

**The Role of Media Slant in Elections  
and Economics**

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# The Role of Media Slant in Elections and Economics

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## Abstract

We formalize the concept of media slant as a relative emphasis on different issues of political interest by the media, and we illustrate the effects of the media choice of slant on political outcomes and economic decisions in a rational expectations model. In a two-candidate election, if the media is biased in favor of the underdog, then it will put more emphasis on issues with a large electoral impact, hoping that the news will deliver an upset victory. Whether citizens are better off with media biased in favor of the underdog or the frontrunner depends on the importance of choosing the “right” candidate for citizens versus the impact of political news on the private economic decisions of voters. Balanced media, giving each issue equal coverage, may be worse for voters than partisan media.

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# 1 Introduction

In contemporary democracies, the opinions and electoral decisions of citizens are based to a large extent on the information provided to them by mass media. Coverage of news events, however, is by necessity selective: the media must choose which events to cover and how much emphasis to give to each. Moreover, given the limited disposition of citizens to process information about complex political issues, news media very often must simplify the analysis of news they do cover. The ideological construct of the liberal-conservative spectrum, for example, is regularly reflected and reinforced in the jargon of political coverage by the news media. In fact, research in political science supports the hypothesis that the meaning of the liberal-conservative spectrum has changed over time:

The space in which political parties compete can be of highly variable structure. Just as the parties may be perceived and evaluated on several dimensions, so the dimensions that are salient to the electorate may change widely over time... Drastic electoral changes can result from changes in the *coordinate system* of the space rather than changes in the distribution of parties and voters.” (Stokes (1963), pp.371–372, original emphasis)

The role of the media in determining the salience of political issues for the public, thereby influencing the political agenda, has long been recognized and debated by political scientists and sociologists.<sup>1</sup> As well, a recent but growing literature in economics has started to explore the role of the media in shaping policy outcomes through its influence on public opinion. Most of this literature conceives of media influence as the result of opportunistic, selective omission of facts toward a particular end.<sup>2</sup> We take the view that media influence operates through not just the suppression of information, but more generally in the choice of perspective, involving emphasis and depth of coverage of the different issues, rather than outright denial of inconvenient

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<sup>1</sup>McCombs and Shaw (1972), for example, state that “the mass media set the agenda for each political campaign, influencing the salience of attitudes toward the political issues” (p.177). See Schudson and Waisbord (2005) for a recent review.

<sup>2</sup>With some exceptions; see a short review of the literature in the next section.

facts.<sup>3</sup>

In this paper, we consider an election between a known incumbent and an unknown challenger, who is the subject of news coverage. Our approach grows out of the citizen-candidate literature (Osborne and Slivinski 1996, Besley and Coate 1997), where the policy positions of the politicians are fixed, but we incorporate the news media as a player that can influence the voters' information about the challenger through its choice of perspective, or *slant*. We do not model the media as simply suppressing ex post unpalatable news. Rather, we assume that the media commits ex ante to a particular slant, which we define as a systematic filtering that at once simplifies political reality and assigns relative emphasis to the different policy issues. We view slant as a long-run decision arising from the media outlets' choice of editorial board or the hiring and firing of journalists. Since the media choices of editorial board are public and relatively sticky, we assume that citizens are fully aware of the media slant when reading the news, updating their beliefs, and making their decisions. Thus, we provide a rational expectations model of the impact of slant on elections and policy outcomes.

We posit a simple model of the economy, in which public policy has two components, a level of public good provision and an income tax rate, and we assume for concreteness that the incumbent occupies the traditionally conservative position of small government (i.e., low income taxes and low government expenditures). News reporting essentially projects this multi-dimensional space into a one-dimensional spectrum, and after reading the news, each citizen makes a voting decision and an economic decision (for concreteness, a job choice). Information revealed by the media about the challenger's stance on public good provision is of social value because it allows citizens to vote for the candidate whose policy position is closer to the optimal provision of public good. Information about the challenger's position on tax policy is of private value because it allows citizens to choose jobs according to their expectations about the tax rate to be implemented by the new government. Information about the latter issue, however, may have a negative externality on social welfare: if the citizens expect the challenger to win the election but implement high income tax rates, then they will choose lower paying jobs, which hurts everyone in the economy.

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<sup>3</sup>We stipulate that suppression of information does play some role in media slant; see, e.g., McMillan and Zoido (2004) for a particularly egregious and well-documented case.

We take the view that citizens are more likely to pay attention to political news that affects their own private decisions; this is just the converse statement of the “rational ignorance hypothesis” of Downs (1957).<sup>4</sup> Thus, we regard as a desirable feature of our model the fact that the information transmitted by the media is of use for citizens’ private economic decisions. It also creates a strategic linkage between the two decisions, as a citizen must anticipate the outcome of the election in order to make the optimal job choice. We show, for example, that in equilibrium a citizen will not choose to take the low-paying job and vote for the incumbent. In short, each citizen must make her job choice and voting decision jointly and must do so in light of the joint choices of others.

By considering both political and economic decisions, our model highlights three novel aspects of the effect of media on electoral and economic outcomes. First, more information provided by the media to voters is not necessarily good for society. Second, economic and political decisions are interdependent. Decisions of citizens with respect to which candidate to support interact with their economic decisions, and their economic decisions are based in turn on their expectations about which of the candidates will attract more popular support. Third, and related, the news has predictive value to citizens, and this value is greater when other citizens access the same news media. By tapping the same sources of information as others, a citizen can make more precise inferences about the decisions of others and, thereby, about aggregate outcomes. In particular, accessing the same media as others allows a citizen to more accurately predict the result of the election.

We assume for most of the analysis that all media share the same slant, or equivalently, that there is a single media outlet. We use this model to investigate the *optimal partisan slant*, i.e., the choice of slant that maximizes the probability of either the incumbent or the challenger winning the election. Our analysis reveals that by judicious choice of slant, the media can have a substantial impact on the outcome of the election.<sup>5</sup> A partisan media will choose to be more electorally informative if it favors the underdog, the

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<sup>4</sup>Because the effect of a single vote is negligible, citizens have minimal incentive to acquire information that is only useful for voting.

<sup>5</sup>This is interesting in itself as recent behavioral literature (in particular, DeMarzo et al. 2003 and DellaVigna and Kaplan 2007) has cast doubt about the possibility of media effects on policy outcomes in a rational expectations setup. Of course, we are introducing a behavioral style assumption in forcing the media to report one-dimensional news.

candidate who trails in popular support on the basis of prior beliefs. If that is the the challenger, then pro-challenger media will be most informative with respect to the challenger’s position on the public good, hoping that the news will lead to an upset victory by the challenger; pro-incumbent media, instead, will be most informative with respect to the tax policy of the challenger, which is irrelevant for citizens as long as the challenger is expected to lose. Conversely, if the incumbent is the underdog, then a pro-challenger media will be most informative about the challenger’s tax policy, which influences job decisions but not voting intentions; pro-incumbent media, instead, will pick an intermediate slant, hoping that bad news about the challenger will lead to an upset victory by the incumbent.<sup>6</sup>

Next, we take a welfare perspective on the media choice of slant. We show that if citizens are inclined to take higher paying jobs on the basis of prior beliefs, then they are better off if the media favors the underdog. This is because the media will put more emphasis on information regarding the position of the challenger on the public good, which is socially useful, rather than information regarding the income tax position of the challenger, which can only be socially damaging. Conversely, if citizens are inclined to take lower paying jobs on the basis of prior beliefs, then citizens are (generally) better off if the media favors the frontrunner, the candidate leading in electoral support on the basis of prior beliefs. The reasoning in this case is more involved. If citizens care little about the public good provision, pro-incumbent media is better than pro-challenger media because it reduces to zero the probability that citizens take lower paying jobs. If instead citizens care a great deal about the public good, then pro-challenger media is better than pro-incumbent media because it maximizes the probability of the challenger winning the election and increases the probability that citizens take higher paying jobs conditional on citizens voting for the challenger.

We then consider the effects of *balanced* media, i.e., media that puts the same emphasis on both policy dimensions.<sup>7</sup> We show that balanced media is always worse than either pro-challenger or pro-incumbent media, and for

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<sup>6</sup>As this last case illustrates, partisan media will not necessarily adopt an extreme slant.

<sup>7</sup>As Kovach and Rosenstiel (2007) advise, “Keeping news in proportion and not leaving important things out are also cornerstones of truthfulness. Journalism is a form of cartography: it creates a map for citizens to navigate society. Inflating events for sensation, neglecting others, stereotyping or being disproportionately negative all make a less reliable map.”

some parameter values it is worse than both. A balanced slant is always intermediate between the slants that would be chosen by pro-challenger and pro-incumbent media. But social welfare is not necessarily monotonic in slant. Citizens may be better off with an extreme slant that guarantees that either the incumbent will win, thus assuring that citizens will take high paying jobs, or the challenger will win, thus increasing the probability of a better public good provision, than with an intermediate slant that does neither.

Finally, we consider an extension of the model in which citizens may split in audiences of media outlets with potentially different slants. We argue that, since the private value of information stems from its use in the citizens' private economic decisions, there will be a strong tendency for all citizens to listen to media with similar slants insofar as citizens face similar economic decisions.

The remainder of paper is organized as follows. In Section 2, we review the growing literature on the role of the media. In Section 3, we present the model with exogenous slant. In Section 4, we define our equilibrium concept and state our existence and uniqueness result. In Section 5, we explore the implications of partisan media for slant. In Section 6, we take up the issue of the socially optimal slant. In Section 7, we briefly consider the extension of the model to media outlets with different slants. In Section 8, we offer some concluding remarks.

## 2 Related Literature

Our definition of “slant” is more general than that usually given in the literature. The term is often explained as the omission of information toward a particular end. Indeed, Hayakawa (1964) defines the term as “the process of selecting details that are favorable or unfavorable to the subject being described” (p.13). Groseclose and Milyo (2005) also define “bias” as the selective omission of facts.<sup>8</sup> We define “slant,” in contrast, as an orientation

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<sup>8</sup>They write that “for every sin of commission, such as those by (Stephen) Glass or (Jayson) Blair, we believe that there are hundreds, and maybe thousands, of sins of omission” (p.1205). Although the authors use the term “bias,” they offer “slant” as an equivalent term.

that systematically distorts news. The mechanism through which this occurs may be as simple as the omission of facts, but it can be more subtle and nuanced, resulting from the choice of phrasing, the emphasis of some details over others, the ordering of facts, etc. In fact, our definition appears to be consistent with examples used by other authors, which seem to allude to a more nuanced enterprise. For example, Mullainathan and Shleifer (2005) offer an illustration of slant by juxtaposing two possible stories about a small increase in the unemployment rate. The difference between these two stories is more than simply a discrepancy between two lists of facts; rather, the stories differ in wording, emphasis, and framing.<sup>9</sup>

Our formalization of slant, in so far as it involves the projection of a multi-dimensional issue space down to a one-dimensional spectrum, is reminiscent of ideas discussed by Enelow and Hinich (1981) in a model of uncertainty about candidate positions. They tell a bounded rationality story: “In a world of imperfect information, a world in which there are costs associated with gathering and evaluating new information, the voter, faced with a serious decision such as deciding which candidate would make a better president, is forced to utilize a shortcut method to arrive at his choice.” (p.489) In fact, they note that “this simplification process is practiced even by those who watch campaigns most closely—journalists—who certainly are much better informed than most voters about the complexity of candidates’ statements and actions.” (p.489) The idea of a reduction of the policy space is also considered by Hammond and Humes (1993), following suggestions by Riker (1990). In contrast to the latter authors, who assume voters are myopic, and the former authors, who take voter beliefs as exogenous, we present a fully rational model in which voters understand the process through which news about economic policy are framed.

The phenomenon of media slant is a topic of growing interest in the literature. Evidence for the existence of media slant is provided by Groseclose and Milyo (2005), Puglisi (2006), and Lott and Hassett (2004), and a number of other papers provide various theoretical explanations for slant. Focusing on the demand side, Mullainathan and Shleifer (2005) assume that readers hold beliefs they like to see confirmed. In contrast, Baron (2006) and Bovitz

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<sup>9</sup>One story begins, “Recession Fears Grow: New data suggest the economy is slipping into a recession,” and the other begins, “Turnaround in Sight: Is the economy poised for an imminent turnaround?” See Mullainathan and Shleifer (2005), pp.1032–1033.



et al. (2002) focus on the supply side, analyzing the incentives of reporters and editors to manipulate the news. Gentzkow and Shapiro (2006) also focus on the supply side, demonstrating that a media outlet's concern for reputation can lead to the censoring of unexpected stories. Chan and Suen (2004) consider a media outlet with policy preferences that can falsify reports about the true state of the world to achieve preferred outcomes. Bernhardt et al. (2006) combine both sides of the market, assuming that two media firms compete for patronage from citizens who have a preference for stories about their favorite candidate. Besley and Prat (2004) consider the possibility of government capture of the media.<sup>10</sup>

In all of the forgoing theoretical models, the nature of the decision facing media outlets is either to lie by falsely reporting their signal or to simply suppress their information. Only Mullainathan and Shleifer (2005) and Chan and Suen (2004) model the media's decision as a continuous variable, allowing in principle the possibility of capturing the subtleties of slant, but in both of those papers the media, after observing a signal of a one-dimensional state variable, simply sends a one-dimensional announcement that has no necessary connection to the true state. Thus, news stories are not informative, per se, beyond the strategic inferences drawn by readers. In Gentzkow and Shapiro (2006) and Baron (2006), the media outlet has a binary choice of stories and, similarly, makes reports that have no meaning beyond the strategic information they convey.<sup>11</sup> In other papers, news stories do have content in the sense that reports are verifiable, and the media outlet can choose not to report its information.<sup>12</sup> In contrast, the media outlet in our model may choose from a continuum of orientations, and while reporting involves a simplification of the facts (and a corresponding loss of information), a story is a noisy signal with meaningful content.

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<sup>10</sup>Though not explicitly concerned with the media, Virag (2006) and Glaeser, Ponzetto, and Shapiro (2005) show the possibility of divergence of party platforms when voters are only informed of the position of their preferred candidate. This assumption can be rationalized if there are two media outlets, each reports the position of one candidate, and each voter patronizes only the outlet covering her candidate.

<sup>11</sup>Gentzkow and Shapiro (2006) do assume, however, that readers can confirm or disconfirm a story with some probability. The latter authors suggest that the media outlet in their model can employ subtler forms of bias by a suitable labelling of news stories. But that interpretation is limited by the assumption that there are only two possible stories.

<sup>12</sup>Puglisi (2004) also assumes that all reports are verifiable, but the media outlet's actions are determined by spin exerted by an incumbent politician.

A final point of differentiation of the above models is their treatment of the citizen’s decision. In Gentzkow and Shapiro (2006), Baron (2006), Stromberg (2004), and Bovitz et al. (2002), the reader is assumed to use information from the news to make a private decision. Thus, readers will be willing to pay a positive amount for the news. This is also true in Bernhardt et al. (2006) and Mullainathan and Shleifer (2005), where readers receive intrinsic utility from reading the news. In Besley and Prat (2006) and Chan and Suen (2004), readers use information obtained from the news to make a voting decision. In our model, each citizen uses information to jointly make a private decision and cast a vote, but in so doing they use information from the news to predict the actions of other citizens, a strategic aspect not present in other models.

### 3 Exogenous Slant

We consider an election between an incumbent ( $I$ ) and a challenger ( $C$ ). We posit a simple model of the economy, in which public policy has two components: a level of public good provision,  $g$ , and an income tax rate,  $t$ . Thus, the set of policies is the two-dimensional space  $\mathfrak{R}_+ \times [0, 1]$ , with typical element  $(g, t)$ . Income tax revenue is used to finance the public good, with any deficit (or surplus) being collected (or distributed) by a lump sum tax (or refund). The incumbent and the challenger are committed to implement some policies  $(g^I, t^I)$  and  $(g^C, t^C)$ , respectively, in case either wins the election. The incumbent’s policy is known to citizens, but the challenger’s policy is not. To fix ideas, we assume that the challenger favors more taxation and a larger level of the public good. Citizens have some prior beliefs about the challenger’s policy, represented by a uniform distribution over  $[\underline{g}, \bar{g}] \times [\underline{t}, \bar{t}]$ , with  $\underline{g} \geq g^I$  and  $\underline{t} \geq t^I$ .

There is a unit mass of citizens, who for simplicity are ex ante identical. Citizens can learn about the challenger’s policy by reading a unique media outlet. The media outlet does not directly report the challenger’s policy, but rather it reports the projection of the challenger’s policy on a straight line in the policy space through the incumbent’s policy,  $(g^I, t^I)$ , with negative slope. The slope of this line corresponds to media slant. Thus, we assume that the process of reporting the challenger’s position necessarily involves some

simplification, in that the multidimensional policy space is collapsed into a one-dimensional statistic. That such simplification indeed takes place is not controversial, as the complexities of real world policy cannot be precisely conveyed in a media report. Furthermore, we assume that this simplification is systematic, in that it takes the form of a projection. Though we do not model the mechanism underlying slant explicitly, we view it as arising from the media outlet's choice of editorial board or the hiring and firing of journalists. For now, we assume the level of slant is exogenously fixed and known to the citizenry. When we endogenize slant, in Section 5, we assume that the media's choice of slant is observed by the citizenry prior to economic and voting decisions. This implicitly assumes that slant can only be adjusted slowly or at substantial cost, as is consistent with our interpretation.

After reading the news, and before the election, citizens must decide whether to take a high-paying job or a low-paying job. If the policy  $(g, t)$  is adopted, then the utility of a citizen from taking the high-paying job is

$$u(g) + (1 - t)w^H + \tau - e,$$

and the utility of the citizen from taking the low-paying job is

$$u(g) + (1 - t)w^L + \tau.$$

The function  $u$  represents the utility citizens derive from the public good, while the constants  $w^H > 0$  and  $w^L > 0$  represent the wage earned in the high-paying and the low-paying job, respectively. The constant  $e$  is a fixed cost, e.g., the cost of education, involved in acquiring the skills required for the high-paying job. We assume  $0 < e < w^H - w^L$ . The term  $\tau$  represents a lump-sum transfer to each citizen and is obtained from the policy  $(g, t)$  using the government budget-balance condition:

$$\tau = -c(g) + t(w^H P(H) + w^L P(L)).$$

The function  $c$  represents the per capita cost of providing the public good, and  $P(H)$  and  $P(L)$  are the fraction of citizens who take high-paying and low-paying jobs, respectively. Of course, these fractions are determined endogenously by the behavior of all citizens.

For convenience, we maintain the following parametric assumptions.

**(A1)**  $(g^I, t^I) = (0, 0)$ ;

**(A2)**  $(\underline{g}, \underline{t}) = (0, 0)$  and  $(\bar{g}, \bar{t}) = (1, 1)$ ;

**(A3)**  $u(g) - c(g) = 2bg - 3g^2$ , where  $0 < b < 3/2$ .

Assumption (A1) is tantamount to a normalization, and assumption (A2) fixes the idea that the incumbent holds the traditionally conservative position of small government. Assumption (A3) provides a convenient functional form for the net benefit of the public good in terms of a parameter  $b$ , which measures the value of the public good. It implies that  $\int_{\underline{g}}^{\bar{g}} (u(g) - c(g)) dg$  is strictly concave in  $g, \bar{g}$ . This implies, in turn, that the rational expectations equilibrium described in Theorem 1 has a simple cutoff structure. It is straightforward to verify that the optimal level of public good provision is  $g^* = b/3$ , and that the net benefit from  $g = 2b/3$  units of the public good is equal to zero: beyond that, the per capita cost of the public good outweighs the per capita benefit, and the citizens would on average be better off with no public good.

Recall that the media reports the projection of the challenger's policy on a negatively sloped line in  $\mathfrak{R}^2$  going through the origin  $(0, 0)$ . We denote the absolute value of the slope of this line by  $\sigma$ , where  $\sigma \in \mathfrak{R}_{++} \cup \{0, \infty\}$ , and we refer to it as the *slant* of the media. For a fixed  $\sigma$ , we refer to the set of points in the unit square with a common projection on the line as a *news story*. Thus, a story is a line segment, denoted  $s$ , contained in the unit square. We write  $(\underline{g}(s), \underline{t}(s))$  and  $(\bar{g}(s), \bar{t}(s))$ , with  $\underline{g}(s) \leq \bar{g}(s)$  and  $\underline{t}(s) \leq \bar{t}(s)$ , to indicate the lower and upper endpoints, respectively, of the story  $s$ . We use the obvious notation

$$s = [(\underline{g}(s), \underline{t}(s)), (\bar{g}(s), \bar{t}(s))]$$

to describe a story by its endpoints. Figure 1 illustrates a story  $s$  and its projection (what we might call the news “report”)  $r(s)$  on the line  $y = -\sigma x$ .

We denote the set of stories given slant  $\sigma$  by  $S^\sigma$ . For any  $\sigma$ , the set of stories  $S^\sigma$  is completely ordered according to the partial order  $\succeq$ , with asymmetric part  $\succ$ , given by

$$s' \succeq s \quad \iff \quad \underline{t}(s) \geq \underline{t}(s') \text{ and } \underline{g}(s) \leq \underline{g}(s').$$

That is,  $s' \succeq s$  indicates that the story  $s'$  is located “to the southeast” of story  $s$ . We denote by  $\underline{s}$  the story containing the point  $(0, 1)$  and by  $\bar{s}$  the

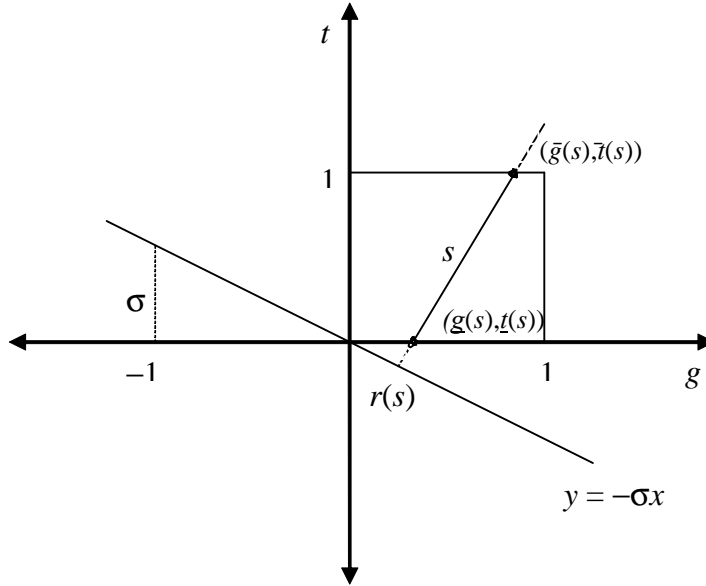


Figure 1: A News Story  $s$  and Corresponding News Report  $r(s)$

story containing the point  $(1, 0)$ . Note that, if  $\sigma \in \mathfrak{R}_{++}$ , then the stories  $\underline{s}$  and  $\bar{s}$  reveal the exact location of the challenger's policy.

## 4 Equilibrium Analysis

We first examine a citizen's optimal job choice. This will depend on the probabilities that the incumbent and the challenger win the election,  $P(I|s)$  and  $P(C|s)$ , from the point of view of a citizen after reading the news report  $r(s)$ . These probabilities are determined by the behavior of all citizens, but they are taken as given by any individual citizen. The optimal job choice will also depend on the fractions of citizens who take high-paying and low-paying jobs,  $P(H|s)$  and  $P(L|s)$ , following story  $s$ . In a rational expectations equilibrium, the probabilities  $P(I|s)$  and  $P(C|s)$  and the fractions  $P(H|s)$  and  $P(L|s)$  will be anticipated correctly by each citizen.

When the incumbent is re-elected, a citizen with the high-paying job receives the high wage less the necessary investment,  $w^H - e$ . In this case, the level of public good and the income tax are both zero. When the challenger

is elected, the citizen pays income tax  $tw^H$ , receives utility  $u(g) - c(g)$  from the public good, and is taxed the lump sum  $\tau$ . Thus, the citizen's expected utility is

$$P(I|s)(w^H - e) + P(C|s)\mathbf{E}^\sigma[(1-t)w^H - e + u(g) - c(g) + t(w^H P(H|s) + w^L P(L|s))|s],$$

where  $\mathbf{E}^\sigma$  is the expectations operator. (For notational convenience, from now on we drop the superscript  $C$  when referring to the challenger's policy. And when not central to the discussion, we drop the superscript  $\sigma$  on  $\mathbf{E}$ , leaving the dependence on slant implicit.) Simplifying the previous expression, we have

$$w^H - e + P(C|s)\mathbf{E}[u(g) - c(g) - tw^H + t(w^H P(H|s) + w^L P(L|s))|s].$$

Similarly, if a citizen takes a low-paying job, then the citizen's expected utility is

$$w^L + P(C|s)\mathbf{E}[u(g) - c(g) - tw^L + t(w^H P(H|s) + w^L P(L|s))|s].$$

Thus, a citizen will be willing to take a high-paying job if and only if

$$1 - \frac{e}{\Delta w} \geq P(C|s)\mathbf{E}[t|s],$$

where  $\Delta w = w^H - w^L$ , and will be willing to take a low-paying job if and only if the inequality is reversed. Note that  $1 - e/\Delta w > 0$  follows from our parametric assumptions. Thus, if the incumbent wins with probability one after story  $s$ , i.e.  $P(C|s) = 0$ , then every citizen prefers the high-paying job.

After making their job choices, citizens decide which party to support in the election. Citizens vote sincerely. Since a citizen with a high-paying job receives utility  $(1-t)w^H - e$  regardless of which candidate wins, the inequality characterizing when the citizen is willing to support the incumbent reduces to

$$tw^H \geq \mathbf{E}[u(g) - c(g) + t(w^H P(H|s) + w^L P(L|s))|s],$$

or equivalently,

$$\mathbf{E}[u(g) - c(g)|s] - \Delta w P(L|s)\mathbf{E}[t|s] \leq 0.$$

The citizen will be willing to support the challenger when the inequality is reversed. Similarly, a citizen who has taken a low-paying job is willing to support the incumbent if and only if

$$tw^L \geq \mathbb{E}[u(g) - c(g) + t(w^H P(H|s) + w^L P(L|s))|s],$$

or equivalently,

$$\mathbb{E}[u(g) - c(g)|s] + \Delta w(1 - P(L|s))\mathbb{E}[t|s] \leq 0.$$

Note that the incentive to support the incumbent is larger for a citizen with a high-paying job than for a citizen with a low-paying job, but even citizens with high-paying jobs may support the challenger.

Given slant  $\sigma$  and any story  $s \in S^\sigma$ , we say that the pair  $P(C|s), P(L|s) \in [0, 1]^2$  is a *rational expectations outcome at s* if the actions of individual citizens induced by  $P(C|s), P(L|s), \mathbb{E}[u(g) - c(g)|s]$ , and  $\mathbb{E}[t|s]$  are consistent with their beliefs about  $P(C|s)$  and  $P(L|s)$ . We will show that, generically, there are only three possible types of rational expectations outcomes. We consider these in turn.

**Type 1.** Suppose the challenger wins the election and all citizens take a low-paying job, i.e.,  $P(C|s) = 1$  and  $P(L|s) = 1$ . Given the preceding analysis, this is a rational expectations outcome if and only if

$$(1) \quad \mathbb{E}[t|s] \geq 1 - \frac{e}{\Delta w} \quad \text{and} \quad \mathbb{E}[u(g) - c(g)|s] \geq 0.$$

**Type 2.** Similarly,  $P(C|s) = 1$  and  $P(L|s) = 0$  is a rational expectations outcome if and only if

$$(2) \quad \mathbb{E}[t|s] \leq 1 - \frac{e}{\Delta w} \quad \text{and} \quad \mathbb{E}[u(g) - c(g)|s] \geq 0.$$

**Type 3.** Suppose  $P(C|s) = 0$  and  $P(L|s) = 0$ . Recall that when the incumbent wins with probability one, all citizens prefer the high-paying job, so this is a rational expectations outcome if and only if

$$(3) \quad \mathbb{E}[u(g) - c(g)|s] \leq 0.$$

Other rational expectations outcomes are conceivable, but they rely on razor's edge conditions on the parameters of our model. Because such equilibria are not robust, we preclude them with the following maintained assumption. With it, rational expectations outcomes other than Types 1–3

can occur only after a negligible (i.e., measure zero) set of stories, and they are therefore inconsequential to our analysis.

**(A4)**  $e/\Delta w \notin \{1/2, 3/4\}$  and  $b \neq 1$ .

Given slant  $\sigma$ , a *rational expectations equilibrium* is a pair of functions  $P(C|\cdot): S^\sigma \rightarrow [0, 1]$  and  $P(L|\cdot): S^\sigma \rightarrow [0, 1]$  such that  $P(C|s), P(L|s)$  is a rational expectations outcome for almost every story  $s \in S^\sigma$ . In the interest of parsimony, we will not distinguish between equilibria that differ only on a set of measure zero stories. The next theorem (proved in the Appendix) establishes the existence and uniqueness of a rational expectations equilibrium.

**Theorem 1** *For any given  $\sigma$ , there is a unique rational expectations equilibrium. It is characterized by a pair of stories,  $s_C^\sigma$  and  $s_L^\sigma$ , such that*

$$P(C|s) = \begin{cases} 0 & \text{if } s \succ s_C^\sigma \\ 1 & \text{if } s_C^\sigma \succ s \end{cases} \quad \text{and} \quad P(L|s) = \begin{cases} 0 & \text{if } s \succ s_C^\sigma \text{ or } s \succ s_L^\sigma \\ 1 & \text{if } s_C^\sigma \succ s \text{ and } s_L^\sigma \succ s \end{cases} .$$

Moreover, for  $\sigma \in \mathfrak{R}_{++}$ , the stories  $s_C^\sigma$  and  $s_L^\sigma$  solve

$$E[u(g) - c(g)|s] = 0 \quad \text{and} \quad E[t|s] = 1 - \frac{e}{\Delta w},$$

respectively.

The equilibrium has a simple ‘‘cutoff’’ structure, given by the two stories  $s_C^\sigma$  and  $s_L^\sigma$ . If a story  $s$  is realized to the southeast of  $s_C^\sigma$ , i.e.,  $s \succ s_C^\sigma$ , then citizens learn that the challenger intends to implement an excessively high level of the public good. That is,  $E[u(g) - c(g)|s] < 0$ , so that only Type 3 rational expectations outcomes are possible: citizens decide to vote in favor of the incumbent, and since the incumbent will not impose income taxes, citizens all take the high-paying job. In the remaining case of  $s_C^\sigma \succ s$ , we may have stories realized to the southeast of  $s_L^\sigma$ , i.e.,  $s_C^\sigma \succ s \succ s_L^\sigma$ .<sup>13</sup> Then citizens learn that the challenger intends to implement a level of the public good that they like more than the status quo, and citizens anticipate that the income tax implemented by the challenger will be moderate. That is,  $E[t|s] < 1 - e/\Delta w$ , so that only Type 2 outcomes are possible: citizens all

<sup>13</sup>This intermediate region disappears if  $s_L^\sigma \succeq s_C^\sigma$ .



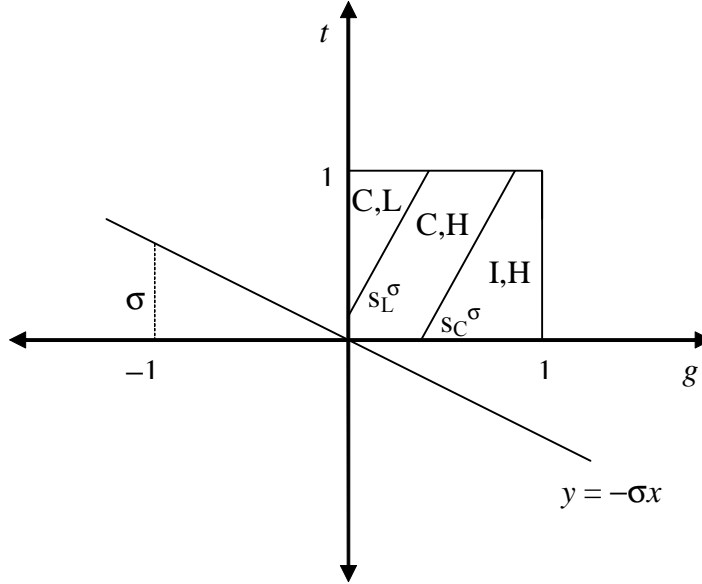


Figure 2: Cutoff News  $s_L^\sigma$  and  $s_C^\sigma$

vote for the challenger and take high-paying jobs. Finally, after news located to the northwest of both  $s_C^\sigma$  and  $s_L^\sigma$ , citizens learn that the challenger intends to implement a level of the public good that they like, but they also learn that the challenger intends to finance the provision of the public good with high labor taxes. That is,  $E[t|s] > 1 - e/\Delta w$ , so that only Type 1 outcomes are possible: citizens all vote for the challenger and take low-paying jobs. The structure of equilibrium is illustrated in Figure 2.

The exact form of the equilibrium found in Theorem 1 depends on the solutions to the two equations

$$E[u(g) - c(g)|s] = 0 \text{ and } E[t|s] = 1 - \frac{e}{\Delta w},$$

and these solutions in turn depend on parameter values. The solution to the first equation depends on whether  $b < 1$  or  $b > 1$ . That is, it depends on the value of the public good. It is straightforward but cumbersome to derive the closed form of  $s_C^\sigma$  in these two cases.

(i) If  $b < 1$ , then

$$s_C^\sigma = \begin{cases} \left[ \left( \frac{-3\sigma + 2b + \sqrt{4b^2 - 3\sigma^2}}{6}, 0 \right), \left( \frac{3\sigma + 2b + \sqrt{4b^2 - 3\sigma^2}}{6}, 1 \right) \right] & \text{if } 0 \leq \sigma \leq b \\ \left[ \left( 0, 1 - \frac{b}{\sigma} \right), (b, 1) \right] & \text{if } b \leq \sigma < \infty \\ \left[ (0, 1), (1, 1) \right] & \text{if } \sigma = \infty \end{cases} .$$

(ii) If  $b > 1$ , then

$$s_C^\sigma = \begin{cases} \left[ \left( \frac{-3\sigma + 2b + \sqrt{4b^2 - 3\sigma^2}}{6}, 0 \right), \left( \frac{3\sigma + 2b + \sqrt{4b^2 - 3\sigma^2}}{6}, 1 \right) \right] & \text{if } 0 \leq \sigma \leq \hat{\sigma} \\ \left[ \left( \frac{b-1 + \sqrt{b^2 + 2b - 3}}{2}, 0 \right), \left( 1, \frac{3-b - \sqrt{b^2 + 2b - 3}}{2\sigma} \right) \right] & \text{if } \hat{\sigma} \leq \sigma < \infty \\ \left[ (0, 0), (1, 0) \right] & \text{if } \sigma = \infty \end{cases} ,$$

where the value of  $\hat{\sigma}$  is given by the expression

$$\hat{\sigma} = \frac{3 - b - \sqrt{b^2 + 2b - 3}}{2}.$$

This is the level of slant such that the cutoff  $s_C^\sigma$  includes the point  $(1, 1)$ , i.e., it is the maximum level of slant such that citizens, after a report on a challenger with position  $(g, t) = (1, 1)$ , expect nonpositive utility from the challenger's public good level.

The solution to the second equation depends on the returns to the high-paying job relative to the cost of human capital investment.

(iii) If  $e/\Delta w < 1/2$ , then

$$s_L^\sigma = \begin{cases} \left[ (0, 0), (0, 1) \right] & \text{if } \sigma = 0 \\ \left[ \left( 0, 1 - \frac{2e}{\Delta w} \right), \left( \frac{2e\sigma}{\Delta w}, 1 \right) \right] & \text{if } 0 < \sigma \leq \frac{\Delta w}{2e} \\ \left[ \left( 0, 1 - \frac{e}{\Delta w} - \frac{1}{2\sigma} \right), \left( 1, 1 - \frac{e}{\Delta w} + \frac{1}{2\sigma} \right) \right] & \text{if } \frac{\Delta w}{2e} \leq \sigma \leq \infty \end{cases} .$$

(iv) If  $e/\Delta w > 1/2$ , then

$$s_L^\sigma = \begin{cases} \left[ (1, 0), (1, 1) \right] & \text{if } \sigma = 0 \\ \left[ \left( 1 - 2\sigma + \frac{2e\sigma}{\Delta w}, 0 \right), \left( 1, 2 - \frac{2e}{\Delta w} \right) \right] & \text{if } 0 < \sigma \leq \left( 2 - \frac{2e}{\Delta w} \right)^{-1} \\ \left[ \left( 0, 1 - \frac{e}{\Delta w} - \frac{1}{2\sigma} \right), \left( 1, 1 - \frac{e}{\Delta w} + \frac{1}{2\sigma} \right) \right] & \text{if } \left( 2 - \frac{2e}{\Delta w} \right)^{-1} \leq \sigma \leq \infty \end{cases} .$$

Theorem 1 describes the equilibrium outcome after almost every story for every slant. With the closed form calculated above, we can make positive predictions about the slant for different objective functions of the media outlet as well as welfare comparisons. We take up these issues in the following sections.

## 5 Partisan Media

In this section, we derive the optimal slant under the assumptions that the media outlet seeks to maximize the probability that one candidate or the other wins the election. We assume that the choice of slant takes place and is publicly observed prior to the citizens' job choices and votes. Thus, we take a long run view of slant as a variable that can only be adjusted slowly or at substantial cost. It would be implausible, for example, for a media outlet to replace its editorial board and alter its orientation to manipulate the beliefs of citizens immediately prior to an election.

### 5.1 Pro-Incumbent Media

Assume the media is biased in favor of the incumbent, in the sense that it chooses slant with the objective of maximizing the probability of the incumbent winning the election. The following result states that the optimal slant depends on the value of the public good, given by  $b$ . If the electorate favors the incumbent ex ante, i.e.,  $b < 1$ , then citizens care little about the public good that the challenger will deliver, and the optimal choice for pro-incumbent media is to conceal all information about public good policy. Absent any information about the challenger's position, voters will be turned away by the expectation that the challenger will overprovide public good, and the incumbent wins the election with probability one. If the electorate favors the challenger ex ante, i.e.,  $b > 1$ , then the value of the public good is high, and the best a pro-incumbent media can do is choose an interior slant that reveals information about the intended level of the public good in proportion to the payoff that voters receive from the it, hoping that this level will be high enough to discourage voters. Then the incumbent wins the election with probability decreasing in  $b$  and going from  $1/2$  when  $b$  is close to one to 0

when  $b$  is close to  $3/2$ .<sup>14</sup>

**Proposition 1** *The probability that the incumbent wins is uniquely maximized at  $\sigma = \infty$  if  $b < 1$  and at  $\sigma = \hat{\sigma}$  if  $b > 1$ . If the media is biased in favor of the incumbent, then the incumbent wins with probability one if  $b < 1$  and with probability  $1 - b/3 - (1/6)\sqrt{4b^2 - 3\hat{\sigma}^2}$  if  $b > 1$ .*

PROOF. Suppose  $0 < b < 1$ . Using the first line of Theorem 1(iii), if  $0 \leq \sigma \leq b$ , then the probability of the incumbent winning the election is the area of the trapezoid to the right of  $s_C^\sigma$ . This area is  $1 - b/3 - (1/6)\sqrt{4b^2 - 3\sigma^2}$ , which is increasing in  $\sigma$ . Using the second line of Theorem 1(iii), if  $b \leq \sigma < \infty$ , then the probability of the incumbent winning is one minus the triangle to the left of  $s_C^\sigma$ . This area is  $1 - b^2/(2\sigma)$  and is increasing in  $\sigma$ . Using the third line of Theorem 1(iii), if  $\sigma = \infty$ , then the probability of the incumbent winning is 1. Thus, if  $0 < b < 1$ , then the probability of the incumbent winning the election is maximized at  $\sigma = \infty$ .

Suppose  $1 < b < 3/2$ . Using the first line of Theorem 1(iv), if  $0 \leq \sigma \leq \hat{\sigma}$ , then the probability of the incumbent winning the election is the area of the trapezoid to the right of  $s_C^\sigma$ . This area is  $1 - b/3 - (1/6)\sqrt{4b^2 - 3\sigma^2}$ , which is increasing in  $\sigma$  and achieves a maximum of

$$1 - b/3 - (1/6)\sqrt{4b^2 - 3\hat{\sigma}^2} = 1 - \frac{b}{3} - \frac{1}{6}\sqrt{\frac{5}{2}b^2 + 3b - \frac{9}{2} + \frac{3(3-b)}{2}\sqrt{b^2 + 2b - 3}}$$

at  $\sigma = \hat{\sigma}$ . Using the second line of Theorem 1(iv), if  $\hat{\sigma} \leq \sigma < \infty$ , then the probability of the incumbent winning the election is the area of the triangle to the right of  $s_C^\sigma$ , which is strictly decreasing in  $\sigma$ . Using the third line of Theorem 1(iii), if  $\sigma = \infty$ , then the probability of the incumbent winning is 0. Thus, if  $1 < b < 3/2$ , then the probability of the incumbent winning the election is maximized at  $\sigma = \hat{\sigma}$ . ■

## 5.2 Pro-Challenger Media

Assume that the media outlet is biased in favor of the challenger, in the sense that it chooses slant with the objective of maximizing the probability

<sup>14</sup>Recall for the statement of Proposition 1 that  $\hat{\sigma}$  is the maximum level of slant such that citizens, after a report on a challenger with position  $(g, t) = (1, 1)$ , expect nonpositive utility from the challenger's public good level.

of the challenger winning the election. An argument similar to the proof of the previous proposition establishes that if the challenger is the ex ante frontrunner,  $b > 1$ , then the optimal slant of pro-challenger media is to suppress the candidate's position on the public good and report only the candidate's tax policy. Then the challenger provides a more efficient level of public good, in expectation, and citizens vote for the challenger, who wins with probability one. If the challenger is the ex ante underdog,  $b < 1$ , then the optimal slant is to perfectly reveal the challenger's position on the public good in the hope that the revealed policy position will be low enough to attract voters. In this case, the challenger wins the election with probability increasing in  $b$  and going from zero when  $b$  is close to zero to  $2/3$  when  $b$  is close to one.

**Proposition 2** *The probability that the challenger wins is uniquely maximized at  $\sigma = 0$  if  $b < 1$  and at  $\sigma = \infty$  if  $b > 1$ . If the media is biased in favor of the challenger, then the challenger wins with probability  $2b/3$  if  $b < 1$  and with probability one if  $b > 1$ .*

Taken together, Propositions 1 and 2 show that when the media is biased toward the frontrunner (the incumbent when  $b < 1$ , the challenger when  $b > 1$ ), its optimal slant conceals information about the challenger's position on public policy. This suppresses socially valuable information and leads to the possibility of an inefficient choice of public good level by the electorate, but the media's preferred candidate wins with probability one. When biased toward the challenger, the media's optimal slant reveals information about the challenger's position on public good and yields the outcome preferred by the media with positive probability.

Figure 3 contrasts the probability of the challenger winning the election with a pro-challenger media and with a pro-incumbent media for different values of  $b$ . The significant gap between the two probabilities is an indication of the power of the media to influence the result of the election. For purposes of comparison, the dashed line represents the probability that the challenger wins the election when the media is *balanced* in the sense of adopting a slant equal to 1, which implies covering both dimensions of the policy space with the same weight.

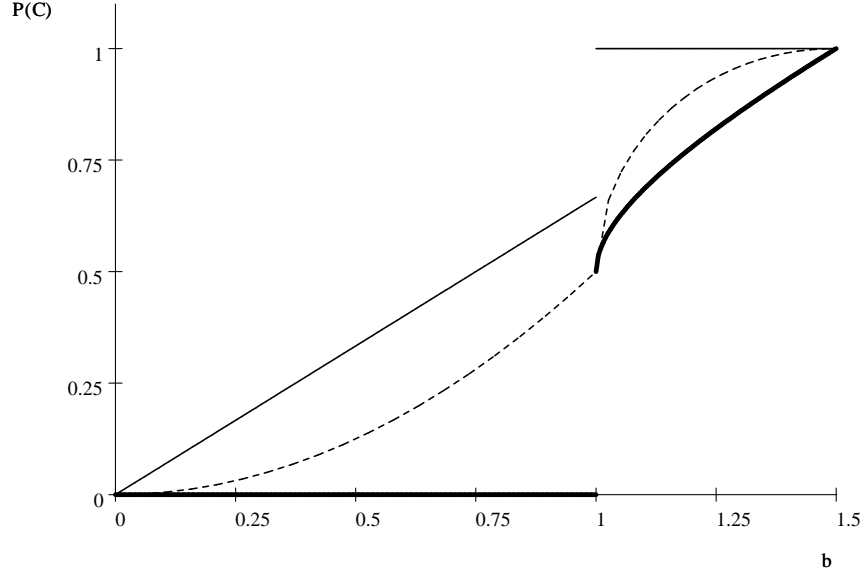


Figure 3: Probability of Challenger Winning the Election: Pro-Challenger (thin line), Pro-Incumbent (thick line) and Balanced Media (dashed line)

## 6 Welfare

In this section, we compare pro-incumbent, pro-challenger, and balanced media from the point of view of social welfare. To obtain a benchmark, we first characterize the socially optimal level of slant. To simplify the presentation, in the remainder of the section we impose the following assumption:

**(A5)**  $\Delta w - e \geq 7/18$  and  $(e/\Delta w)^2(\Delta w - e) \geq 1/24$ .

That is, we assume that the net gain (before taxes) for the high-paying job and the relative cost of education are not too small.<sup>15</sup>

Note that from the viewpoint of social welfare, income tax in itself is irrelevant to the extent that tax proceeds are returned to citizens as lump-sum transfers. Of course, if citizens anticipate a high income tax, then they will take low paying jobs, which reduces social welfare. Also, from the viewpoint

<sup>15</sup>As it is clear from the proofs of Propositions 3 and 4, assumption (A5) is not needed for most of our results.

of social welfare, the public good level  $g$  that the challenger intends to implement is better than the status quo if and only if  $u(g) - c(g) > 0$ , i.e., if and only if  $0 < g < 2b/3$ . Thus, social welfare is maximized when citizens take high paying jobs regardless of who wins the election and the challenger wins the election if and only if  $0 < g < 2b/3$ . For any given slant  $\sigma$ , social losses with respect to this maximum can be measured as

$$\begin{aligned} \text{Social losses} &= (\Delta w - e) P(L|\sigma) \\ &+ \int_{\substack{(g,t) \in I(\sigma) \\ 0 < g < 2b/3}} (u(g) - c(g)) dg dt + \int_{\substack{(g,t) \in C(\sigma) \\ 2b/3 < g < 1}} (c(g) - u(g)) dg dt, \end{aligned}$$

where  $I(\sigma)$  is the area in the unit square where the incumbent wins the election, and  $C(\sigma)$  is the area where the challenger wins the election.

The first term in the right-hand side of the above equation is the loss due to the (ex ante, before learning the news) probability that citizens take low paying jobs, and it is equal to the area in the unit square such that low paying jobs are adopted,  $P(L|\sigma)$ , multiplied by the loss  $\Delta w - e$ . The second term is the loss due to failing to adopt the challenger's proposed level of the public good when in fact this level would be better than the status quo, and it is equal to the net benefit of the public good, integrated over the area in the unit square such that  $0 < g < 2b/3$  and the challenger is defeated. The third term is the loss due to adopting the challenger's proposed level of the public good when in fact this level is worse than the status quo, and it is equal to the net loss due to the public good, integrated over the area in the unit square such that  $2b/3 < g < 1$  and the challenger wins the election.

Since social losses change continuously with the slant  $\sigma$ , and the set of possible slants  $\mathfrak{R}_{++} \cup \{0, \infty\}$  is compact, there exists an optimal slant  $\sigma^*$  for any given parameter values  $\Delta w$ ,  $e$ , and  $b$ . Proposition 3 (proved in the Appendix) provides the optimal slant for different parameter values.

**Proposition 3** (i) If  $e/\Delta w < 1/2$ , then the unique socially optimal slant is  $\sigma^* = 0$  for all  $b$ . (ii) If  $e/\Delta w > 1/2$ , then there exist  $b', b''$  satisfying  $1 < b' \leq b'' < 3/2$  such that the unique socially optimal slant is  $\sigma^* = \infty$  if  $b < 1$ ,  $\sigma^* = \hat{\sigma}$  if  $1 < b < b'$ ,  $\sigma^* = 0$  if  $b' < b < b''$ , and  $\sigma^* = (2 - 2e/\Delta w)^{-1}$  if  $b'' < b < 3/2$ .

If the cost of education is small compared to the salary premium of high-paying jobs, then it is socially optimal for the media to report only on the public good ( $\sigma^* = 0$ ). The reason is that in the absence of information about income taxes, citizens invest in education. Thus, reporting only about the public good reduces social losses to zero, since the challenger wins the election only if she intends to implement a level of public good provision with positive net benefits for citizens.

If the cost of education is large and citizens do not care much about the public good, then it is socially optimal for the media to report only on income taxes ( $\sigma^* = \infty$ ) if  $b$  is smaller than one and to choose the slant  $\hat{\sigma}$  if  $b$  is slightly above one. Intuitively, when the cost of education is large, citizens will not acquire education in case the challenger is elected, so if citizens do not care much about the public good, then it is socially optimal to maximize the probability of the incumbent winning the election. Finally, if the cost of education is large and citizens care a great deal about the public good, then the optimal slant is either 0 or  $(2 - 2e/\Delta w)^{-1}$ , determined according to the trade-off between providing the public good, which requires electing the challenger, and giving incentives for citizens to take high-paying jobs, which requires electing the incumbent.

Using the previous results, Proposition 4 (proved in the appendix) provides a ranking of the different media objectives according to the expected utility of citizens.

**Proposition 4** *(i) If  $e/\Delta w < 1/2$ , then if  $b < 1$ , pro-challenger media is socially optimal, and pro-incumbent media is better for citizens than balanced media, and if  $b > 1$ , pro-incumbent media is better for citizens than balanced media, which in turn is better than pro-challenger media. (ii) If  $e/\Delta w > 1/2$ , then there exist  $\underline{b}, \bar{b}$  satisfying  $1 < \underline{b} \leq \bar{b} < 3/2$  such that if  $0 < b < \underline{b}$ , then pro-incumbent media is socially optimal and balanced media is better for citizens than pro-challenger media; and if  $\bar{b} < b < 3/2$ , then pro-challenger media is better than balanced media which in turn is better than pro-incumbent media.*

Figures 4 and 5 illustrate Proposition 4 for the case of a small education cost ( $e/\Delta w < 1/2$ ) and the case of a large education cost ( $e/\Delta w > 1/2$ ),



respectively.<sup>16</sup> In each figure, we represent citizens' expected welfare under pro-challenger, pro-incumbent and balanced media as a fraction of expected welfare under the optimal slant.

Consider first the case of a small education cost. From Proposition 3, in this case it is socially optimal for the media to report only on the public good. When citizens care little about the public good ( $b < 1$ ), this is exactly the optimal slant for a pro-challenger media, so pro-challenger media is better for citizens than pro-incumbent media. When citizens care enough about the public good ( $b > 1$ ), though, the optimal slant for a pro-challenger media is to report only on income taxes, so the ordering of pro-challenger and pro-incumbent media from the viewpoint of social welfare is reversed.

Consider now the case of a large education cost. From Proposition 3, in this case it is socially optimal for the media to maximize the probability that the incumbent gets elected when citizens care little about the public good. In particular, the optimal slant is  $\sigma = \infty$  for  $0 < b < 1$  and  $\sigma = \hat{\sigma}$  for  $1 < b < b'$  for some  $b' > 1$ . Thus, pro-incumbent media is socially optimal for  $b < b'$  for some  $b' > 1$ . Also from Proposition 3, if citizens care enough about the public good, then the socially optimal slant is equal to  $(2 - 2e/\Delta w)^{-1}$  which gives more weight than  $\hat{\sigma}$  to information about the public good. Thus, pro-challenger media is better than pro-incumbent media for  $b$  close enough to  $3/2$ .

Balanced media implies a slant that is intermediate between the slants favored by pro-incumbent and pro-challenger media in every case depicted in Figures 4 and 5. Figure 4 illustrates nicely that social welfare is not single-peaked in slant. If the cost of education is small and citizens do not care much about the public good, pro-incumbent media would report only on the income tax dimension, therefore guaranteeing that the incumbent would win the election with probability one and all citizens would choose high-paying jobs. Pro-challenger media, on the other hand, would report only on the public good dimension, therefore guaranteeing that all citizens would choose high-paying jobs and also that the challenger would win the election if and only if the intended level of provision of the public good were better than no provision. Balanced media would report on both policy dimensions with equal weight, provoking the challenger to win in some circumstances

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<sup>16</sup>We adopt the parameter values  $e/\Delta w = 1/4$  for Figure 4,  $e/\Delta w = 2/3$  for Figure 5, and  $\Delta w - e = 1$  for both figures.

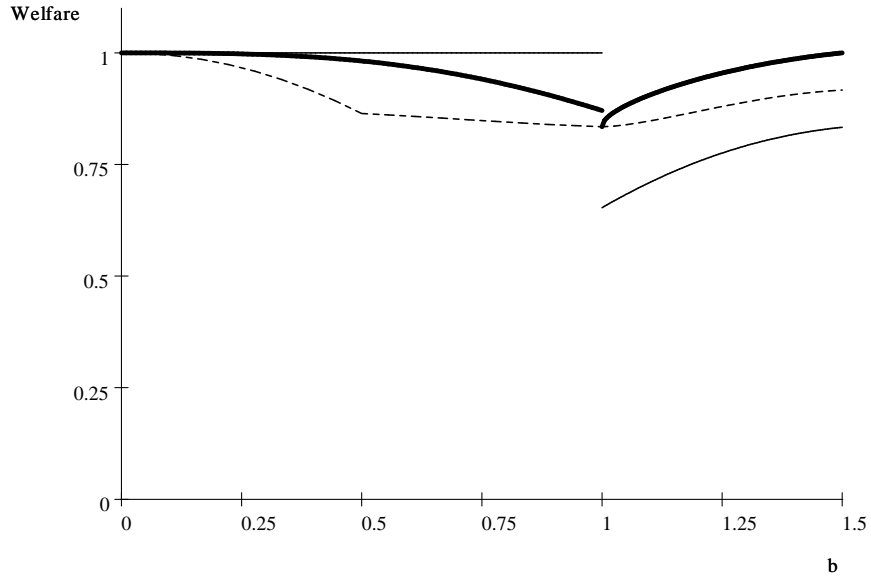


Figure 4: Welfare under Pro-Challenger (thin line), Pro-Incumbent (thick line), and Balanced Media (dashed line) for Small Education Cost

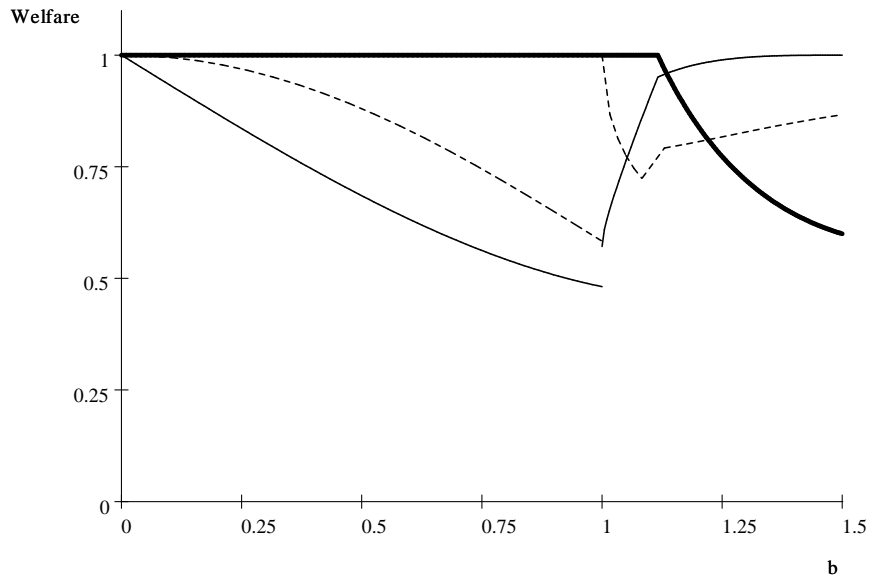


Figure 5: Welfare under Pro-Challenger (thin line), Pro-Incumbent (thick line), and Balanced Media (dashed line) for Large Education Cost

in which the intended level of provision of the public good were worse than no provision, and in some circumstances in which the expectation of the challenger winning would lead citizens to take low-paying jobs. Thus, there can be no general presumption that balanced media is a “good compromise” between media with opposite partisan objectives.

## 7 Multiple Slants

We have assumed so far that all citizens have access to a single news source, or alternatively to different media sharing the same slant, perhaps because a similar slant allows media outlets to maximize advertisement revenues, as proposed by Hamilton (2004) to explain nonpartisan reporting on U.S. politics from the 1870s to the early 1990s.

Of course, if citizens have access to at least two media with different slants, they can pinpoint exactly the policy position of the challenger. This would not necessarily be better for citizens than having access to a single news source. It is simple to check that if citizens can pinpoint exactly the position of the challenger, they will vote for the challenger and choose high-paying jobs if  $t < 1 - e/\Delta w$  and  $g < 2b/3$ , will vote for the challenger and choose low-paying jobs if  $t > 1 - e/\Delta w$ ,  $\Delta w - e < b^2/3$  and  $g \in (b/3 - \sqrt{b^2/9 - (\Delta w - e)/3}, b/3 + \sqrt{b^2/9 - (\Delta w - e)/3})$ , and will vote for the incumbent and choose high-paying jobs in the complement of the closure of the set just described. Thus, social losses as defined in the previous section will be positive, since citizens do not always vote for the challenger when  $g < 2b/3$  and may take low-paying jobs with positive probability. Recall that social losses are zero with a single news source under the optimal slant if  $e/\Delta w < 1/2$ .

A more interesting, and possibly more realistic, view is that due to information processing costs, it is difficult for most or all citizens to read and understand news reports with different slants. In our set up, we can incorporate this by assuming that each citizen consults only one news source, and we can consider the possibility that the citizenry splits into two audiences for media outlets with different slants. We then need to model not only the job and voting decisions of individuals after reading the news, but also the ex ante choice of media outlets. Since each vote is negligible, citizens will

choose the outlet that leads to a better job decision. But since reading the newspaper that is read by the majority allows a voter to infer which party is going to win the election, there are potentially multiple equilibria.

To fix ideas, suppose that there are two newspapers, 1 and 2, with exogenously given slants  $\sigma_1 = 0$  and  $\sigma_2 = \infty$ . That is, newspaper 1 informs only about the public good dimension and newspaper 2 only about the tax policy dimension. Citizens must decide whether to read one newspaper or the other but cannot read both. It is easy to check that there is an equilibrium in which every citizen reads newspaper 2. However, there is also an equilibrium in which every citizen reads newspaper 1 if and only if either  $e/\Delta w \leq 1 - 2b/3$  or  $e/\Delta w > 1/2$ . If  $e/\Delta w \leq 1 - 2b/3$ , then a would-be reader of newspaper 2 would find it optimal to take a high-paying even if he knew the income tax rate intended by the challenger is equal to 1, so the would-be deviator could not learn anything useful from reading newspaper 2. If instead  $e/\Delta w > 1/2$  and  $e/\Delta w > 1 - 2b/3$ , then a would-be reader of newspaper 2 would find it optimal to take low-paying jobs for high enough income taxes, but would still be worse off than a reader of newspaper 1 who knows if the challenger or the incumbent will win the election and who uses this information to take a low or a high-paying job.

The example above illustrates both the existence of multiple equilibria and the possibility that private motivations lead all citizens to access media with similar slants. Further along this line, it may be interesting to consider a model with different media outlets and a heterogeneous citizenry. We leave this for future research.

## 8 Final Remarks

We have shown that the media choice of slant, or relative emphasis on the different issues of political interest, may have a large impact on political outcomes in a rational expectations model of political and economic choice. In a two-candidate election, if the media is biased in favor of the underdog (in terms of popular support before listening to the news), then its news reports will have a potentially large electoral impact, being more informative about the public good issue, in hopes of an upset victory for the underdog. In contrast, if the media is biased in favor of the frontrunner, then its reports

will have little electoral impact. Which of the two biases is better for voters depends on the importance of choosing the “right” candidate (promoting the more efficient public good level) for citizens versus the impact of political news on the private economic decisions of voters. If political news is expected to have little impact on private economic decisions, then it is unambiguously better for voters that media favors the underdog. But if political news have a large impact on private economic decisions, then it may be better for voters that media favors the frontrunner.

We have provided what we consider a useful perspective on media slant, and have used a simple two-dimensional policy model to illustrate the role of the media from this perspective. Our results related to the optimal choice of media slant by partisan media are likely to hold under more general conditions than the model we propose; whichever candidate is ahead in popular support will be less keen on news reports having a large impact on beliefs of citizens that may induce changes in voting behavior. On the other hand, our result that citizens may be better off if the media favors the candidate who is ahead in popular support depends on the feature of the model that private economic decisions in response to more information may make everyone worse off. The more general point here is that we cannot evaluate the welfare impact of different slants focusing on political outcomes alone, in isolation of the economic impact of political news.

Our analysis, in contrast to the growing literature on media influence, has placed its focus on the role of information in making economic choices (in addition to voting decisions), the media’s choice of perspective (rather than simply the suppression of information), and the rational use of information by citizens in forming expectations about the future on the basis of news reports. Whereas we have largely considered the case of a unitary media in order to isolate the incentives underlying the media’s choice of slant and to investigate the welfare properties of this choice, more must be done to improve our understanding of the strategic aspects of media competition and, related, the role of voter heterogeneity in determining political and economic outcomes. We leave the treatment of these issues for future work.

## Appendix

PROOF OF THEOREM 1: There are three additional types of rational expectation outcome that are not accounted for in Section 4.

**Type 4.** Suppose  $P(C|s) = 1$  and  $0 < P(L|s) < 1$ . A necessary condition for this to be a rational expectations outcome is that citizens are indifferent between taking high-paying or low-paying jobs. That is,

$$E[t|s] = 1 - e/\Delta w.$$

**Type 5.** Suppose  $0 < P(C|s) < 1$  and either  $P(L|s) = 1$  or  $P(H|s) = 1$ . In either case, a necessary condition for this to be a rational expectations outcome is that citizens are indifferent between supporting the challenger and the incumbent. That is,

$$E[u(g) - c(g)|s] = 0.$$

**Type 6.** Suppose  $0 < P(C|s) < 1$  and  $0 < P(L|s) < 1$ . We assume that citizens choose their actions independently.<sup>17</sup> The only value of  $P(C|s)$  that can be induced by independent actions on the part of citizens is the one corresponding to an electoral tie, i.e.,  $P(C|s) = 1/2$ . Using  $0 < P(L|s) < 1$ , we find that a necessary condition for this to be a rational expectations outcome is

$$E[t|s] = 2(1 - e/\Delta w).$$

It is simple to check that there are no other possible rational expectations outcomes. If citizens expect  $P(C|s) = 0$ , for example, then all citizens take the high-paying job, so there is no story such that  $P(C|s) = 0$  and  $P(L|s) > 0$  is a rational expectations outcome.

Note that

$$E[t|s] = (\underline{t}(s) + \bar{t}(s))/2.$$

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<sup>17</sup>Since in our setup there is a continuum of citizens, there is a technical difficulty defining “independent” actions whenever a positive measure of citizens adopt mixed strategies. The independence notion we require is that there is no subset of citizens with positive measure who cast correlated votes. The idea is that if the probability of the challenger winning the election is strictly between zero and one and different from 1/2, then it is necessarily the case that a set of citizens with positive measure cast correlated votes.

It is easy to check that  $s' \succ s$  implies  $E[t|s] \geq E[t|s']$ , with strict inequality unless  $\underline{t}(s) = \underline{t}(s') = 0$  and  $\bar{t}(s) = \bar{t}(s') = 1$ . Equivalently,  $s' \succ s$  implies

$$E[t|s] > E[t|s'] \text{ or } E[t|s] = E[t|s'] = 1/2.$$

Using assumption (A4) ( $e/\Delta w \neq 1/2$ ), we find that the equation  $E[t|s] = (1 - e/\Delta w)$  holds for at most one story  $s$ , so Type 4 rational expectations outcomes can occur only for a measure zero set of stories. Similarly, assumption (A4) ( $e/\Delta w \neq 3/4$ ) implies that  $E[t|s] = 2(1 - e/\Delta w)$  holds for at most one  $s$ , so Type 6 rational expectations outcomes can occur only for a measure zero set of stories.

We now argue that  $E[t|s] = 1 - e/\Delta w$  has at most one solution. Suppose  $\sigma > 0$ , and note that  $E[t|\underline{s}] = 1$  and  $E[t|\bar{s}] = 0$ . Using assumption (A4) ( $e/\Delta w \neq 1/2$ ), we get that if  $\sigma > 0$ , then the equation  $E[t|s] = 1 - e/\Delta w$  has a unique solution  $s_L^\sigma$ . Suppose  $\sigma = 0$ . If  $e/\Delta w < 1/2$ , then we have  $E[t|s] = 1/2 < 1 - e/\Delta w$  for all  $s$ . Thus,  $P(L|s) = 0$  for all  $s$ , which we represent by letting

$$s_L^0 = [(0, 0), (0, 1)].$$

For  $0 < \sigma \leq \Delta w/(2e)$ , it is simple to check that

$$s_L^\sigma = [(0, 1 - 2e/\Delta w), (2e\sigma/\Delta w, 1)]$$

solves  $E[t|s] = 1 - e/\Delta w$ . Similarly, for  $\Delta w/(2e) \leq \sigma \leq \infty$ , it is simple to check that

$$s_L^\sigma = [(0, 1 - e/\Delta w - 1/(2\sigma)), (1, 1 - e/\Delta w + 1/(2\sigma))]$$

solves  $E[t|s] = 1 - e/\Delta w$ . If  $e/\Delta w > 1/2$ , then we have  $E[t|s] = 1/2 > 1 - e/\Delta w$  for all  $s$ . Thus,  $P(L|s) = 1$  for all  $s$  if  $E[u(g) - c(g)|s] > 0$ , which we represent by letting

$$s_L^0 = [(1, 0), (1, 1)].$$

For  $0 < \sigma \leq 1/(2 - \frac{2e}{\Delta w})$ , it is simple to check that

$$s_L^\sigma = [(1 - 2\sigma + 2e\sigma/\Delta w, 0), (1, 2 - 2e/\Delta w)]$$

solves  $E[t|s] = 1 - e/\Delta w$ . The remaining case is similar to the argument given above.

Now we turn to the expression  $E[u(g) - c(g)|s]$ . Note that  $u(g) - c(g) > 0$  if and only if  $0 < g < 2b$ , and  $u(g) - c(g) < 0$  if and only if  $2b < g \leq 1$ . Suppose  $\sigma \in \mathfrak{R}_{++}$ . Then

$$\begin{aligned} E[u(g) - c(g)|s] &= \frac{1}{\bar{g}(s) - \underline{g}(s)} (b\bar{g}(s)^2 - \bar{g}(s)^3 - b\underline{g}(s)^2 + \underline{g}(s)^3) \\ &= b(\bar{g}(s) + \underline{g}(s)) - (\bar{g}(s)^2 + \bar{g}(s)\underline{g}(s) + \underline{g}(s)^2), \end{aligned}$$

which is strictly concave as a function of  $\bar{g}$  and  $\underline{g}$ . Moreover,  $\bar{g}(s)$  and  $\underline{g}(s)$  are weakly increasing in  $s$ , with at least one of them increasing strictly as we consider news stories to the southeast, except possibly if  $\underline{g}(s) = 0$  and  $\bar{g}(s) = 1$ . Note also that  $E[u(g) - c(g)|s]$  is positive for news stories close enough to  $\underline{s}$  and is negative for news stories close enough to  $\bar{s}$ . By assumption (A4) ( $b \neq 1/3$ ), it follows that if  $\underline{g}(s) = 0$  and  $\bar{g}(s) = 1$ , then  $E[u(g) - c(g)|s] \neq 0$ . Thus, there is at most one solution, which we denote  $s_C^\sigma$ , to  $E[u(g) - c(g)|s] = 0$ . Moreover,

$$E[u(g) - c(g)|s] \geq 0 \iff s \leq s_C^\sigma$$

for every story  $s$ .

Suppose  $\sigma = 0$ , so news stories are fully revealing about  $g$ . Thus,  $E[u(g) - c(g)|s] > 0$  if and only if  $s_C^0 \succ s$ , where

$$s_C^0 = [(2b/3, 0), (2b/3, 1)].$$

Suppose  $\sigma = \infty$ , so that no information about  $g$  is revealed by any story. Then

$$E[u(g) - c(g)|s] = \int_0^1 (u(g) - c(g)) dg = b - 1.$$

Thus, if  $b < 1$ , then we have  $E[u(g) - c(g)|s] < 0$  for every  $s$ , which we represent by

$$s_C^\infty = [(0, 1), (1, 1)],$$

while if  $b > 1$ , then we have  $E[u(g) - c(g)|s] > 0$  for every  $s$ , which we represent by

$$s_C^\infty = [(0, 0), (1, 0)].$$

Note the implication that Type 5 rational expectations outcomes can occur only for a measure zero set of stories.



From the analysis of Section 4, it follows that if  $P(C|\cdot)$ ,  $P(L|\cdot)$  is a rational expectations equilibrium of Type 1, 2, or 3, then

$$P(C|s) = \begin{cases} 0 & \text{if } E[u(g) - c(g)|s] < 0 \\ 1 & \text{if } E[u(g) - c(g)|s] > 0 \end{cases}$$

and

$$P(L|s) = \begin{cases} 0 & \text{if } E[t|s] < 1 - e/\Delta w \quad \text{or} \quad E[u(g) - c(g)|s] < 0 \\ 1 & \text{if } E[t|s] > 1 - e/\Delta w \quad \text{and} \quad E[u(g) - c(g)|s] > 0 \end{cases}$$

for almost every  $s \in S^\sigma$ . With the foregoing analysis, the existence and uniqueness of rational expectations equilibrium follows, as well as its characterization in terms of the cutoff stories  $s_C^\sigma$  and  $s_L^\sigma$ . ■

PROOF OF PROPOSITION 3: Suppose  $e/\Delta w < 1/2$ , as in case (iii) following Theorem 1. In this case, citizens are predisposed to taking high-paying jobs regardless of who wins the election, in the absence of information about the income tax level intended by the challenger. By setting  $\sigma = 0$ , news are unrevealing about the income tax level, so that every citizen takes a high-paying job. Moreover, news are perfectly revealing about the level of the public good that the challenger intends to implement, so that citizens vote for the challenger if and only if the net benefit of the public good is positive. Thus, if  $e/\Delta w < 1/2$ , then social welfare is maximized by setting  $\sigma = 0$ . In fact, it is uniquely maximized at that slant since for any other slant the sum of the second and third terms of the social losses equation is positive. This finishes the proof of part (i) of the proposition.

Now suppose  $e/\Delta w > 1/2$  and  $b < 1$ . Using cases (i) and (iv) following Theorem 1 we get that if  $b < 1$  then  $s_L^\sigma > s_C^\sigma$  for all  $\sigma$ . Thus, citizens take low-paying jobs whenever they anticipate the challenger will win the election. Consider any slant  $\sigma$  in  $[0, b]$ . The expected welfare is

$$W(\sigma) = (\Delta w - e) \left( 1 - b/3 - \sqrt{b^2/9 - \sigma^2/12} \right) + \int_{t=0}^1 \int_{g=0}^{-\sigma/2 + b/3 + \sqrt{b^2/9 - \sigma^2/12} + \sigma t} (2bg - 3g^2) dg$$

or equivalently

$$W(\sigma) = (\Delta w - e) \left( 1 - b/3 - \sqrt{b^2/9 - \sigma^2/12} \right) \\ + (2b^2/9) \sqrt{b^2/9 - \sigma^2/12} + 2b^3/27 + b\sigma^2/18.$$

Thus,

$$W'(\sigma) = (\Delta w - e)(b^2/9 - \sigma^2/12)^{-1/2} \sigma/12 - (\sigma b^2/54)(b^2/9 - \sigma^2/12)^{-1/2} + b\sigma/9.$$

It is straightforward to check that  $b < 1$  implies  $W'(\sigma) > 0$ . Thus, no slant in  $[0, b)$  can be optimal.

Now consider any slant  $\sigma$  in  $[b, \infty]$ . The expected welfare is

$$W(\sigma) = (\Delta w - e) (1 - b^2/2\sigma) + \int_{t=1-b/\sigma}^1 \int_{g=0}^{-\sigma+b+\sigma t} (2bg - 3g^2) dg$$

or equivalently

$$W(\sigma) = (\Delta w - e) (1 - b^2/2\sigma) + b^4/12\sigma.$$

Thus,  $W'(\sigma) \geq 0$  iff  $\sqrt{6(\Delta w - e)} \geq b$ . Since  $\Delta w - e \geq 1/6$  (from assumption A5), it follows that if  $e/\Delta w > 1/2$  and  $b < 1$  then the optimal slant is  $\infty$ .

Finally, suppose  $e/\Delta w > 1/2$  and  $b > 1$ . Consider first any slant  $\sigma \in [0, \hat{\sigma}]$ . Using cases (ii) and (iv) following Theorem 1 we get that  $s_L^\sigma \succ s_C^\sigma$ . Defining  $B = b/3 + \sqrt{b^2/9 - \sigma^2/12}$ , the expected welfare is

$$W(\sigma) = (\Delta w - e)(1 - B) + \int_{t=0}^1 \int_{g=0}^{-\sigma/2+B+\sigma t} (2bg - 3g^2) dg dt$$

or equivalently

$$W(\sigma) = (\Delta w - e) \left( 1 - b/3 - (b^2/9 - \sigma^2/12)^{1/2} \right) \\ + 2b^3/27 + 2(b^2/9 - \sigma^2/12)^{3/2}.$$

It follows that  $W(\sigma)$  is convex. Thus,  $W(\sigma)$  is maximized in the interval  $[0, \hat{\sigma}]$  by  $\sigma$  equal to either 0 or  $\hat{\sigma}$ . Note in particular

$$W(0) = (\Delta w - e)(1 - 2b/3) + 4b^3/27.$$

Now consider any slant  $\sigma \in [\hat{\sigma}, \hat{\sigma}(2 - 2e/\Delta w)^{-1}]$ . Using cases (ii) and (iv) following Theorem 1 we get that  $s_L^\sigma \succ s_C^\sigma$ . The expected welfare is

$$W(\sigma) = (\Delta w - e)\hat{\sigma}^2/2\sigma + \int_0^1 \int_0^1 (2bg - 3g^2) dg dt - \int_{t=0}^{-(1-\hat{\sigma})/\sigma+g/\sigma} \int_{g=1-\hat{\sigma}}^1 (2bg - 3g^2) dg dt$$

or equivalently

$$W(\sigma) = (\Delta w - e)\hat{\sigma}^2/2\sigma + b - 1 - [(b - 3/2)\hat{\sigma}^2 + (1 - b/3)\hat{\sigma}^3 - \hat{\sigma}^4/4]/\sigma.$$

Since the expression in brackets is negative for any  $b \in (1, 3/2)$ , we have that  $W(\sigma)$  is strictly decreasing. Thus,  $W(\sigma)$  is maximized in the interval  $[\hat{\sigma}, \hat{\sigma}(2 - 2e/\Delta w)^{-1}]$  by  $\sigma$  equal to  $\hat{\sigma}$ . Note in particular

$$W(\hat{\sigma}) = (\Delta w - e)\hat{\sigma}/2 + b - 1 - [(b - 3/2)\hat{\sigma} + (1 - b/3)\hat{\sigma}^2 - \hat{\sigma}^3/4].$$

Next consider any slant  $\sigma \in [\hat{\sigma}(2 - 2e/\Delta w)^{-1}, (2 - 2e/\Delta w)^{-1}]$ . Using cases (ii) and (iv) following Theorem 1 we get that  $s_C^\sigma \succ s_L^\sigma$ . The expected welfare is

$$W(\sigma) = (\Delta w - e)(2 - 2e/\Delta w)^2\sigma/2 + b - 1 - [(b - 3/2)\hat{\sigma}^2 + (1 - b/3)\hat{\sigma}^3 - \hat{\sigma}^4/4]/\sigma.$$

Thus,  $W(\sigma)$  is increasing if

$$(\Delta w - e)(2 - 2e/\Delta w)^2/2 > -[(b - 3/2)\hat{\sigma}^2 + (1 - b/3)\hat{\sigma}^3 - \hat{\sigma}^4/4]/\sigma^2,$$

which is satisfied for any slant in  $\sigma \in [\hat{\sigma}(2 - 2e/\Delta w)^{-1}, (2 - 2e/\Delta w)^{-1}]$  if

$$(\Delta w - e)/2 > -[(b - 3/2) + (1 - b/3)\hat{\sigma} - \hat{\sigma}^2/4]$$

or equivalently

$$\Delta w - e > -b/2 + 3/4 - b^2/12 - (b/12 - 1/4)\sqrt{b^2 + 2b - 3}.$$

The right-hand side in the inequality above is strictly decreasing in  $b$ , so that a sufficient condition for  $W(\sigma)$  to be increasing for any  $b \in (1, 3/2)$  is  $\Delta w - e \geq 1/6$ . Thus, from assumption (A5),  $W(\sigma)$  is maximized by  $\sigma = (2 - 2e/\Delta w)^{-1}$  in the interval  $[\hat{\sigma}(2 - 2e/\Delta w)^{-1}, (2 - 2e/\Delta w)^{-1}]$ .

Finally consider any slant  $\sigma \in [(2 - 2e/\Delta w)^{-1}, \infty]$ . Using cases (ii) and (iv) following Theorem 1 we get that  $s_C^\sigma \succ s_L^\sigma$ . The expected welfare is

$$W(\sigma) = (\Delta w - e)(1 - e/\Delta w) + b - 1 - [(b - 3/2)\hat{\sigma}^2 + (1 - b/3)\hat{\sigma}^3 - \hat{\sigma}^4/4]/\sigma.$$

Since the expression in brackets is negative,  $W(\sigma)$  is strictly decreasing. Thus,  $W(\sigma)$  is maximized in the interval  $[(2 - 2e/\Delta w)^{-1}, \infty]$  by  $\sigma$  equal to  $(2 - 2e/\Delta w)^{-1}$ . Note in particular

$$\begin{aligned} W((2 - 2e/\Delta w)^{-1}) &= (\Delta w - e)(1 - e/\Delta w) + b - 1 \\ &\quad - [(b - 3/2)\hat{\sigma}^2 + (1 - b/3)\hat{\sigma}^3 - \hat{\sigma}^4/4](2 - 2e/\Delta w). \end{aligned}$$

From the previous paragraphs it follows that if  $e/\Delta w > 1/2$  and  $b > 1$ , then  $W(\sigma)$  is maximized by setting  $\sigma$  equal to either 0,  $\hat{\sigma}$  or  $(2 - 2e/\Delta w)^{-1}$ . We claim that if  $b$  is close to 1 then  $W(\hat{\sigma})$  is larger than  $W(0)$  and  $W((2 - 2e/\Delta w)^{-1})$ . To see this, note that  $\hat{\sigma}$  changes continuously with  $b$  and if  $b$  is close to one, then  $\hat{\sigma}$  is close to one. Thus, for  $b$  close to one,  $W(0)$  is close to  $(\Delta w - e)/3 + 4/27$ ,  $W(\hat{\sigma})$  is close to  $(\Delta w - e)/2 + 1/12$ , and  $W((2 - 2e/\Delta w)^{-1})$  is close to  $(\Delta w - e + 1/6)(1 - e/\Delta w)$ . The desired result follows from assumption (A5). Next, we claim that if  $b$  is close to  $3/2$  then  $W((2 - 2e/\Delta w)^{-1})$  is larger than  $W(0)$  and  $W(\hat{\sigma})$ . To see this, note that if  $b$  is close to  $3/2$ , then  $W((2 - 2e/\Delta w)^{-1})$  is close to  $(\Delta w - e)(1 - e/\Delta w) + 1/2$  while  $W(0)$  and  $W(\hat{\sigma})$  are close to  $1/2$ . Finally, it is tedious but straightforward to verify that  $W(0) - W(\hat{\sigma})$ ,  $W((2 - 2e/\Delta w)^{-1}) - W(\hat{\sigma})$  and  $W((2 - 2e/\Delta w)^{-1}) - W(0)$  are increasing in  $b$  for  $1 < b < 3/2$  under assumption (A5). Thus, the cutoff points  $b', b''$  in the statement of the proposition are well-defined. This finishes the proof of part (ii) of the proposition. ■

PROOF OF PROPOSITION 4: Suppose first  $e/\Delta w < 1/2$  and  $b < 1$ . From Proposition 3(i) and Proposition 2 it follows that pro-challenger media is optimal. From Proposition 1 and cases (i) and (iii) after Theorem 1, it follows that welfare under pro-incumbent media is given by  $W(\infty) = \Delta w - e$ . With respect to balanced media, we have that if  $b \leq 2e/\Delta w$  then  $W(1) = (\Delta w - e)(1 - b^2/2) + b^4/12$ , and if  $b \geq 2e/\Delta w$  then  $W(1) = (\Delta w - e)(1 - 2(e/\Delta w)^2) + b^4/12$ . Thus,  $W(\infty) > W(1)$  if  $b \leq 2e/\Delta w$  and  $\Delta w - e \geq 1/6$  or if  $b \geq 2e/\Delta w$  and  $(e/\Delta w)^2(\Delta w - e) \geq 1/24$ . Using Assumption (A5) we obtain  $W(\infty) > W(1)$ . This partially proves part (i) of the proposition.

Next suppose  $e/\Delta w < 1/2$  and  $b > 1$ . From Proposition 1 and cases (ii) and (iii) after Theorem 1, it follows that welfare under pro-incumbent media

is

$$W(\hat{\sigma}) = (\Delta w - e)(1 - 2\hat{\sigma}(e/\Delta w)^2) + b - 1 - [(b - 3/2)\hat{\sigma}^2 + (1 - b/3)\hat{\sigma}^3 - \hat{\sigma}^4/4]/\hat{\sigma}.$$

Similarly, from Proposition 2, it follows that welfare under pro-challenger media is

$$W(\infty) = (\Delta w - e)(1 - e/\Delta w) + b - 1.$$

Finally, welfare under balanced media is

$$W(1) = (\Delta w - e)(1 - 2(e/\Delta w)^2) + b - 1 - [(b - 3/2)\hat{\sigma}^2 + (1 - b/3)\hat{\sigma}^3 - \hat{\sigma}^4/4].$$

Since the expression in brackets is negative,  $\hat{\sigma}$  is smaller than one and  $e/\Delta w < 1/2$ , we get  $W(\hat{\sigma}) > W(1) > W(\infty)$ . This finishes the proof of part (i) of the proposition.

Next suppose  $e/\Delta w > 1/2$  and  $b < 1$ . From Proposition 3(ii) and Proposition 1 it follows that pro-incumbent media is optimal. From Proposition 2 and cases (i) and (iv) after Theorem 1, it follows that welfare under pro-challenger media is

$$W(0) = (\Delta w - e)(1 - 2b/3) + 4b^3/27.$$

Similarly, welfare under balanced media is

$$W(1) = (\Delta w - e)(1 - b^2/2) + b^4/12.$$

Thus,  $W(1) > W(0)$  if  $\Delta w - e > b^2(4/27 - b/12)/(2/3 - b/2)$ . Since the expression in the right-hand side of this inequality is increasing in  $b$ , it follows that  $W(1) > W(0)$  if  $\Delta w - e \geq 7/18$ . This partially proves part (ii) of the proposition.

Last, suppose  $e/\Delta w > 1/2$  and  $b > 1$ . From Proposition 3(ii) and Proposition 1 it follows that there is some  $\tilde{b} \in (1, 3/2)$  such that if  $1 < b < \tilde{b}$  then pro-incumbent media is optimal. We claim that for  $b$  close enough to 1, balanced media is better for citizens than pro-challenger media. To see this, from Proposition 2, welfare under pro-challenger media is  $W(\infty)$ , which is close to  $(\Delta w - e)(1 - e/\Delta w)$  for  $b$  close to 1. Similarly, since  $\hat{\sigma}$  is close to 1 when  $b$  is close to 1, welfare under balanced media ( $W(1)$ ) is close to  $(\Delta w - e)/2 + 1/12$  for  $b$  close to 1. The desired result follows.

Finally, we claim that for  $b$  close enough to  $3/2$ , pro-challenger media is better for citizens than balanced media which in turn is better than pro-incumbent media. Note that  $\hat{\sigma}$  is close to 0 when  $b$  is close to  $3/2$ . Thus, for  $b$  close to  $3/2$ , welfare under pro-challenger media is close to  $(\Delta w - e)(1 - e/\Delta w) + 1/2$ , welfare under balanced media is close to  $(\Delta w - e)(2 - 2e/\Delta w)^2/2 + 1/2$  and welfare under pro-incumbent media is close to  $1/2$ . The desired result follows. This and the previous claim finish the proof of part (ii) of the proposition. ■

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