets' per-period payoff depends on the distance between the player's ideal policy in state $\omega \in \{l, c, r\}$—denoted $x^K(\omega)$, $K \in \{R, L, N^U, N^L, N^R\}$ and

described in Table 1—and the policy implemented x_t. It thus assumes the following form:

$$U^K(x_t) = -|x_t - x^K(\omega_t)|$$

The voter's payoff depends on the distance between her ideal policy $x^V(\omega)$ and the policy choice as well as a valence shock ξ, which captures the voter's evaluation of other aspect of politician R's performance (e.g., charisma) or various aspects of the political environment in a reduced form (e.g., partisanship). V observes ξ after x_1, but before making her electoral decision. For now, I assume that ξ is distributed according to the cumulative distribution function $F(\xi)$, which is continuous and strictly increasing over $[-2\kappa\pi, 2\kappa\pi]$. While not necessary for the results to hold, the assumptions on $F(\cdot)$ simplify the analysis by guaranteeing that voter indifference is a zero probability event and the incumbent's reelection probability is interior as we will see. The voter's payoff is given by:

$$U^V(x_t) = -|x_t - x^V(\omega)| + \mathbb{I}_{\{R \text{ in office}\}}\xi,$$

with $\mathbb{I}$ the indicator function. To restrict the number of parameters, I assume (without loss of generality) that players do not discount the future.

To summarize, the timing of the game is:

- **Period 1:**

    0. Nature draws the first-period state of the world ($\omega_1 \in \{l, c, r\}$) and politicians' types $((\tau^R, \tau^L) \in \{m, e\}^2)$;

    1. Politician R observes his type τ^R, the state of the world ω_1 and chooses policy $x_1 \in \{-1, 0, 1\}$;

    2. News outlet(s) N observes the first-period policy (x_1), R's type (τ^R), and news story $d^N \in \{\emptyset, \omega\}$. It (They) then publishes (publish) a news report $n^N \in \{m, e\} \times \{\emptyset, d^N\}$;

    3. Voter observes first-period policy, outlet's (outlets') report(s) n^N, and valence shock ξ. She then decides whether to reelect R;

- **Period 2:**

    0. Nature draws the second-period state of the world $\omega_2 \in \{l, c, r\}$;

    1. The office-holder (R or L) observes his type, the state of the world, and chooses policy $x_2 \in \{-1, 0, 1\}$;

    2. The game ends and payoffs are realized

The equilibrium concept is Perfect Bayesian Equilibrium (PBE), see Definition 1 in the Supplemental Appendix for a formal definition. As it is common in political agency models, multiple PBE can arise for similar parameter values. First, to simplify the analysis and facilitate the exposition of the positive implications, I suppose that politicians play pure strategies (the voter always plays a pure strategy due to the presence of a valence shock). Second, I focus on the most informative equilibrium (there is always a babbling equilibrium in opinion pages as it resembles a cheap talk game). In addition, I refine outcome-equivalent PBE (in term of policy choices and electoral strategy) by assuming that if truth telling is an equilibrium strategy for a news outlet then its editorial strategy satisfies $o^N(\tau^R) = \tau^R$ (truth telling can also take the form of $o^N(\tau^R) = \neg\tau^R$, with $\neg$ the opposite to τ^R). Third, since a non-strategic extermist R always implements $x_1 = 1$, I impose that the voter always believes that R is moderate when she observes $x_1 \in \{-1, 0\}$ (i.e., the voter's posterior that R is moderate—denoted $\mu^V(x_1, n)$—satisfies $\mu^V(-1, n) = \mu^V(0, n) = 1$ for all news report(s) n). Finally, if multiple PBE still exist after the three aforementioned refinements, I select the PBE which maximizes the voter's ex-ante expected *policy payoff* (henceforth, policy welfare). I select policy welfare as a welfare criterion to (i) simplify the analysis and (ii) ensure that results are driven by candidates' strategic choices, not the exogenous valence shock. In what follows, the term 'equilibrium' refers to PBE satisfying the four refinements (PBE refers to players' strategy satisfying Definition 1).

Before proceeding to the analysis, a few remarks on the set-up are in order. The voter seeks to select moderate politicians and thus looks for congruence (Maskin and Tirole, 2004) rather than competence (Canes-Wrone et al., 2001). However, one can interpret extremists as non-strategic incompetent politicians who always implement the policy which maximizes their per-period expected utility. I briefly discuss the consequences of relaxing the assumption of behavioral extremist types at the end of the next section.

I also focus on a political environment which exhibits significant political polarization, like the United States in recent years (Fiorina, 2006; Bonica et al., 2013). Even moderate politicians do not share the same policy preferences as the voter's. This guarantees that the voter faces the double problem of controlling and selecting politicians. If moderate politicians have similar preferences as the voter (or both types are non-strategic), her problem is one of selection and unbiased outlets (as we will see) always perform better. In turn, if moderate and extremist politicians have similar preferences (with moderates reacting to electoral incentives), the selection problem is mute—the

voter is always indifferent between R and L at the time of the election—and the media environment has no effect.

Finally, the equilibrium restrictions play a significant role in establishing the normative results below (all most informative PBE are described in the Online Appendix).[2] In particular, the focus on the most informative equilibrium, while common, is not innocuous. It is not, however, unjustified. As long as media outlets can make reports after the incumbent's policy choices and before the election (and there is little reason to believe they cannot), the most informative equilibrium is the only renegotiation-proof equilibrium between an unbiased outlet and the voter. In fact, an unbiased news provider would even be willing to pay a cost (e.g., printing a special edition) to credibly signal it is playing an informative cheap talk strategy. In addition, the choice of the most informative equilibrium guarantees that any presentation bias is the result of strategic interactions rather than equilibrium selection. In turn, equilibrium uniqueness represents a best-case scenario for researchers as multiplicity of equilibria tends to bias empirical estimates of the variables of interests (for a detailed discussion on this issue, see Bueno de Mesquita, 2010; Wolton 2017).

4 Analysis: Normative implications

The analysis proceeds in two steps. In this section, I describe the normative implications of biased media. In the next, I detail the positive implications.

Working by backward induction, in period 2, the office-holder always implements his preferred policy since he faces no electoral incentive. An extreme politician R (L) chooses $x_2 = 1$ ($x_2 = -1$). The voter's expected policy payoff in period 2 with an extremist in office is then $W_2(e) := -1$ (0 in one of the extreme states, $(1 - 2\pi) \times (-1)$ in the centrist state and $\pi \times (-2)$ in the other extreme state). In turn, a moderate politician's policy choice is as described Table 1. The voter's expected policy payoff from electing a moderate is: $W_2(m) := -(1 - 2\pi)$ (a moderate matches the voter's preferred policy in all, but the centrist state). Recall that $\mu^V(x_1, n)$ is the voter's posterior that R is moderate after observing his policy choice and outlet's (or outlets') report(s). The voter thus reelects the incumbent R if and only if (after slight rearranging):

$$\mu^V(x_1, n)2\pi + \xi \geq \kappa 2\pi \tag{1}$$

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[2]The Online Appendix is available here.

Since the voter observes ξ after the report(s) or policy choice, outlet(s) and politician R treat ξ as random. From their perspective, the probability that politician R is reelected is $P(\mu^V(x_1, n)) := 1 - F((\kappa - \mu^V(x_1, n))2\pi)$.

With these preliminary results, common to all media environments, I can now consider voter information and policy welfare under different media systems. To do so, I introduce the following terminology. I say that a news outlet N's editorial is free of presentation bias if and only if $o^N(\tau^R) = \tau^R$ for all τ^R. In contrast, I say that N's opinion piece suffers from severe presentation bias if it never reveals information about the incumbent's type (either because N's report is type invariant or because N plays an uninformative mixed strategy equivalent to babbling). Under severe presentation bias, the voter simply learns nothing from the outlets' editorials. I further state that outlet N's news story is free of omission bias if and only if $s^N(\omega) = \omega$.

Observe a difference between presentation and omission biases. The former is defined over all types, the latter separately for each state of the world. This is due to the difference in reporting technology. Editorials are a form of cheap talk (Crawford and Sobel, 1982) and the message space needs to be considered as a whole to judge its informativeness. News stories correspond to information disclosure (Milgrom, 1981) and can thus be evaluated in isolation.

Returning to the analysis, consider outlet N^U's reporting strategy. At the time of its report, the outlet can only influence the voter's electoral decision. Since it shares the voter's preferences, the outlet would like to maximize the probability that the second-period office-holder is moderate. To do so, N^U has no interest to engage in presentation bias or omission bias (the focus on the most informative equilibrium implies that N^U discloses its news story even if its editorial is a sufficient statistic for the voter). We thus obtain the following Lemma (whose proof is direct from the text and omitted).

Lemma 1. *The unbiased news outlet N^U's report is free of presentation and omission biases:* $o^{N^U}(\tau^R) = \tau^R \in \{m, e\}$ *and* $s^{N^U}(d) = d \in \{\emptyset, \omega\}$ *for all* $\omega \in \{l, c, r\}$.

Anticipating the unbiased outlet's strategy, the voter perfectly learns the incumbent R's type. Consequently, an extreme incumbent's reelection probability is $P(0)$, whereas a moderate's is $P(1)$ *independently of his first-period action.* A type $\tau = m$ then chooses his preferred policy in all states since his choice has no impact on his electoral chances. With an unbiased outlet, the voter maximizes selection while losing control over the incumbent.

Combining all elements together, I can then compute the voter policy welfare with an unbiased outlet denoted W_U. Denote $W_2(L) := \kappa W_2(m) + (1 - \kappa)W_2(e)$ the voter's expected policy payoff from electing a random challenger L and recall that $W_2(m) = -(1 - 2\pi)$ and $W_2(e) = -1$. I then obtain:

$$
\begin{aligned}
W_U &= \kappa\big(W_2(m) + W_2(L) + P(1)(W_2(m) - W_2(L))\big) + (1 - \kappa)\big(W_2(e) + W_2(L) + P(0)(W_2(e) - W_2(L))\big) \\
&= \underbrace{\kappa W_2(m) + (1 - \kappa)W_2(e)}_{\text{1st period}} + \underbrace{W_2(L) + \kappa(1 - \kappa)(P(1) - P(0))2\pi}_{\text{2nd period}} \quad\quad (2)
\end{aligned}
$$

W_U corresponds to the benchmark welfare. It can be divided into two parts. The first two terms $(\kappa W_2(m) + (1 - \kappa)W_2(e))$ correspond to the first-period expected policy payoff. The other terms $(W_2(L) + \kappa(1 - \kappa)(P(1) - P(0))2\pi)$ corresponds to the second-period expected policy payoff. In particular, the term $\kappa(1 - \kappa)(P(1) - P(0))2\pi$ corresponds to the selection gain over electing a randomly selected challenger L. Equation 2 clearly highlights that, when the media environment is unbiased, the voter loses control and the incumbent R behaves as if he has no electoral incentive in the first-period. In turn, she maximizes the gain from selection as measured by the difference in reelection probabilities $P(1) - P(0)$.

Let us now turn to the case of a balanced media environment. I first consider the outlets' reporting strategy. The pro-incumbent outlet N^R always prefers a moderate incumbent to an extreme R, but also a right-wing extremist to any type of left-wing politician. The reverse holds true for the pro-challenger outlet N^L. Thus outlets and the voter do not have the same ranking of politicians. This difference of opinion has important implications for outlets' reporting as the next Lemma establishes (the proof of the Lemma and all subsequent results can be found in the Online Appendix).

Lemma 2. *Suppose the media environment is balanced and the first-period policy choice does not reveal politician R's type. Then, in any Perfect Bayesian Equilibrium,*
(i) N^L and N^R's editorials suffer from severe presentation bias;
(ii) One outlet's report is free of omission bias.

Lemma 2 highlights that when it comes to voter information, a balanced media environment does not mimic an unbiased media environment when news reports can influence the voter's electoral decision (if the policy choice perfectly reveals the incumbent's type, news reports are inconsequential). It shows that the difference is driven by editorials. When it comes to news story, the

media environment as a whole is always free of omission bias in all states. The left-wing outlet N^L always has incentive to disclose information that hurts the incumbent R, and vice versa for the right-wing outlet N^R (this result follows directly from Milgrom and Roberts, 1986).

The same logic does not apply to editorials. To build intuition for this result, suppose that there exists a PBE in which both news outlets' reports are free of presentation bias. This implies that both outlets' editorials should have the same content. Any difference necessarily implies that one outlet has lied. The voter, however, do not know which provider did not truthfully report the incumbent's type, she can only conjecture. Suppose she believes after observing $o^{N^L} \neq o^{N^R}$ that outlet N^R has distorted her editorial. To deter the right-wing outlet from lying, the voter must punish N^R and elect the left-wing challenger L. But this punishment strategy generates an incentive for the left-wing outlet to engage in presentation bias. (Lemma B.3 in Online Appendix B shows that the logic extends to all possible editorial strategies, including mixed strategies.) Because elections are only a coarse instrument, one news outlet's punishment is always the other outlet's reward, and the voter cannot encourage truth telling.[3]

At the time of the election, the voter can thus only rely on the politician's first-period policy choice and the (possibly) uncovered news story to make her electoral decision. A moderate politician R now has incentive to choose a moderate policy to signal his type. Indeed, as long as electoral incentives are strong enough, there exists a PBE in which a moderate R picks policy $x_1 = -1$ in state l and the centrist policy $x_1 = 0$ otherwise. In this case, the voter faces no loss when it comes to selection (the first-period policy choice perfectly reveals the incumbent's type). In addition, she gains in term of control since a moderate R chooses her preferred policy in the most likely state $\omega = c$ rather than the less common right-wing state $\omega = r$. Overall, the voter is better off (in term of policy welfare) in a balanced compared to unbiased media environment. Denote $\Delta^R := \kappa \times (1 - 2\pi) \times 2 + (1 - \kappa) \times \big((1 - 2\pi) \times 2 + \pi \times 2\big)$ the expected cost for a moderate R to be replaced by a randomly drawn left-wing politician. I obtain:

Proposition 1. *Suppose $P(1) - P(0) \geq \frac{1}{\Delta^R}$. Then, the voter policy welfare is strictly higher in equilibrium in a balanced media environment than in an unbiased media environment.*

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[3]This result contrasts with Krishna and Morgan's (2001) analysis of the relationship between committees and the floor in legislatures. They show that a median legislator can use a simple rule to always learn the state of the world in a cheap talk game when she faces two congressional committees (or experts) with symmetrically opposed bias. The difference is due to the space of strategies available to the receiver (voter here, legislator in Krishna and Morgan's) as explained by Battaglini (2002). When the strategy space is broad (such as a policy space in legislative policy-making), the receiver can sustain truth telling by opposite experts. When the strategy space is coarse (as in elections), truth telling is not achievable.

In a balanced media environment, the voter can exert some control over her representative while maintaining efficient selection since the first-policy policy choice fully reveals the incumbent's type. Observe that while the voter does not use the outlets' reports on path, they play a critical role. A moderate incumbent implements the centrist rather than right-wing policy because editorials do not reveal his type.

Can the voter improve over this PBE in which policy choice fully reveals the incumbent's type? The answer turns out to be yes. In this set-up, the voter prefers full control over selection. That is, her policy welfare is higher in a PBE in which the incumbent R chooses her preferred policy in all states ($x_1 = x^V(\omega)$ for all $\omega \in \{l, c, r\}$, not just $\omega \in \{l, c\}$). Reelecting a moderate politician generates little policy benefit for the voter since the office-holder always implements his favourite policy in the centrist state which differs from the voter's preferred option. In contrast, control guarantees that, in the first period, the implemented policy matches the voters' ideal policy in all states.

This 'full control PBE,' however, does not always exist. Politician R must be reelected with sufficiently high probability when he chooses the right-wing policy. This is the case when two conditions are met. First, when the voter learns that the right-wing policy matches the state, the incumbent's reelection chances must be high enough (in formal term, $P(1) - P(\kappa)$ must be sufficiently low noting that the voter's posterior is κ when she observes $s = r$ and $x_1 = 1$). Second, when the first condition is met, the voter must be sufficiently likely to learn that the incumbent's policy choice is correct (in formal term, ρ must be sufficiently large). The voter policy welfare is thus maximized in a high quality media environment and a political environment relatively favorable to the incumbent everything else equal (recall $P(\kappa) = 1 - F(0)$).

Before stating the result, it is useful to define the following quantity $\mu^B = \frac{\kappa\pi}{\kappa\pi + (1-\kappa)}$, which corresponds to the voter's posterior after observing the right-wing policy and no news story when a moderate politician chooses $x_1 = 1$ if and only if $\omega = r$. Denote further $W_B(\rho)$ the voter policy welfare in a balanced media environment as a function of the quality of the media environment ρ. I obtain the following corollary, Figure 1 provides an illustration.

Corollary 1. *Suppose $P(1) - P(\kappa) < \frac{1}{\Delta^R} < P(1) - P(0)$. There exists a unique $\rho_B \in (0, 1)$ such that:*

(i) for all $\rho < \rho_B$, the first-period equilibrium policy choice is fully revealing and the voter policy welfare is

$$W_B(\rho) = W_U + \kappa(1 - 3\pi);$$

(ii) for all $\rho \geq \rho_B$, the first-period equilibrium policy choice is the voter's preferred policy and the voter policy welfare is

$$W_B(\rho) = W_U + \kappa(1 - 2\pi) - \kappa(1 - \kappa)2\pi\Big(\pi P(1) + (1 - \pi)(1 - \rho)P\left(\mu^B\right) - (1 - \rho(1 - \pi))P(0)\Big).$$
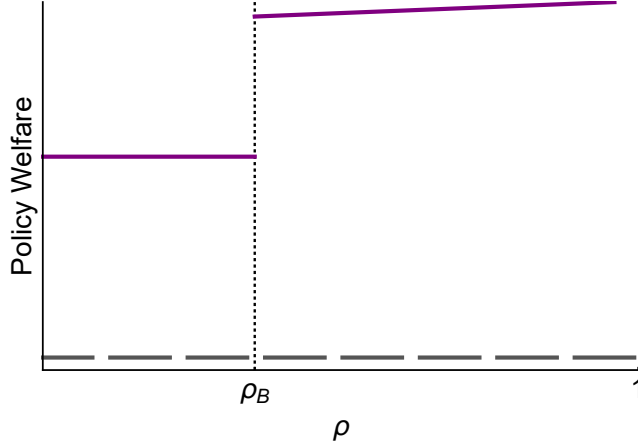

Figure 1: Voter policy welfare in a balanced and unbiased media environment

The purple plain (gray long dashed) line is the equilibrium voter policy welfare in a balanced (unbiased) media environment. Parameter values: $\pi = 1/4$, $\kappa = 0.5$, and ξ distributed according to a triangular distribution over the interval $[-1/3, 1/3]$ with mode 0.2.

The advantage of reduced information extends to the case of biased media environments. Indeed, a PBE in which a moderate politician R fully reveals his type with his first-period policy choice does not depend on the number of biased outlets reporting. It only requires that the voter does not learn the incumbent's type. Consequently, the voter is better off in a biased compared to unbiased media environment. It would, however, be wrong to conclude from this that a biased media environment is inconsequential. In a high-quality media environment, the voter is strictly better off with balanced media outlets.

Two distinct factors explain this result. First, conditional on the full control equilibrium being played, the voter loses in term of selection in a biased media environment. With a single report from a biased outlet, editorials suffer from severe presentation bias and news stories from omission bias in one state. The left-wing outlet always hides good news for the incumbent (that is, that the policy 1 matches the state) diminishing the reelection chances of moderate politicians. In turn, the right-wing outlet always hides bad news for the incumbent (that is, that the policy 1 does not match the state) impeding the screening of extreme politicians. Second, the conditions necessary

to sustain the full control equilibrium become more stringent. Due to its reporting behavior, a left-wing outlet reduces the electoral benefit from choosing the right-wing policy in the right-wing state r. A right-wing outlet's, in turn, increases the incentive of implementing the right-wing policy when the state is not r. The next proposition summarizes these findings (the sufficient condition on the second derivative of $P(\cdot)$ guarantees that the incumbent's electoral incentives are primarily affected by changes in the voter posterior, and not in the valence shock), Figure 2 illustrates them.

Proposition 2. *Suppose* $P(1) - P(\kappa) < \frac{1}{\Delta^R} < P(1) - P(0)$.

1. For all $\rho \in [0,1]$, the voter policy welfare is higher in a biased media environment than in an unbiased media environment.

2. There exists $\overline{P}$ such that if $|P''(\mu^V)| \leq \overline{P}$, then the voter policy welfare is strictly higher in a balanced media environment than in a biased media environment for all $\rho \in [\rho_B, 1)$ and equals otherwise.
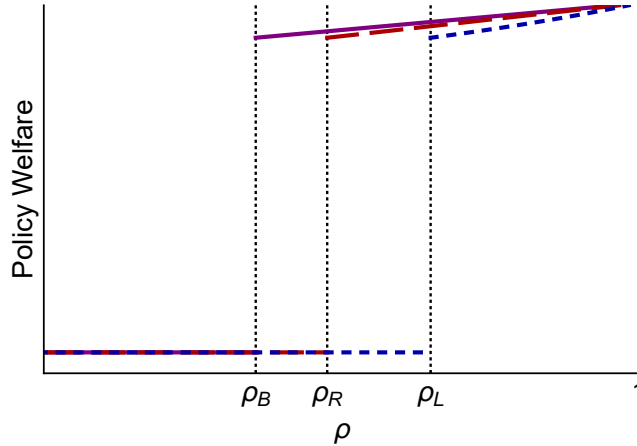

Figure 2: The effect of a balanced media environment on voter policy welfare

The purple plain line is the equilibrium voter policy welfare in a balanced media environment. The red dashed (blue short dashed) line is the equilibrium voter policy welfare in a right-wing (left-wing) biased media environment. A full control PBE exists if and only if $\rho \geq \rho_R$ ($\rho \geq \rho_L$) in a right-wing (left-wing) biased media environment. Parameter values: $\pi = 1/4$, $\kappa = 0.5$, and ξ distributed according to a triangular distribution over the interval $[-1/3, 1/3]$ with mode 0.2.

In this section, I find, as scholars have long claimed, that the voter is less informed when her news providers are biased compared to unbiased even if media outlets have opposite ideological preferences. However, contrary to the apprehension of many, biased media do not harm the voter in my set-up. The informational loss renders selection less efficient, but improves the control over politicians. In a polarized world, where politicians do not share the voter's views, selection matters less than control leading to higher policy welfare for the electorate.

These findings are robust to several modifications of the framework. In a setting with multiple elections, the effects identified (no control with unbiased outlet, some with biased news providers) could persist over all periods, instead of two. Replacing extremist politicians with some strategic type (e.g., all politicians have the same policy preferences as moderates, but differ in their ability to learn the state of the world) implies that the voter could benefit from controlling both types, rather than just moderates (though the condition for equilibrium existence would change). When the voter discounts the future, electing moderate politicians would become even less valuable. In all these cases, the value of control increases relative to selection tilting even more the balance in favor of biased media.[4] The normative conclusion of this paper would be reverted only if the voter no longer faces a trade-off between control and selection like in models of political posturing in which politicians take extreme rather than moderate actions to signal their type (e.g., Fox and Stephenson, 2011; Acemoglu et al., 2013; Kartik and Van Weelden, 2017).

5   Analysis: Positive implications

A large empirical literature attempts to evaluate the effect of biased media on electoral outcomes using changes in the media environment (Druckman and Parkin, 2005; DellaVigna and Kaplan, 2007; Gerber et al., 2009; Enikopolov et al., 2011; Gentzkow et al., 2011; DellaVigna et al., 2014; Adena et al., 2015; Barone et al., 2015; Peisakhin and Rozenas, 2017; Martin and Yurukoglu, 2017). But what are these studies actually measuring? This section aims to shield some light on this question.

From the onset, let me point out some limitations of the exercise. Most prominently, a biased media environment is a theoretical construct; in practice, the electorate is always exposed to multiple sources and adjusts its viewership/readership pattern in function of the media environment (Durante and Knight, 2012). The scenari discussed below thus represent ideal cases (where all voters are treated), but are still informative as long as swing voters are more or less likely to be exposed to biased news providers following a change in the media environment (i.e., the intention to treat has an effect). An additional issue concerns the dependent variable. Researchers consider vote shares, whereas I can only look at the ex-ante reelection probability (vote share is always zero

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[4]In this set-up, the voter would, however, be hurt if politicians enjoy rents from office. These rents magnify the importance of electoral incentives and tighten (in the sense of set inclusion) the conditions for existence of a full control PBE. A PBE with fully revealing policy choices would still exist for all parameter values.

or one with a representative voter). Notice, however, that in a large electorate with i.i.d valence shocks for each voter, the vote share would equal the ex-ante reelection probability used in the analysis. Finally, my set-up always includes an incumbent, whereas empirical papers also look at open races (e.g., the 2000 U.S. presidential election in DellaVigna and Kaplan, 2007). This is less of an issue if the (non-running) incumbent's past performance reveals information about his replacement's political leaning (e.g., Clinton's performance is informative about his Vice-President Al Gore's ideology).

In my set-up, the media environment has no impact on the incumbent's re-election probability whenever a moderate incumbent R's electoral incentives to choose the centrist policy are too low $(P(1) - P(0) < \frac{1}{\Delta^R})$ or too high $(P(1) - P(\kappa) > \frac{1}{\Delta^R})$. Indeed in states $\omega \in \{c, r\}$, a moderate R chooses his preferred policy $x = 1$ in the first case and the centrist policy $x = 0$ in the second whether the environment is left-wing biased, right-wing biased, or balanced. To focus on the most interesting cases, I thus assume that electoral incentives are intermediate $(P(1) - P(\kappa) < \frac{1}{\Delta^R} < P(1) - P(0))$ and, to simplify the exposition, I further impose that $|P''(\mu^V)| \leq \overline{P}$ such that all conditions stated in Proposition 2 hold.

To estimate the impact of the media environment, empirical studies often use exogenous variation in outlets availability due to sequential entry (e.g., DellaVigna and Kaplan, 2017), the quality of signal reception (e.g., Adena et al., 2015), or experimental design (Gerber et al., 2009)—for more details, see Sobbrio (2014). This approach has several advantages. It guarantees that the electorate is exposed to different news, not to different politicians' behavior. In addition, it eliminates bias from voters selecting their news provider (an issue in Druckman and Parkin, 2005). For my next result, I thus focus on parameter values such that politician R's equilibrium behavior does not depend on the media environment to resemble this empirical strategy.

Observe that, in my framework, it is not guaranteed that the media environment has an effect on electoral outcomes fixing the incumbent's action. The representative voter is strategically sophisticated and well aware of outlets' biases. She perfectly anticipates that the left-wing (right-wing) outlet may hide good (bad) news about the incumbent R. Nonetheless, whenever policy choices do not fully reveal politician R's type, the media environment changes his electoral fortune. News outlets affect voter's behavior because she cannot identify whether the absence of news story results from omission bias ($d^N = \omega$ but $s^N = \emptyset$) or no news worth reporting ($d^N = \emptyset$).

Denote $\mathcal{P}_B(\rho)$, $\mathcal{P}_L(\rho)$, and $\mathcal{P}_R(\rho)$ the ex-ante probability that a politician R is reelected as

a function of media quality ρ in a balanced, left-wing biased, and right-wing biased environment respectively. Recall that $\mu^B = \frac{\kappa\pi}{\kappa\pi+(1-\kappa)}$ is the voter's posterior after observing the right-wing policy and no news story in the full control equilibrium. I obtain:

Proposition 3. *1. For all $\rho < \rho_B$, $\mathcal{P}_B(\rho) = \mathcal{P}_L(\rho) = \mathcal{P}_R(\rho)$.*

2. There exists $\overline{\rho}_L \in [\rho_B, 1)$ such that for all $\rho \geq \overline{\rho}_L$, if on the interval $[\mu^B, \kappa]$:

  (a) $P(\mu^V)$ is (strictly) concave, then $\mathcal{P}_L(\rho) \geq (>)\mathcal{P}_B(\rho)$;

  (b) $P(\mu^V)$ is strictly convex, then $\mathcal{P}_L(\rho) < \mathcal{P}_B(\rho)$.

3. There exists $\overline{\rho}_R \in (\rho_B, 1)$ such that for all $\rho \geq \overline{\rho}_R$, if on the interval $[0, \mu^B]$:

  (a) $P(\mu^V)$ is (strictly) concave, then $\mathcal{P}_R(\rho) \geq (>)\mathcal{P}_B(\rho)$;

  (b) $P(\mu^V)$ is strictly convex, then $\mathcal{P}_R(\rho) < \mathcal{P}_B(\rho)$.

Proposition 3 highlights that right-wing and left-wing biased outlets have a differential impact on the electoral chances of a partisan incumbent (labels in parts 2. and 3. would simply be reversed if the incumbent leans left). Recall that, with a right-wing incumbent, a left-leaning outlet hides good news (evidence that the right-wing policy matches the state). Consequently, the voter's posterior upon observing no news is a combination between μ^B (the posterior absent news story when there is no omission bias) and κ (the posterior if the voter learns the policy matches the state). In turn, a right-leaning outlet hides bad news (evidence that the right-wing policy does not match the state). As a result, the voter's posterior upon observing no news story is a combination between μ^B and 0 (the posterior if the voter learns the policy does not match the state).

Since left-wing and right-wing outlets affect the voter's posteriors differently, there is no reason to expect that the electoral consequences of switching from a balanced to a right-wing biased media environment are the same as switching to a left-wing biased environment. This makes estimates of changes in media environment difficult to interpret when the observations cover multiple constituencies. To see this, consider a balanced to right-wing biased change. The resulting estimates are then an average of districts in which incumbent's partisanship matches the outlet's preferences and districts in which the reverse holds true. If biased outlets only influence electoral outcomes when incumbents and news providers are aligned, then the treatment is effective on some, but not all observations. Further, parsing out these heterogeneous effects by distinguishing districts according to incumbents' partisan identity can be problematic since it risks introducing post-treatment bias whenever variation in media environment impacts who is elected in the first place (especially for studies using variation in signal qualities due to time-invariant geographic factors).

Proposition 3 focuses on cases when politician's behavior is held constant across media environments. This need not be the case (as the conditions in the proposition do not span the whole space of parameter values).

Corollary 2. *There exist a non-empty set $\Gamma_J \subset [\rho_B, 1]$ such that for all $\rho \in \Gamma_J$, in state $\omega = r$, a moderate R's equilibrium policy choice is 1 in a balanced media environment and 0 in a biased media environment with outlet N^J.*

Empirical studies which use exogenous temporal or geographic variations in media availability avoid biases due to voters selecting outlets or outlets selecting a market. This, however, comes at a cost in term of external validity. These empirical designs hold politicians' behavior fixed and cannot capture the possible general equilibrium effects Corollary 2 describes.

Corollary 2 combined with Proposition 3 has additional implications for empirical research on biased media. First, estimates obtained using exogenous variation in availability which modify reporting while holding politicians' behavior constant (like in DellaVigna and Kaplan, 2007) are likely to differ significantly from estimates using wholesale change in the media environment which incorporates the impact of both reporting and change in behavior (like in Gentzkow et al., 2011). Indeed, these two types of studies cannot directly be compared. Second, within a single study, researchers should be careful about comparing their estimates over time as any change in the political environment may change biased media reporting and thus its electoral consequences. This finding may provide a rationale for why radio had a negative impact on Nazis' electoral fortune in 1930, but not in 1932 even though radio content remained constant over that period (Adena et al., 2013, Table 3 and page 22). The different estimates for the two elections may be explained by the increase in the number of NSDAP incumbents (12 in 1930 against 107 in July 1932). Similarly, the fluctuating electoral impact of Fox News over time (DellaVigna and Kaplan, 2007; Martin and Yurukoglu, 2017) can be due to greater availability (which affects politicians' actions) or distinct political situations (which affect the outlet's reporting) rather than variations in the TV channel's persuasiveness.

The model can also be used to evaluate what the current empirical research on media environment and electoral outcomes actually captures. In particular, it suggests that existing studies are unlikely to measure the effect of media bias. To do so, researches need to compare elections in an unbiased media and a biased media environments. But scholars never observe the former. Rather, they use as a baseline a balanced media environment to make inference about the consequences

of media bias. This problem, well-understood when it comes to measuring the extent of media slant (Groeling, 2013), has generally been ignored when it comes to assessing its impact. The present theoretical framework can be used to construct the proper counterfactual. As the next proposition shows, empirical studies using a balanced media environment as baseline are unlikely to yield unbiased estimate of the impact of biased media. Denote $\mathcal{P}_U$ the ex-ante probability that a politician R is reelected with an unbiased news outlet N^U, I obtain:

Proposition 4. $\mathcal{P}_U = \mathcal{P}_B(\rho)$ *for all* $\rho \in [0, 1]$ *if and only if*
$$(\kappa\pi + (1 - \kappa))P(\mu^B) = \pi P(\kappa) + (1 - \kappa)(1 - \pi)P(0) \tag{3}$$

Unbiased outlets favor selection, whereas balanced outlets (in high quality media environment) are associated with full control of politicians. Since they have distinct effects, they are observationally equivalent only under specific conditions. Note that Equation 3 holds all parameter constant (especially, politicians' quality κ), but media quality ρ. The conditions to guarantee $\mathcal{P}_B(\rho) = \mathcal{P}_U$ for all parameter values are even more restrictive.[5]

Current empirical research may not measure the impact of media bias (compared to unbiased environments). But can it still be informative about the consequences of biased media? The answer turns out to be negative in my set-up. Depending on parameter values, using a balanced media environment as baseline leads to upwardly biased, downwardly biased or even wrongly signed estimates of the electoral impact of media bias.

Figure 3 highlights the problem faced by empirical researchers for $\rho \geq \rho_B$ (below this threshold the media environment has no effect on electoral outcomes). The red plain line represents the difference in politician R's ex-ante winning probabilities in a right-wing biased compared to a balanced media environment: $\mathcal{P}_R(\rho) - \mathcal{P}_B(\rho)$. In turn, the gray dashed line is the difference in reelection probabilities in a right-wing biased compared to an unbiased media environment: $\mathcal{P}_R(\rho) - \mathcal{P}_U$. For media quality lower than some threshold ρ_R, comparing biased and balanced environments, the researcher would find a (negative) effect of biased media, but media bias has no effect in practice since the incumbent plays a fully revealing strategy in right-wing biased like in unbiased media environment. In turn, for media quality ρ between ρ_R and some $\hat{\rho}$, empirical studies would find a smaller positive effect of biased media than it is actually the case (the red

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[5]If ξ is uniformly distributed, then $\mathcal{P}_B(\rho) = \mathcal{P}_U$ for all parameter values. However, all media environments (unbiased, balanced, or biased) lead to the exact same electoral outcomes in this case because of the martingale property of posteriors, arguably an unsatisfying conclusion.
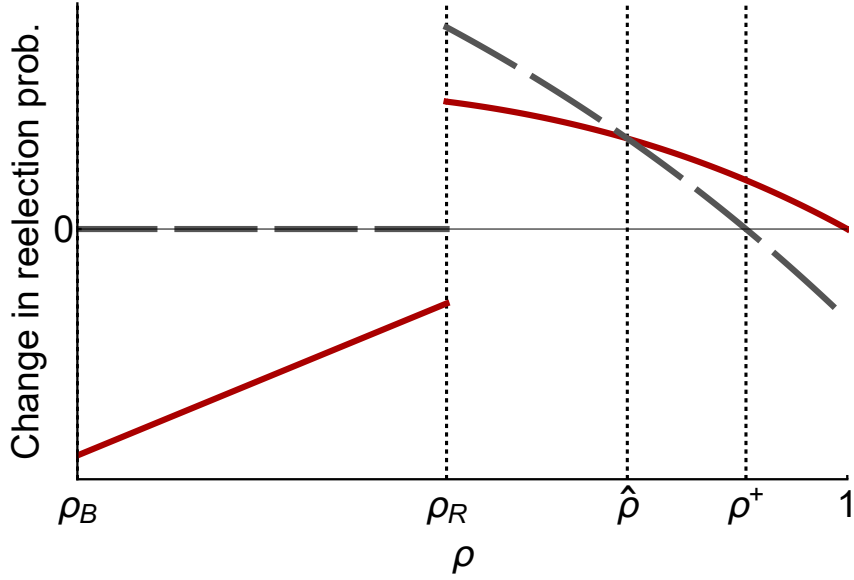
Figure 3: Media environment and reelection probability

The red plain line is $\mathcal{P}_R(\rho) - \mathcal{P}_B(\rho)$. The gray dashed line is $\mathcal{P}_R(\rho) - \mathcal{P}_U$. A full control PBE exists if and only if $\rho \geq \rho_R$ in a right-wing biased media environment. Parameter values: $\pi = 1/4$, $\kappa = 0.5$, and $F(\xi) = \widehat{F}(\xi)/\widehat{F}(\pi)$ with $\widehat{F}(\xi) = \frac{3}{2}\pi(\xi + \kappa 2\pi) - \frac{1}{2}(\xi + \kappa 2\pi)^2$ if $\xi \in [-\kappa 2\pi, -(\frac{1}{4} - \kappa)2\pi]$ and $\widehat{F}(\xi) = \frac{1}{2}(\frac{3}{2}\pi)^2 + \frac{5}{2}(\xi + (\frac{1}{4} - \kappa)2\pi)^2$ if $\xi \in [-(\frac{1}{4} - \kappa)2\pi, \kappa 2\pi]$.

plain line is below the dashed gray line). The reverse holds true for $\rho \in [\hat{\rho}, \rho^+]$. Worse, empirical research may find that biased media improve the incumbent's electoral chances when the baseline is a balanced environment, whereas compared to unbiased outlets, biased news providers hurt the incumbent (the gray line is below zero, while the red line is above it for $\rho \geq \rho^+$).

To conclude this section, let me delimit the empirical critiques drawn from my theoretical findings. First, my conclusions do not imply that it is impossible to estimate the electoral consequences of biased vis-a-vis unbiased media. A balanced and unbiased media environments are equivalent whenever outlets cannot engage in presentation bias (see Lemma 2). Researchers may thus take advantage of settings where information is likely to be verifiable to evaluate the impact of biased media. Second, even if current estimates do not capture the effect of media bias, they nonetheless measure important quantities. Existing empirical findings are especially relevant when there is no possibility (or no desire) to guarantee that news providers are unbiased. As recommended above, richer descriptions of the political and media environment analyzed would then lead to greater comparability across studies and more informed policy-making.

6   Conclusion

In this paper, I study the consequences of media bias in a political agency framework with strategic representative voter, polarized politicians, and news outlets which can engage in both presentation and omission biases. I show that biased news outlets reduce the information available to the electorate even when the media environment is balanced. Biased media then entail a loss in term of selection, but a gain in term of control as politicians act in the voters' interest to signal their type. This results in higher policy welfare as the benefit of electing moderate politicians is always limited when politicians are polarized. Media bias does not necessarily poses a threat to democracy as claimed by several scholars (e.g., Entman, 1989; Kellner, 2005).

From an empirical perspective, I highlight the difficulties in interpreting estimates of the electoral consequences of changes in the media environment. The impact of right-wing and left-wing biased news providers on incumbents' electoral fortunes depend on the politicians' partisan identity. The presence of heterogeneous effects suggests that empirical works would do well to precisely describe the media environment (prior and after changes) and political situation they analyze to facilitate comparison across studies. In addition, estimates using exogenous variation to fix politicians' behavior constant may omit important equilibrium effects. Finally, current empirical estimates may not be informative of the consequences of media bias since a balanced media environment is a poor approximation of an unbiased media environment when outlets can engage in presentation bias.

At a deeper level, the present work joins a few papers studying a different empirical implication of theoretical models (EITM). Rather than focusing on comparative statics (Ashworth and Bueno de Mesquita, 2006), these studies (re)assess in various contexts what empirical estimates actually measure (e.g., Eggers, 2017, for the incumbency effect; Prato and Wolton, 2017, for the determinants of electoral success; Wolton, 2017, for special interest group influence). This approach, broadly defined, uses formal reasoning to rethink empirical counterfactuals.[6] Since theoretical models are closed worlds in which everything else is equal by definition (Morgan, 2012; Ashworth et al., 2015), they seem especially adapted to discipline counterfactual thinking. Given that counterfactuals are at the core of any empirical work claiming causality (Fearon, 1991), the applications

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[6]This approach is related to, but not equivalent to the analysis of historical events with game theoretic models (e.g., North and Weingast, 1989; Greif et al., 1994). Historical analysis often relies on off-path behavior to explain historical phenomena (see Weingast, 1996). The counterfactual analysis I briefly describe is grounded on on-path behavior to make sense of observables.

of this logic are potentially numerous (broader than structural estimations to which it is generally associated). A full analysis of the benefits and pitfalls of this EITM approach could generate new fruitful complementarities between empirical and formal works.

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