A Spatial Theory of Media Slant and Voter Choice

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Abstract

We develop a theory of media slant as a systematic filtering of political news that reduces multidimensional politics to the one-dimensional space perceived by voters. Economic and political choices are interdependent in our theory: expected electoral results influence economic choices, and economic choices in turn influence voting behavior. In a two-candidate election, we show that media favoring the frontrunner will focus on issues unlikely to deliver a surprise, while media favoring the underdog will gamble for resurrection. We characterize the socially optimal slant and show it coincides with the one favored by the underdog under a variety of circumstances. Balanced media, giving each issue equal coverage, may be worse for voters than partisan media.

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1 Introduction

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. 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. In this paper, we introduce a multidimensional policy space and the simultaneous consideration of voting and economic decisions into the economics literature on media effects. In particular, we view the one-dimensional political space perceived by voters as a by-product of media coverage, and we develop the notion of media *slant* as a relative emphasis on different dimensions of political and economic interest. Furthermore, we show that voting and economic decisions are interdependent: in order to make economic decisions, citizens need to predict the voting behavior of others in order to predict the election winner; in turn, citizens' political preferences are influenced by their economic decisions. Thus, the economic and political effects of media slant need to be jointly considered.

Our concept of slant is consistent with traditional spatial models of voting. We define media slant as a systematic filtering that at once simplifies political reality and assigns relative weights—and implicitly, positive or negative correlation—to the different political issues. In our model, the slant of a media outlet is the one-dimensional policy spectrum that can be inferred from news coverage by this outlet. Our definition reflects the idea that, by associating political positions on different issues more or less strongly with liberal or conservative positions, actual news coverage may result in different one-dimensional policy spaces. In fact, research in political science supports the hypothesis that the meaning of the liberal-conservative spectrum has changed over time.[1] We show that the media can play a key role in reducing the dimensionality of the policy space and thus in changes in the political spectrum as perceived by voters.

[1] "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.)

We view slant as the result of decisions of the media outlet at the editorial level: "The job description of editors includes the hiring, promotion, supervision, and firing of journalists. Editors assign (and sometimes take away) stories. They read copy and accept, alter, or reject what is written. They decide upon story placement and salience." (Page (1996a), p. 22.) The editorial make-up of a media is outlet is a choice variable of the owner or manager of the outlet, but these choices cannot be changed quickly without damaging the credibility of a media outlet. An illustration is provided by Rupert Murdoch's take-over of the *Wall Street Journal* in 2007, which resulted in only minor changes in spite of the anticipation of the 2008 US presidential election.[2] Another illustration is provided by the *New York Times*' coverage of presidential elections every four years, which according to content analysis follows an almost rigid formula in the allocation of space to substantive affairs and political issues.[3] These decisions, in turn, may lead to unexpected results such as the *Chicago Tribune*'s and *Houston Chronicle*'s surprise endorsements of Barack Obama in the 2008 US presidential election.

For concreteness, we consider an election between an incumbent politician and a challenger. The election winner sets an income tax rate and an amount of public good provided. In addition to voting, citizens must choose whether to take high-paying or low-paying jobs, with the former requiring a costly investment. As in a citizen-candidate framework (Osborne and Slivinski (1996) and Besley and Coate (1997)), the positions of the two politicians in the two-dimensional policy space are fixed. Citizens know the policies offered by the incumbent politician, but the challenger is known, ex ante, only to be more "liberal" than the incumbent, i.e., more favorable to a higher tax rate and a higher level of the public good. Thus, citizens must rely on a media outlet for more information about the policy position of the challenger.

Due to cognitive limitations of readers or the limited ability to communicate by the media outlet, the media outlet can only deliver a *news story*, i.e., a one-dimensional object to which the two-dimensional platform of the challenger is collapsed. The choice of slant by the media is represented by the ex ante choice of the slope of the line on which the policy platform is projected—or equivalently, by the choice of the one-dimensional policy space

[2] See *International Herald Tribune*, April 22, 2008 and *OpEdNews* <www.opednews.com>, May 29, 2008.

[3] See, e.g., R. Michael Alvarez (1998), p. 16.

orthogonal to that slope. Because the choice of slant is public and sticky, as we have argued above, we assume 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 media on elections and policy outcomes.

From a positive point of view, the imperfect technology of information transmission implies that media slant has significant effects on private decisions and voting outcomes. We investigate the optimal slant for a media outlet whose objective is to maximize the probability of electing the incumbent and for a media outlet who seeks to elect the challenger. Whether editorial decisions are sometimes politically oriented has been a subject of some interest in the political science literature. In his analysis of *New York Times* news coverage of the runup to the first Gulf war in 1991, Page (1996b) concludes that "the narrow range of views expressed, and the symmetry with which they fell on both sides of the *Times*' editorial stand, indicate that deliberation about Iraq was consciously or unconsciously *constructed* by the *Times*' editors, with the effect of advancing their own policy views" (original emphasis). As well, Bagdikian (1992) reports numerous examples of editorial manipulation of newspapers and book publishers, including the firing of journalists and suppression of information, in response to economic and political incentives.

We show the optimal slant for the media depends on who is the electoral frontrunner ex ante, and this in turns depends on how much citizens care about the public good. First, suppose the media favors the incumbent. If the incumbent is the frontrunner, i.e., citizens place less value on the public good, then the media would choose to suppress all information on the public good in order not to alter the ex ante preferences of the electorate. On the other hand, if the incumbent is the underdog, i.e., citizens place more value on the public good, then the media would choose an intermediate slant, exploiting both the relative emphasis on different issues and the correlation between those issues in order to maximize the probability that citizens will find possibly damaging news stories about the challenger. Conversely, suppose the media favors the challenger. If that candidate is the frontrunner, then again the outlet would choose to suppress all information on the public good. On the other hand, if the challenger is the underdog, then the optimal choice of slant of a pro-challenger media outlet would be to perfectly reveal the challenger's

position on the public good, with the hope of revealing a moderate position (which would be appreciated by the electorate).

All in all, the media is less informative when it favors the frontrunner, avoiding issues that may lead to surprises. When the media favors the underdog, instead, it "gambles for resurrection" in the hope of overturning the ex ante preferences of the electorate.[4] If partisan media behaves optimally, then there is little scope for regret in the sense of their favorite candidate being better off in the absence of news. In equilibrium, news stories published by media favoring the frontrunner do not cause that candidate to lose the election. Media favoring the underdog will publish news that in the worse case scenario does not overturn the voters' decision in the absence of news.

As an illustration of our theory, we may expect very little coverage of opposition candidates in political regimes in which a dominant party holds sway of the media, with a dramatic outpouring of attention if one of the opposition candidates manages to acquire popularity. Indeed, the behavior of media in Mexico during the PRI rule seems to fit this pattern. We return to this example in the final remarks.

From a normative point of view, we characterize the optimal slant for citizens as a function of the parameters of the model, and we pin down whether a pro-incumbent, pro-challenger, or unbiased media outlet would deliver the smallest welfare loss with respect to the first best. If the return on taking high-paying jobs is big enough, then it is best for citizens that the media favors the underdog, since the optimal slant for citizens implies complete suppression of information on tax policy (in the lack of additional information, citizens would take high paying jobs) and perfect revelation of the information about the public good, in order to allow citizens to choose the most suitable candidate. If the return on high-paying jobs is small, however, then the optimal slant for citizens must strike a balance between revealing information about income taxes, in order to induce citizens to choose high-paying jobs with some probability, and revealing information about the public good, in order to allow citizens to choose the most suitable candidate on this dimension.

[4] As discussed later on, this result can be nicely contrasted with the "issue ownership" view of Petrocik (1996) and others.

Interestingly, an unbiased media outlet is never socially optimal.[5] In fact, an unbiased media outlet may be worse for citizens than *both* partisan media, revealing a nonconvexity in the social value of media slant. The reason for this is that with an intermediate slant, information showing the underdog to be a moderate with respect to public goods provision may also reveal this candidate as favoring high taxes, prompting citizens to avoid costly investment in education—which ends up hurting everyone. Thus, citizens may be better off forsaking all information on income taxes or on public good provision. For a similar reason, a media outlet favoring the frontrunner may be socially optimal even though it avoids information that may alter the voters' behavior. This result, however, is sensitive to the sequence of economic and political decisions. If job decisions are taken in anticipation of the media slant but without knowledge of the news content, then the socially optimal slant always involves some revelation of information.

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 consider extensions of the model. In Section 8, we conclude by discussing the implications of our perspective on media slant for state-controlled media.

2 Related Literature

Our definition of "slant" is more nuanced than that usually given in the literature. The term is often explained as the simple 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) define "bias" as the

[5] This in spite of the common view, as advocated, say, by Kovach and Rosenstiel (2007): "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."

selective omission of facts.[6] We define "slant," in contrast, as an orientation that systematically distorts news. We do not model the mechanism through which this occurs; it could be as simple as the omission of facts, but it may be more subtle, resulting from the choice of phrasing, the emphasis of some details over others, the ordering of facts, etc. Our definition appears to be consistent with examples used by other authors. For instance, 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.[7]

Our formalization of slant is reminiscent of ideas discussed in the traditional literature on spatial models of voting in political science. Enelow and Hinich (1981), for instance, tell a bounded rationality story in which voters and journalists stick to simplified views of the world.[8] The idea of a reduction of the policy space is also considered by Hammond and Humes (1993), following Riker (1990). In contrast to these authors, who assume voters are myopic or take voter beliefs as exogenous, we present a fully rational model in which voters understand the process through which news about economic policy is framed.

Our modelling of slant is also reminiscent of the communications literature on agenda-setting and framing effects, pioneered by McCombs and Shaw (1972). This literature puts emphasis on the ability of mass media to exert a large influence on public opinion (and hence, on voters' behavior) through the creation of public awareness and concern for issues given prominent news

[6] 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.

[7] 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.

[8] "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. (...) (T)his 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." (Enelow and Hinich 1981, p. 489.)

coverage.[9] Our analysis provides conditions under which the large media effects predicted by this literature are in fact consistent with rational learning on the part of citizens.

The phenomenon of media slant is a topic of growing interest in the political economy literature. Evidence for the existence of media slant is provided by Groseclose and Milyo (2005), Puglisi (2006), Gentzkow and Shapiro (2006, 2010), Larcinese, Puglisi, and Snyder (2007), and Lott and Hassett (2004). Consistent with our theory, Knight and Chiang (2008) provide empirical evidence that voters are sophisticated in the sense that they take the bias of a news source into account when updating on endorsements of political candidates.

A number of 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 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. (2008) combine both sides of the market, assuming that two media firms compete for readers who have a preference for stories about their favorite candidate. Besley and Prat (2004) consider the possibility of government capture of the media.

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

[9] 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.

(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.[10] 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.[11] 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.

Recently, Chan and Suen (2008) have offered a model in which media receive a continuously distributed signal but can only report whether the signal exceeds or not a certain threshold, determined by the "editorial policy" of the media. This model is related to ours in the sense that media slant involves a systematic simplification of the signal observed by the media. However, in representing editorial policy as a (finer) partition of a two-dimensional policy space, our model allows the editorial policy to determine both the relative emphasis of news reporting on different issues of interest to citizens and also the possible correlation between reporting on different issues. Moreover, our focus is different; Chan and Suen (2008) focus on the impact of editorial policies on spatial competition, while we focus on the rational use of news by citizens in forming expectations about the future in order to make economic and political decisions.

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. (2008) and Mullainathan and Shleifer (2005), where readers receive intrinsic utility from reading the news. In Besley and Prat (2006) and Chan and Suen (2004, 2008), 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

[10] Gentzkow and Shapiro (2006) do assume, however, that readers can confirm or disconfirm a story with some probability. Gentzkow and Shapiro 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.

[11] Puglisi (2004) also assumes that all reports are verifiable, but the media outlet's actions are determined by spin exerted by an incumbent politician.

from the news to predict the actions of other citizens, a strategic aspect not present in other models.

In a different vein, Spector (2000) has shown that repeated debate in a large population may reduce a multidimensional policy space to one dimension. In our framework a one-dimensional policy space emerges from deliberate actions of a single communicator, the media, rather than from decentralized communication between many agents. Considering both media effects and the possibility of communication between citizens seems an attractive idea but lies beyond the scope of this paper.

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 $\Re_+ \times [0,1]$, 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.[12] Citizens have some prior beliefs about the challenger's policy, represented by a uniform distribution over $[\underline{g}, \overline{g}] \times [\underline{t}, \overline{t}]$, 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 involves collapsing the

[12] For a fixed level of the public good, we can think of a politician commited to higher income taxation as being relatively more incompetent—i.e., less able to tap on nondistortionary taxation.

multidimensional policy space into a one-dimensional statistic. Furthermore, we assume that this simplification is systematic, taking 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.[13] We assume $0 < e < w^H - w^L$. The term τ 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.

[13] Note that both the education and the slant decisions share a sufficiently long time horizon, in contrast with the typical short-run perspective of media effects in the course of electoral campaigns.

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

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

(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 $\int_{\underline{g}}^{\overline{g}}(u(g) - c(g))dg$ is strictly concave in $\underline{g}, \overline{g}$. 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 $\Re^2$ going through the origin $(0, 0)$. We denote the absolute value of the slope of this line by σ, where $\sigma \in \Re_{++} \cup \{0, \infty\}$, and we refer to it as the *slant* of the media. For a fixed σ, 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 $(\overline{g}(s), \overline{t}(s))$, with $\underline{g}(s) \leq \overline{g}(s)$ and $\underline{t}(s) \leq \overline{t}(s)$, to indicate the lower and upper endpoints, respectively, of the story s. We use the obvious notation

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

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 σ by S^σ. For any σ, the set of stories S^σ is completely ordered according to the partial order $\succeq$ given by

$$s' \succeq s \qquad \Longleftrightarrow \qquad \underline{t}(s) \geq \underline{t}(s') \text{ and } \underline{g}(s) \leq \underline{g}(s'),$$

with asymmetric part $\succ$. 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

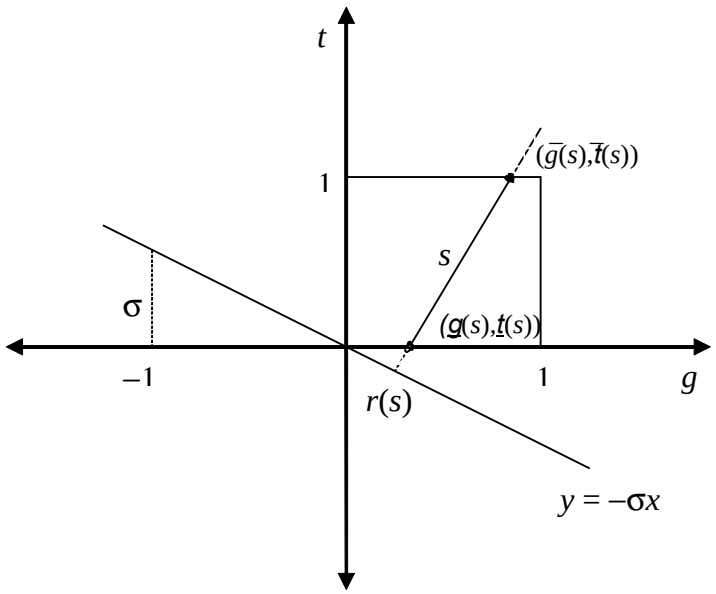

Figure 1: A News Story s and Corresponding News Report $r(s)$

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

Note that our "slant technology" carries on two proposals made by Riker (1990) in the context of a discussion about persuasion and rhetoric. First, as he suggests, we model candidates' policy stances and characteristics as perceived by voters in one space (the space of stories S^σ) and actual policies in a different space (the policy space $[0,1]^2$). Second, we allow the possibility of the mapping between policy stances and actual policies to change as a result of a rhetorician's action (the media's choice of slant σ).

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 τ. Thus, the citizen's expected utility is

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

where E^σ 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 σ on E, leaving the dependence on slant implicit.) Simplifying the previous expression, we have

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

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

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

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

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

where $\triangle w = w^H - w^L$, and will be willing to a take 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

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

or equivalently,

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

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

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

or equivalently,

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

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 σ 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 $P(C|s)$, $P(L|s)$, $\mathrm{E}[u(g)-c(g)|s]$, and $\mathrm{E}[t|s]$ 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

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

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

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

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

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

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) $e/\triangle w \notin \{1/2, 3/4\}$ and $b \neq 1$.

Given slant σ, an *equilibrium* is a pair of functions $P(C|\cdot)\colon S^\sigma \to [0,1]$ and $P(L|\cdot)\colon S^\sigma \to [0,1]$ 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 establishes the existence and uniqueness of equilibrium. (The proof of this and other results in the paper is given in the Appendix.)

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

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

Moreover, for $\sigma \in \Re_{++}$, the stories s_C^σ and s_L^σ solve

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

respectively.

The equilibrium has a simple "cutoff" structure, given by the two stories s_C^σ and s_L^σ. If a story s is realized to the southeast of s_C^σ, i.e., $s \succ s_C^\sigma$, then citizens learn that the challenger intends to implement an excessively high

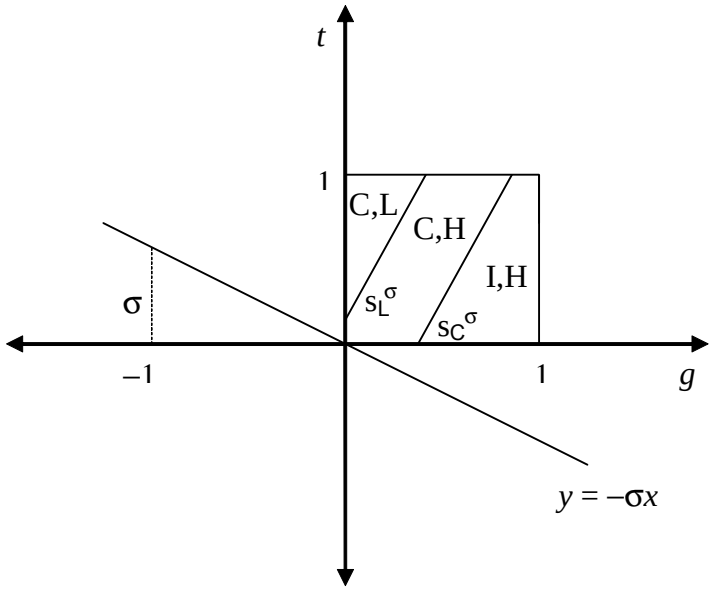

Figure 2: Cutoff News s_L^σ and s_C^σ

level of the public good. That is, $\mathrm{E}[u(g) - c(g)|s] < 0$, 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^σ, i.e., $s_C^\sigma \succ s \succ s_L^\sigma$.[14] 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, $\mathrm{E}[t|s] < 1 - e/\Delta w$, so that only Type 2 outcomes are possible: citizens all vote for the challenger and take high-paying jobs. Finally, after news located to the northwest of both s_C^σ and s_L^σ, 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, $\mathrm{E}[t|s] > 1 - e/\Delta w$, 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

[14] This intermediate region disappears if $s_L^\sigma \succeq s_C^\sigma$.

solutions to the two equations

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

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^σ in these two cases.

(i) If $b < 1$, then

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

(ii) If $b > 1$, then

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

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

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

This is the level of slant such that the cutoff s_C^σ 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 $e/\triangle w < 1/2$, then

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

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

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

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.

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 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 $3/2$.[15]

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 $1 - b/3 - (1/6)\sqrt{4b^2 - 3\widehat{\sigma}^2}$ if $b > 1$.*

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 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

[15] Recall for the statement of Proposition 1 that $\widehat{\sigma}$ 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.

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, instead, the media is biased toward the underdog, its optimal slant reveals information about the challenger's position on public policy. This information is socially valuable as it allows citizens to update their prior beliefs and support the underdog in some circumstances in which it is efficient to do so.

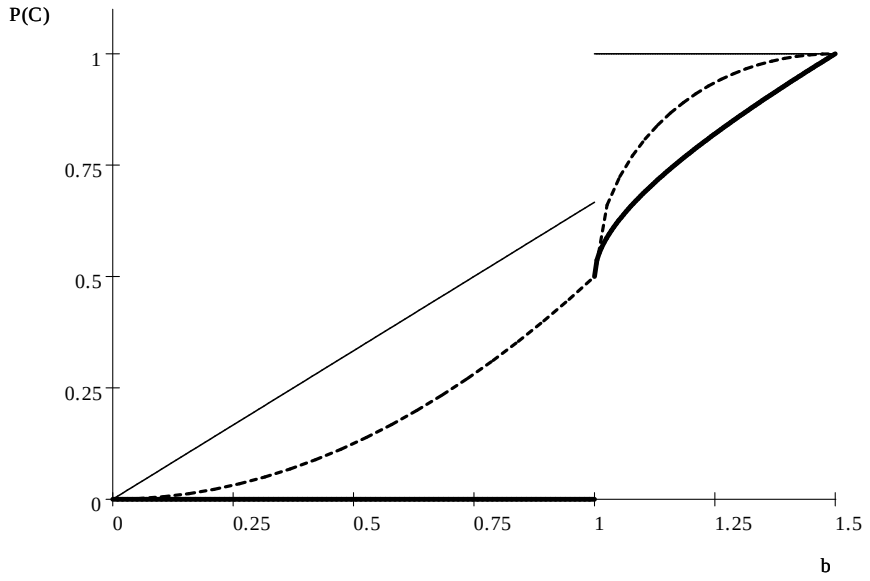

Figure 3: Probability of Challenger Winning the Election: Pro-Challenger (thin line), Pro-Incumbent (thick line) and Balanced Media (dashed line)

There is a subtle contrast to be made between these findings and the literature on issue ownership. Petrocik (1996), for instance, argues that presidential campaigns emphasize the issues in which their candidates have a reputation for greater competence. We argue, instead, that media favoring the frontrunner should not probe deeper on the issues in which their candidates have a better reputation. Note that both arguments are not inconsistent. Partisan media can remark the importance of issues in which their candidate is perceived to be more competent while exploring in detail the issues in which the *other* candidate is perceived to be more competent.[16]

[16] In the 2004 and 2008 US presidential elections, for instance, right-wing media seemed to offer more emphasis than left-wing media on defense issues, but less coverage of the

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.[17]

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) $\triangle w - e \geq 7/18$ 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.

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 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 σ, social

actual management of the Irak and Afghanistan wars. A representative opinion article would call critical coverage of the war by other media as "unpatriotic" (O. S. Card, "The Campaign of Hate and Fear," *Wall Street Journal,* December 16, 2003).

[17] If partisan media gives some negative weight to deviating from balanced reporting, then the partisan bias will be manifest in how slanted is media toward one policy issue.

losses with respect to this maximum can be measured as

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

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 σ, and the set of possible slants $\Re_{++} \cup \{0, \infty\}$ is compact, there exists an optimal slant σ^* for any given parameter values Δw, e, and b. Proposition 3 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 $b < 1$, $\sigma^* = \widehat{\sigma}$ 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 $\widehat{\sigma}$ 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 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 $\underline{b}, \overline{b}$ satisfying $1 < \underline{b} \leq \overline{b} < 3/2$ 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 $\overline{b} < b < 3/2$, 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.[18] 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, it is socially optimal for the media to report only on the public good. When

[18] 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.

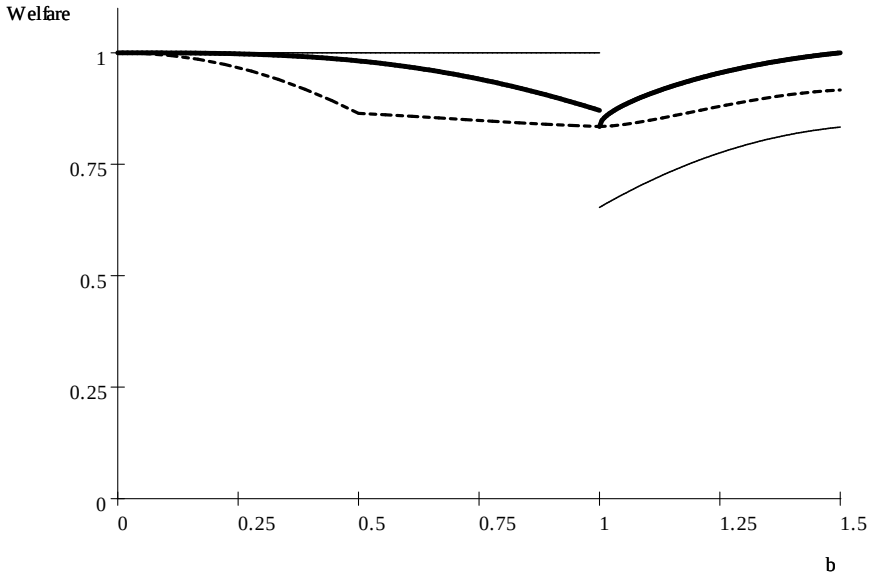

Figure 4: Welfare under Pro-Challenger (thin line), Pro-Incumbent (thick line), and Balanced Media (dashed line) for Small Education Cost

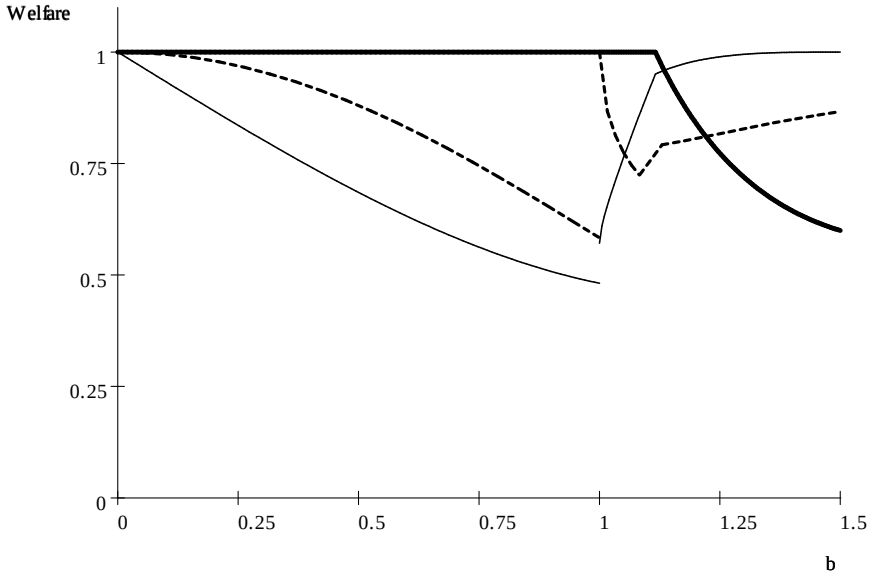

Figure 5: Welfare under Pro-Challenger (thin line), Pro-Incumbent (thick line), and Balanced Media (dashed line) for Large Education Cost

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.[19]

Consider now the case of a large education cost. From Proposition 3, 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 $\sigma = \widehat{\sigma}$ 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 $(2 - 2e/\triangle w)^{-1}$ which gives more weight than $\widehat{\sigma}$ to the public good. Thus, pro-challenger media is better than pro-incumbent media for b close enough to 3/2.

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 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.

[19] In taking the policy position of the challenger as given, we may be undervaluing the welfare gain obtained from media reporting on the public good dimension. Reporting in this dimension will provide the challenger with an incentive to adopt moderate positions.

7 Variations and Extensions

7.1 Sign of Media Slant

Our representation of media slant as a negative slope is meant to portray the assumption that the news is about the relative importance of public goods versus tax rates in the challenger's position. Alternatively, we can consider a positively sloped media slant to portray the assumption that news are about the distance of the challenger's position to the status quo of low taxes and low public good. Considering a positive versus a negative slant illustrates how the media's perspective shapes the policy spectrum. With a negative slant, the policy spectrum perceived by citizens offers a negative correlation between public goods and redistributive taxation, while with a positive slant, the policy spectrum offers a positive correlation.

It is straightforward to replicate the analysis when the slant is positive. For any given (positive) slant, the citizens' behavior is characterized by two cutoffs, with citizens taking high paying jobs and voting for the challenger if they expect the challenger to be moderate enough. Media biased in favor of the frontrunner will find it expedient to suppress politically useful information, reporting only on the position of the challenger on taxes, while media biased in favor of the underdog will favor revealing politically useful information.

The welfare analysis is different with a positive than with a negative slant, for with a negative slant, a challenger who gets elected is likely to implement desirably moderate levels of public goods but undesirably large redistributive taxation, while with a positive slant a challenger that gets elected is likely to implement both desirably moderate public goods and tax rates. If the cost of education is small, from the viewpoint of citizens, then the optimal slant is still the one revealing all information about the position of the challenger about public goods. If the cost is large, however, then it is no longer optimal to suppress all information about the position of the challenger with respect to public goods. In particular, if citizens are ex ante inclined in favor of the incumbent, then pro-incumbent media cannot be optimal. Moreover, if citizens are very inclined in favor of the incumbent, then the optimal slant must be close to revealing all information about the position of the challenger on public goods. (See the proof of these claims in the Appendix.)

7.2 Timing of Economic Decisions

We assumed that citizens make economic and political choices based on the information received from the media. Suppose instead that citizens first make their economic decisions, then receive a news report, and finally vote. With this alternative sequence, additional information about the intended tax policies of the challenger cannot be detrimental to overall welfare, since decisions to invest in education have been taken at the time they are informed of the news. Expectations about media slant, however, are important for education decisions since media slant affects the ex ante probability that the challenger will win the election, and the type of tax policies the challenger will implement if elected.

When economic decisions are taken before news reports, it is never optimal from the viewpoint of citizens to suppress all information about the position of the challenger with respect to public goods: citizens will take high-paying jobs even if the cost of education is high, as long as the probability of the challenger winning the election is small. If b is smaller than one, then the probability that the challenger wins the election can be made small enough by choosing a finite but large enough slant (Theorem 1(i)), so that citizens take high-paying jobs with probability one and obtain a desirable provision of public goods with some probability. In fact, if b is close to zero, then the optimal slant is fully revealing about the challenger's intended provision of the public good, since the ex ante probability of the challenger winning the election is very small anyway.

7.3 Well-Informed Citizens

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, then they can pinpoint exactly the policy position of the challenger.[20]

[20] See, e.g., Mullainathan and Schleifer (2005) for another discussion of the consequences

Due to information processing, however, it may be costly for most citizens to read and understand news reports with different slants. To fix ideas, suppose there are two newspapers, 1 and 2, with exogenously given slants $\sigma_1 \in \Re_{++} \cup \{0, \infty\}$ and $\sigma_2 = \infty$. That is, newspaper 2 informs only about the tax policy dimension. The cost of reading and understanding two different slants is given by c. Suppose $b < 1$ and $e/\Delta w < 1/2$, so that citizens are ex ante biased in favor of the incumbent and disposed to take high-paying jobs. Suppose, finally, that the gain and cost of education are heterogenous and are given respectively by $k_i \Delta w$ and $k_i e$, where k_i is described by a continuous distribution with median k_m. We claim that as long as $c > k_m b e^2/3\Delta w$ and $e/\Delta w < 1 - 2b/3$, there is an equilibrium in which a majority of citizens reads only newspaper 1 for any value of σ_1. In particular, our previous analysis of partisan and socially optimal media holds with respect to newspaper 1.

To understand the claim, note that a well-informed citizen (i.e., one who reads and understands all newspapers) stands to gain if the majority votes for the challenger and the challenger intends to implement a tax rate higher than $1 - e/\Delta w$. In that case, well-informed citizens will not invest, unlike other citizens, and will gain $k_i e - (1-t) k_i \Delta w$. Recall from Proposition 2 that the probability that the challenger wins the election is smaller than or equal to $2b/3$; integrating to obtain the expected gain of being well-informed yields the upper bound $k_i b e^2/3\Delta w$. The inequality $e/\Delta w < 1 - 2b/3$ guarantees that reading newspaper 2 is not better than reading newspaper 1 for citizens who read only one newspaper; it implies that someone who reads only newspaper 2 will always invest. Thus, if the private benefit of information is small enough for a majority of citizens, then there is an equilibrium in which only a minority of citizens read both newspapers.

7.4 Coarser Message Spaces

Since citizens only have two discrete decisions to make, it might seem adequate to model the media as simply issuing two binary messages: one message would instruct citizens to vote for the incumbent or challenger and the other would advise whether to take a high- or low-paying job. Of course, if the media outlet is partisan, then the divergence of interests between the media and citizens would create a game of cheap talk in which the recommendations

of reading multiple newspapers on correcting for slant.

of the media were not credible. Even if the media is benevolent, however, its recommendation would not be credible: social welfare is maximized when all citizens take high-paying jobs, creating an incentive to manipulate the citizens' decisions; in short, there could be no equilibrium in which citizens choose the low-paying job following some news stories and the high-paying job following others. In our model, news stories are credible because they have meaningful content: the media, whether partisan or benevolent, hires reporters to write stories about the position of the challenger in the two-dimensional space (with some slant), and citizens can then optimally condition their decisions on the news.

8 Final Remarks

In this paper, we develop a theory of media slant as a systematic filtering of political information, in which the one-dimensional policy space perceived by citizens is a by-product, and we explore the positive and normative implications of this theory.

As an application of the theory, consider the behavior of state-controlled media. Media may be controlled by the state directly thanks to ownership or indirectly via a combination of threats and lucrative business deals with owners (as in Mexico in the heyday of single-party rule), outright bribes (as in Fujimori's Peru), simple coincidence of interests (as in Yeltsin's Russia), or threats (as in today's Russia).[21] Our model predicts that state-controlled media, which we take to be pro-incumbent, will be most successful in turning the election in favor of the incumbent when citizens themselves are ex ante biased in favor of the incumbent. In that case, state-controlled media will suppress politically relevant information that may lead citizens to revise their beliefs. If citizens' ex ante beliefs turn against the incumbent, however, then state-controlled media will have to tread more carefully, choosing the emphasis on different issues and the correlation between those issues in order to maximize the probability of an upset.

An example is provided by Mexico during the PRI rule. Broadcast tele-

[21] See, respectively, Lawson and McCann (2005), McMillan and Zoido (2004), L. Hockstader, "Russian Media Stack the Deck for Yeltsin," *Washington Post*, April 3, 1996, and the reports from the Committee to Protect Journalists <http://www.cpj.org>.

vision dwarfs other sources of political information in Mexico, and it is itself heavily concentrated, with an alternative to the largest network, *Televisa*, allowed in the market only in the 1990s.[22] The president of *Televisa* in the last few decades of the twentieth century was a self-declared "soldier of the PRI."In the 1988 presidential election, more than 90% of the TV news coverage was concentrated on the PRI's presidential candidate; in the 1994 presidential election, TV news was still very concentrated on the ruling party candidate without ignoring so overwhelmingly his rivals.[23] Survival of the dominant party regime apparently was favored by uncertainty about what would happen if the opposition took over.[24] Facing Vicente Fox, a charismatic opponent in the 2000 presidential election, *Televisa* and other loyalist media provided coverage of Fox's reform intentions with respect to the oil and electricity industries and of his high-handed dealing with other candidates, in the hope they proved unpopular. (They did not, and Fox went on to win the election.)

Our welfare analysis brings to light issues related to the optimality of state-controlled media. In the context of our model, Proposition 4 establishes circumstances in which state-controlled media provide greater social welfare than balanced or pro-challenger media. In fact, if the cost of education is high and citizens do not care much about the public good that may be provided by the challenger, then pro-incumbent media maximizes social welfare over all media objectives. In such cases, if state-controlled media is sub-optimal, then it is not because it is biased in favor of ruling party candidates, but rather because it excludes competing media outlets with possibly different slants. We have noted in Subsection 7.3 that the existence of a second media outlet is sometimes moot, but there may be conditions under which competition between media outlets increases social welfare. A formal proof of the importance of a free press (and the availability of outlets with differing slants) will requires a deeper analysis of multiple outlets.

[22] See Lawson and McCann (2005).
[23] See Sarmiento (2005).
[24] See Magaloni (2008).

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,

$$\mathrm{E}[t|s] = 1 - e/\triangle w.$$

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,

$$\mathrm{E}[u(g) - c(g)|s] = 0.$$

Type 6. Suppose $0 < P(C|s) < 1$ and $0 < P(L|s) < 1$. We assume that citizens choose their actions independently.[25] 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

$$\mathrm{E}[t|s] = 2\left(1 - e/\triangle w\right).$$

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

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

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 $\overline{t}(s) = \overline{t}(s') = 1$. Equivalently, $s' \succ s$ implies

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

[25] That is, there is no subset of citizens with positive measure who cast correlated votes.

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

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

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

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

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

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

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

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

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

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

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

Now we turn to the expression $\mathrm{E}[u(g) - c(g)|s]$. 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 $\sigma \in \Re_{++}$. Then

$$\begin{aligned} E[u(g) - c(g)|s] &= \left(b\overline{g}(s)^2 - \overline{g}(s)^3 - b\underline{g}(s)^2 + \underline{g}(s)^3\right)/(\overline{g}(s) - \underline{g}(s)) \\ &= b(\overline{g}(s) + \underline{g}(s)) - (\overline{g}(s)^2 + \overline{g}(s)\underline{g}(s) + \underline{g}(s)^2), \end{aligned}$$

which is strictly concave as a function of $\overline{g}$ and $\underline{g}$. Moreover, $\overline{g}(s)$ 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 $\overline{g}(s) = 1$. 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 $\overline{s}$. By assumption (A4) ($b \neq 1/3$), it follows that if $\underline{g}(s) = 0$ and $\overline{g}(s) = 1$, then $E[u(g) - c(g)|s] \neq 0$. Thus, there is at most one solution, which we denote s_C^σ, to $E[u(g) - c(g)|s] = 0$. Moreover,

$$\mathrm{E}[u(g) - c(g)|s] \gtrless 0 \iff s \lessgtr s_C^\sigma$$

for every story s.

Suppose $\sigma = 0$, so news stories are fully revealing about g. Thus, $\mathrm{E}[u(g) - c(g)|s] > 0$ 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

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

and

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

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^σ and s_L^σ. ■

PROOF OF PROPOSITION 1: Suppose $0 < b < 1$. Using the first line of Theorem 1(i), 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^σ. This area is $1 - b/3 - (1/6)\sqrt{4b^2 - 3\sigma^2}$, which is increasing in σ. Using the second line of Theorem 1(i), if $b \leq \sigma < \infty$, then the probability of the incumbent winning is one minus the triangle to the left of s_C^σ. This area is $1 - b^2/(2\sigma)$ and is increasing in σ. Using the third line of Theorem 1(i), 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(ii), 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^σ. This area is $1 - b/3 - (1/6)\sqrt{4b^2 - 3\sigma^2}$, which is increasing in σ and achieves a maximum of

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

at $\sigma = \widehat{\sigma}$. Using the second line of Theorem 1(ii), 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^σ, which is strictly decreasing in σ. Using the third line of Theorem 1(ii), 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 $\sigma = \hat{\sigma}$. ■

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 $e/\triangle w < 1/2$, 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 $s_L^\sigma \succ s_C^\sigma$ for all σ. Thus, citizens take low-paying jobs whenever they anticipate the challenger will win the election. Consider any slant σ in $[0, b]$. The expected welfare is

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

or equivalently

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

Thus,

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

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 σ in $[b, \infty]$. The expected welfare is

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

or equivalently

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

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

Finally, suppose $e/\Delta w > 1/2$ and $b > 1$. Consider first any slant $\sigma \in [0, \widehat{\sigma}]$. 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

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

or equivalently

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

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

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

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

$$\begin{aligned} W(\sigma) &= (\triangle w - e)\widehat{\sigma}^2/2\sigma \\ &\quad + \int_0^1 \int_0^1 (2bg - 3g^2)\, dg\, dt - \int_{t=0}^{-(1-\widehat{\sigma})/\sigma + g/\sigma} \int_{g=1-\widehat{\sigma}}^1 (2bg - 3g^2)\, dg\, dt \end{aligned}$$

or equivalently

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

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 $[\widehat{\sigma}, \widehat{\sigma}(2 - 2e/\triangle w)^{-1}]$ by σ equal to $\widehat{\sigma}$. Note in particular

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

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

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

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

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

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

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

or equivalently

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

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 $\triangle w - e \geq 1/6$. Thus, from assumption (A5), $W(\sigma)$ is maximized by $\sigma = (2 - 2e/\triangle w)^{-1}$ in the interval $[\widehat{\sigma}(2 - 2e/\triangle w)^{-1}, (2 - 2e/\triangle w)^{-1}]$.

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

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

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

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

From the previous paragraphs it follows that if $e/\Delta w > 1/2$ and $b > 1$, then $W(\sigma)$ is maximized by setting σ equal to either 0, $\widehat{\sigma}$ or $(2 - 2e/\triangle w)^{-1}$. We claim that if b is close to 1 then $W(\widehat{\sigma})$ is larger than $W(0)$ and $W((2 - 2e/\triangle w)^{-1})$. To see this, note that $\widehat{\sigma}$ changes continuously with b and if b is close to one, then $\widehat{\sigma}$ is close to one. Thus, for b close to one, $W(0)$ is close to $(\triangle w - e)/3 + 4/27$, $W(\widehat{\sigma})$ is close to $(\triangle w - e)/2 + 1/12$, and $W((2 - 2e/\triangle w)^{-1})$ is close to $(\triangle w - e + 1/6)(1 - e/\triangle w)$. The desired result follows from assumption (A5). Next, we claim that if b is close to $3/2$ then $W((2 - 2e/\triangle w)^{-1})$ is larger than $W(0)$ and $W(\widehat{\sigma})$. To see this, note that if b is close to $3/2$, then $W((2 - 2e/\triangle w)^{-1})$ is close to $(\triangle w - e)(1 - e/\triangle w) + 1/2$ while $W(0)$ and $W(\widehat{\sigma})$ are close to $1/2$. Finally, it is tedious but straightforward to verify that $W(0) - W(\widehat{\sigma})$, $W((2 - 2e/\triangle w)^{-1}) - W(\widehat{\sigma})$ and $W((2 - 2e/\triangle w)^{-1}) - W(0)$ 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 $W(\infty) = \triangle w - e$. With respect to balanced media, we have that if $b \leq 2e/\triangle w$ then $W(1) = (\triangle w - e)(1 - b^2/2) + b^4/12$, and if $b \geq 2e/\triangle w$ then $W(1) = (\triangle w - e)(1 - 2(e/\triangle w)^2) + b^4/12$. Thus, $W(\infty) > W(1)$ if $b \leq 2e/\triangle w$ and $\triangle w - e \geq 1/6$ or if $b \geq 2e/\triangle w$ 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

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

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

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

Finally, welfare under balanced media is

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

Since the expression in brackets is negative, $\widehat{\sigma}$ is smaller than one and $e/\triangle w < 1/2$, we get $W(\widehat{\sigma}) > W(1) > W(\infty)$. 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

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

Similarly, welfare under balanced media is

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

Thus, $W(1) > W(0)$ if $\triangle w - e > b^2(4/27 - b/12)/(2/3 - b/2)$. Since the expression in the right-hand side of this inequality is increasing in b, it follows that $W(1) > W(0)$ if $\triangle w - e \geq 7/18$. 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 $\widetilde{b} \in (1, 3/2)$ such that if $1 < b < \widetilde{b}$

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 $(\triangle w - e)(1 - e/\triangle w)$ for b close to 1. Similarly, since $\widehat{\sigma}$ is close to 1 when b is close to 1, welfare under balanced media ($W(1)$) is close to $(\triangle w - e)/2 + 1/12$ 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 $\widehat{\sigma}$ 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 $(\triangle w - e)(1 - e/\triangle w) + 1/2$, welfare under balanced media is close to $(\triangle w - e)(2 - 2e/\triangle w)^2/2 + 1/2$ 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. ■

Proof of Claims in Section 7.1: Let (positive) slant be denoted by σ, and let $(\underline{g}(s), \overline{t}(s))$ and $(\overline{g}(s), \underline{t}(s))$, with $\underline{g}(s) \leq \overline{g}(s)$ and $\underline{t}(s) \leq \overline{t}(s)$, indicate the left and right endpoints, respectively, of the story s in the unit square. Suppose $e/\Delta w > 1/2$ and $b < 1$. With a slant $\sigma = \infty$, we obtain as in the model with negative slant that the incumbent is elected with probability one, so that the citizens' welfare is $W(\infty) = \Delta w - e$. Now consider any slant σ such that $b/2(1 - e/\Delta w) \leq \sigma < \infty$. Citizens will vote for the challenger for any news such that $E[u(g) - c(g)|s] > 0$. We can obtain the cutoff news s_C^σ with endpoints $(\underline{g}(s_C^\sigma), \overline{t}(s_C^\sigma)) = (0, b/\sigma)$ and $(\overline{g}(s), \underline{t}(s)) = (b, 0)$ by solving $E[u(g) - c(g)|s_C^\sigma] = 0$; citizens will vote for the challenger for any news story to the southwest of s_C^σ. Note also that the expected tax imposed by the challenger for any news story to the southwest of s_C^σ is smaller than $b/2\sigma$, and hence smaller than $1 - e/\Delta w$. This implies that the citizens will take high paying jobs even if the challenger wins the election. Thus, taking into account that public goods are provided whenever the challenger wins the election, the citizens' welfare is $W(\sigma) = \Delta w - e + b^4/12\sigma$, which is larger than $W(\infty)$ and is strictly decreasing in σ. This implies that the optimal slant must be smaller than or equal to $b/2(1 - e/\Delta w)$. Thus, if b is arbitrarily close to zero, the optimal slant must be arbitrarily close to zero as well. Now suppose $e/\Delta w > 1/2$ and $b < 1$. If $\sigma = \infty$, the challenger wins with probability one, while if $\sigma = 0$ the challenger wins if and only if the provision of public goods intended by the challenger is beneficial for citizens. ■

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