The Fragmentation of Views in a Democracy

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Abstract

Biased political media are often popular and influential. To explain this, I provide a game-theoretic model in which politicians offer exclusive information to the media in exchange for positive coverage. Bias becomes stronger if more voters support the politician and if the government is less transparent. I provide Fox News in the United States, Kronen Zeitung in Austria, and Russian state TV as examples. I also compare Austria with Germany where, unlike Austria, the media give little support to the far-right. The model suggests that the reason is greater government transparency in Germany, which prevents politicians from offering exclusive information in exchange for bias.

Introduction

The news media often have a political bias (Petrova 2008). Despite that, these media enjoy popularity and trust (Pew Research Center 2019, Faris et al 2017). Moreover, people tend to only follow the news sources that share their ideology (Zaller 1992). How do politicians make certain media outlets both loyal to themselves and trusted by voters? Using a theoretical model, I show that politicians may offer information to the media in exchange for favorable coverage. Despite the bias, these media attract consumers because of the exclusive information they possess. Examples from Europe and the United States show that such agreements indeed take place. The bias of the coopted media depends on how informed are the other media and on the composition of voters. If the other media are sufficiently well-informed, then bias is low because it pays little to cooperate with the politician. The different relationship between media and the far-right in Austria and Germany illustrates this finding. Predictably, I find that if fewer voters strongly support the politician, the bias of the coopted media decreases. However, I also find that if voters who are opposed to the politician become more opposed to her, then bias decreases too. This matches the finding of Bartels (2017) that

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the electoral success of far-right parties was not caused by more right-wing sentiment. As the model shows, change may have happened because the number of strongly left-wing voters decreased or because governments became less transparent.

There are several gaps in the existing literature on media capture that motivate this research. Theoretical models by Gehlbach and Sonin (2014) and Gentzcow and Kamenica (2011) explain why do rational people trust biased media: the main idea is that the media can commit to reporting a certain degree of truth. However, these models do not explain why do people actively rely on biased information when alternative sources are present. Moreover, it is not clear why do people choose information sources that reinforce their opinions. Both facts have vivid illustrations. Pew Research Center (2019) and Faris et al (2017) show that in the United States, Democratic voters trust an array of liberal media, while Conservatives only trust Fox and Breitbart News. Moreover, Fox News, which is strongly supportive of Donald Trump (Mayer 2019) is one of the most popular channels in the United States and Sean Hannity, a strong Trump supporter, is one of the most popular hosts (Joyella 2020). Plasser and Ulam (2003) show that Kronen Zeitung, one of the most popular Austrian newspapers, increased the popularity of the Freedom Party by covering its leaders and reiterating xenophobic messages. Conversely, readers of Kronen Zeitung are more xenophobic than the rest of the population. In the Russian context, Volkov and Goncharov (2018) show that state TV is the most popular information source even though it has pro-government bias and alternative news exists. Television is most popular among older and less educated individuals (Volkov and Goncharov 2018), who are also more supportive of Putin (Treisman 2014).

It is interesting that in the first two cases, media bias emerges without direct control or bribes from politicians. Mayer (2019) does find that Trump administration approved Fox's bid to sell its entertainment assets to Disney despite concerns of monopolism. However, there is no other evidence of material favors. Also, Mayer's description of Fox News suggests that the channel's longstanding conservatism is a way to gain popularity and not a result of bribes or pressure. The popularity of the Hannity show speaks to the same idea. The Austrian Kronen Zeitung did not receive bribes from the Freedom Party. Moreover, two of the party's leaders left the government after their plans to take over the newspaper were caught on camera (Groendahl 2019). This paper suggests a theory that explains why biased media exist and are popular. Politicians may possess information that is hard to learn elsewhere and that the media would like to publish. They may share this information with the media, say, by giving interviews or by letting journalists witness internal decision-making. However, in exchange, the politician expects to receive a favorable coverage of herself. The agreement results in higher bias if it is hard for the media without political connections to get information. As examples from Russia, Austria, and Germany will show, access to information depends on the resources available to these media and on government transparency.

The U.S. case is most illustrative of this theory. Sean Hannity of Fox News got an opportunity to interview Donald

Trump more than other journalists, and he was also allowed to spend time in the White House. By contrast, media outlets other than Fox News got very little attention from the President (Mayer 2019). It is important to note that even Fox News may criticize Trump. For instance, Mayer shows that the channel's hosts criticized the President when he failed to get enough funding for the border wall. Also, Porter (2017) reports that Sean Hannity criticized a Republican candidate over sexual harassment allegations. Hence, even though the channel is strongly pro-Trump and Conservative, it is sometimes critical of the President and his party, so viewers may expect it to be informative.

After the conflict in Eastern Ukraine erupted, Russian state TV became more focused on foreign policy and was able to increase Putin's support (Lipman, Kachkaeva, and Poyker 2018). The nonstate media exist, but for them, it is risky to send journalists to boiling points, for instance, journalist Pavel Kanygin was kidnapped and tortured in the Donetsk area [1](Shevchenko 2014, Kanygin 2014). By contrast, state TV is able to send journalists into the Donetsk area (Shevchenko 2014) or Syria (Ros Business Consulting 2019). As a result, even though they are biased, state TV channels have an advantage over nonstate media because of exclusive information on foreign policy.

In the Austrian case, Kronen Zeitung often publishes interviews with Freedom Party leaders (Kronen Zeitung 2019, Kronen Zeitung 2017) whereas I was unable to find their interviews in other Austrian newspapers. It is noteworthy that the Kronen Zeitung does not always flatter the Freedom Party. For instance, the newspaper criticized the party during the scandal mentioned above (Groendahl 2019). It is interesting that the Freedom Party is trying to suppress other media. For instance, the interior minister and Freedom Party member Herbert Kickl recommended the police not to share information with critical newspapers Der Standard and Kurier (Deutsche Welle 2018). Also, the Freedom Party advocates defunding the Austrian public TV channel, ORF (Newman 2019). This suggests that the Freedom Party perceives some media as more loyal than others and wants only the former to get information. It is important to compare Austria with Germany, where far-right parties are less successful and the media devote less attention to them (Ellinas 2010). According to a report by Centre for Media Pluralism and Media Freedom, in Germany, there is no threat to the right for information (Schulz, Schroeder and Dankert 2015). In Austria, however, the right to information is at high risk. Administrative authorities are able to maintain secrecy and it is hard to file complaints against them if they refuse to share information (Seethaler, Beaufort and Dopona 2016). Therefore, in Austria having contact with a politician is more valuable than in Germany, so it is more likely that certain media will choose to be biased in order to get this contact.

In addition to a theory of media bias, the paper provides comparative statics. The first comparison reflects the different situation in Germany and Austria. The model predicts that if the non-coopted media are sufficiently well-informed, then bias disappears. Indeed, if coopted media have no extra information, they do not have any advantage over

[1] Luckily, the person survived, as the citation makes clear.

competitors. They cannot afford to be biased because in this case, they will lose the audience to competitors who are equally-informed. This result is formalized in Corollary 3. Also, the model shows that the composition of voters may impact bias. If fewer voters strongly support the politician, the bias becomes weaker. Similarly, the bias decreases if the voters who oppose the politician become even more opposed to her. In both cases, coopted media must become more critical of the politician in order to keep consumers. These results are formalized in Corollaries 1 and 2. The model is related to a finding by Bartels (2010) that the success of the European far-right at elections was not accompanied by an increase in far-right sentiment. Other relevant causes that the model suggests are less government transparency and fewer strongly left-wing voters.

Literature

As I discussed in the introduction, Gehlbach and Sonin (2014) and Gentzcow and Kamenica (2011) provide game-theoretic models of persuasion in which the sender commits to an information transmission mechanism. Truthful communication in such models is possible because the sender commits to a signal which reveals some information about the true state. These models do not analyze competition between different sources of information. Moreover, they do not explain why in the real world biased sources remain highly popular. This paper tries to answer both questions by assuming that some media are biased because they receive special information from the politicians they cover. In reward, they offer positive coverage to the politician. Chan and Suen (2008) develop a model where voters must choose between two media outlets which have a fixed editorial policy and may influence the positions of candidates. Charness, Oprea, and Yuksel (2018) do a laboratory experiment in which people choose between biased sources of information to maximize a monetary reward. They show that people tend to choose experiments that are likely to reinforce their original beliefs, even if this is not rational. This paper features both voters who choose between information sources and the media which choose an editorial policy. It provides a setting where the media rationally choose different editorial policies and the voters rationally choose the media source which is close to their ideology.

Model

Players There is a continuum of citizens $[a,b]$ where $0 < a < \frac{1}{2} < b < 1$. The total mass of voters is 1. There is a politician and two media outlets, 1 and 2. There is a payoff-relevant state of the world Θ which is uniformly distributed on the interval $[0,1]$. Each citizen x must take a vote $v_x \in \{0,1\}$. The policy $z \in \{0,1\}$ is selected by majority rule. If

$\Theta = \theta$ and the policy is z, then citizen x gets a payoff:

$$U_c(x,\theta) = \begin{cases} \theta - x & \text{if } z = 1 \\ x - \theta & \text{if } z = 0 \end{cases}$$

So, if the voter's position x is larger, then the voter prefers policy 0 more strongly. If Θ is larger, every voter prefers policy 1 more strongly. Each voter votes as if she were pivotal. The voters do not observe Θ, but they can get a signal about Θ from the media. Before voting takes place, every voter chooses whether to read media outlet 1 or 2. This reflects the fact that people have time constraints and cannot monitor all the media. I assume that if a voter is indifferent between reading or not reading, she chooses not to read. If she is indifferent between two media outlets, she randomly chooses between them. The payoff of each media outlet is the total mass of voters who read it:

$$U_{F_i} = \mu\{x \in I : x \text{ reads outlet } i\}$$

where μ is the Lebesgue measure.

Finally, the utility of the politician is

$$U_P(z) = z$$

Hence, a politician maximizes the probability that the voters select policy 1.

Learning Each media outlet $i \in \{1,2\}$ observes a noisy signal S_i about the state Θ such that:

$$S_i = \begin{cases} \Theta & \text{with probability } p \\ R_i & \text{with probability } 1-p \end{cases}$$

where R_i is uniformly distributed over $[0,1]$ and independent of Θ and R_{-i}. Before observing the signal, each media outlet i commits to a threshold $t_i \in [a,b]$ such that if $S_i \geq t_i$, the outlet publishes a message $m_i = 1$ and if $S_i < t_i$, the outlet publishes a message $m_i = 0$. The intuition, as usual in Bayesian persuasion, is that the media outlet hires a journalist with a certain bias. If a citizen x reads outlet i, then she observes the message m_i. The citizens observe the thresholds before choosing which media outlet to read.

A politician observes the state Θ. Before she observes Θ, she proposes an agreement t_p to media outlet 1. According to the agreement, outlet 1 must select a threshold t_p and will learn Θ from the politician. The interpretation is that the politician allows a journalist to interview herself or to attend the party events and headquarters. In exchange, the journalist has to be ideologically close to the politician. If media outlet 1 does not agree, she can choose any t_1. Outlet 2 observes the proposed agreement and whether outlet 1 accepts or not and then chooses its threshold t_2.

Timing The game proceeds as follows.

1. The politician proposes an agreement t_p to media outlet 1.
2. Media outlet 1 agrees or not. If the media outlet agrees, it chooses the threshold t_p. If it does not, she chooses some t_1.
3. Media outlet 2 observes stages 1 and 2 and chooses the threshold t_2.
4. The voters observe the thresholds and choose which media outlet to read.
5. The state Θ and the messages are realized.
6. Every voter observes the message from an outlet that she reads. Voting takes place and payoffs are realized.

Strategies and solution concept Let $V = \{0,1\}$ be the set of possible votes and set of possible policies, $J = [a,b]$ be the set of possible thresholds that the media can select, $I = [0,1]$ be the support of the state Θ and of the signals S_1 and S_2, $M = \{0,1\}$ be the set of messages and $O = \{1,2\}$ be the set of media outlets. Then a strategy for a citizen x is a pair of maps: $v_x : M \to V$ and $r_x : J^2 \to O$. The first map is the voting decision which depends on the message that a voter gets and the second map is the decision which media outlet to read, which depends on the thresholds of the media outlets. For media outlet 1, the strategy is a map $A : J \to \{Yes, No\}$ and a number t_1. The first map is a choice whether to agree on the politician's proposal. The second choice is the threshold that the outlet selects if it rejects the politician's offer. A strategy for media outlet 2 is a map: $M_2 : J \to J$ and a number t_2. The map M_2 specifies the threshold that outlet 2 chooses if outlet 1 accepts the politician's offer. This choice depends on the offer t_p. The number t_2 is the threshold that outlet 2 chooses if outlet 1 rejects the politician's offer. Finally, the strategy for a politician is the offer t_p.

The solution concept is a sequential equilibrium (Kreps and Wilson 1982).

Assumption

$$\frac{1}{2}\left(\frac{1}{2}p(a+b) - p + 1\right) < a < b < \frac{1}{2}\left(\frac{1}{2}p(a+b) + 1\right)$$

The assumption ensures equilibrium existence in a subgame that emerges if the politician's offer is rejected. It is easy to see that the assumption holds if a and b are sufficiently close to each other and if p is sufficiently high.

Results

Proposition 1 An equilibrium always exists. In every equilibrium:

1. If outlet 1 rejects the offer, then both outlets choose $t_1 = t_2 = \frac{a+b}{2}$.

2. If

$$\left(a - \frac{1}{2}\right) p + \sqrt{(a-1)a(p-1)p} + \frac{1}{2} \geq \frac{a+b}{2}$$

then the politician proposes $t_p = a$, media outlet 1 accepts the proposal and sets the threshold to $t_p = a$, the majority of citizens read outlet 1 and vote $v_x = m_1$. This means that the majority selects policy 1 with probability $1 - a$.

3. If

$$\left(a - \frac{1}{2}\right) p + \sqrt{(a-1)a(p-1)p} + \frac{1}{2} < \frac{a+b}{2}$$

then the politician proposes

$$t_p = \frac{1}{2}\left(-\frac{\sqrt{(p-1)\left(a^2 + 2a(b-1) + b^2 - 2b - p + 1\right)}}{\sqrt{p}} + a + b\right)$$

outlet 1 agrees and sets $t_1 = t_p$, the majority of citizens read outlet 1 and vote $v_x = m_1$. This means that the majority selects policy 1 with probability $1 - t_p$.

Proof: All proofs are in the Appendix.

Corollary 1 Increasing b always weakly increases the equilibrium value of t_p.

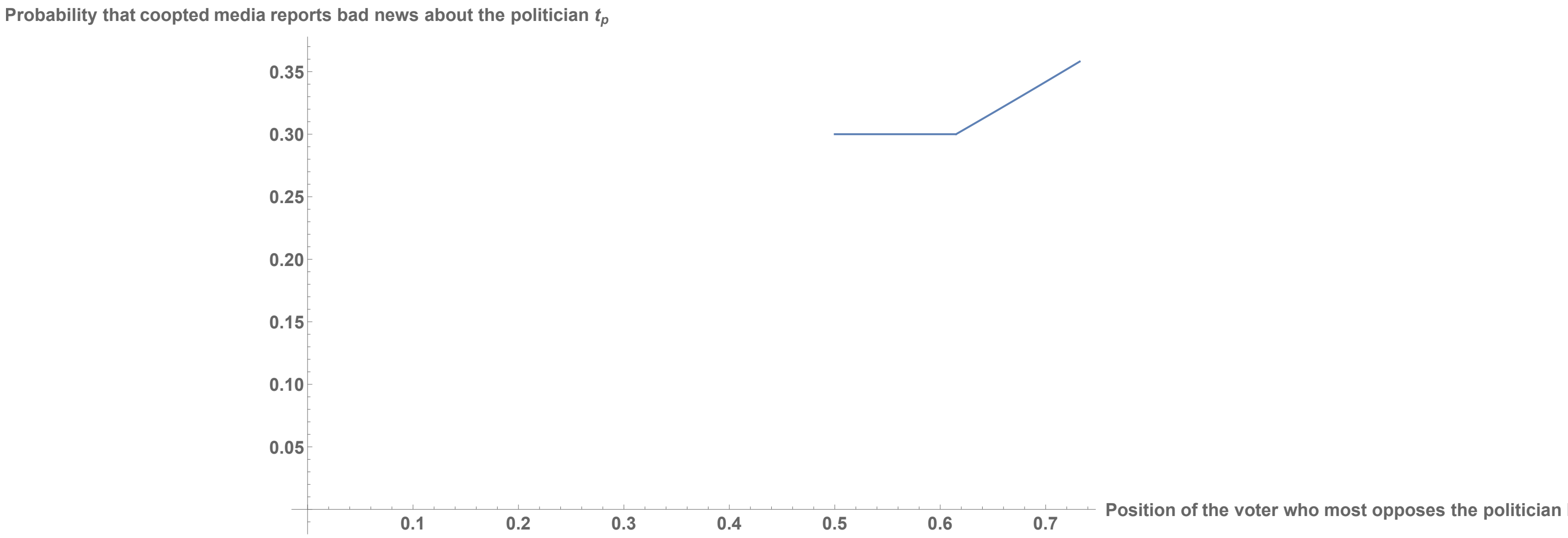

Figure 1 The probability that the coopted media outlet reports bad news for the politician, t_p, as a function of the position of the citizen most opposed to the politician, b. Here $p = 0.9$ and $a = 0.3$.

Corollary 2 Increasing a always weakly increases t_p.

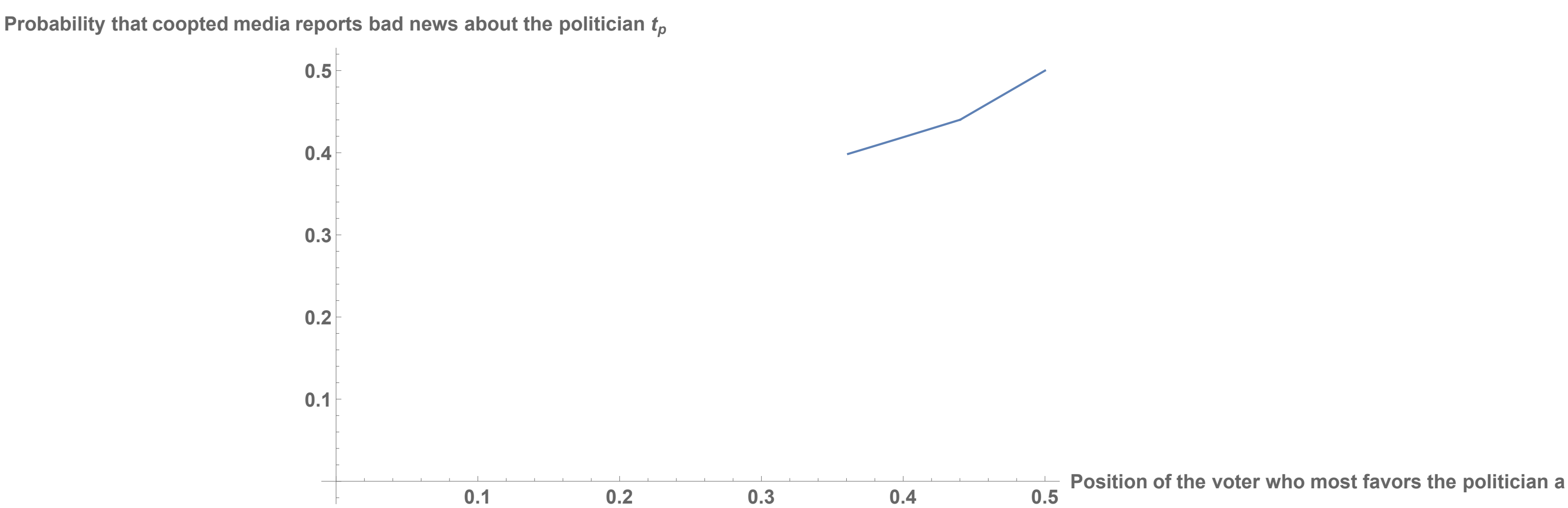

Figure 2 The probability that the coopted media outlet reports bad news for the politician, t_p, as a function of the position of the citizen who most favors the politician, a. Here $p = 0.9$ and $b = 0.75$.

Corollary 3 $\lim_{p\to} t_p = \frac{a+b}{2}$

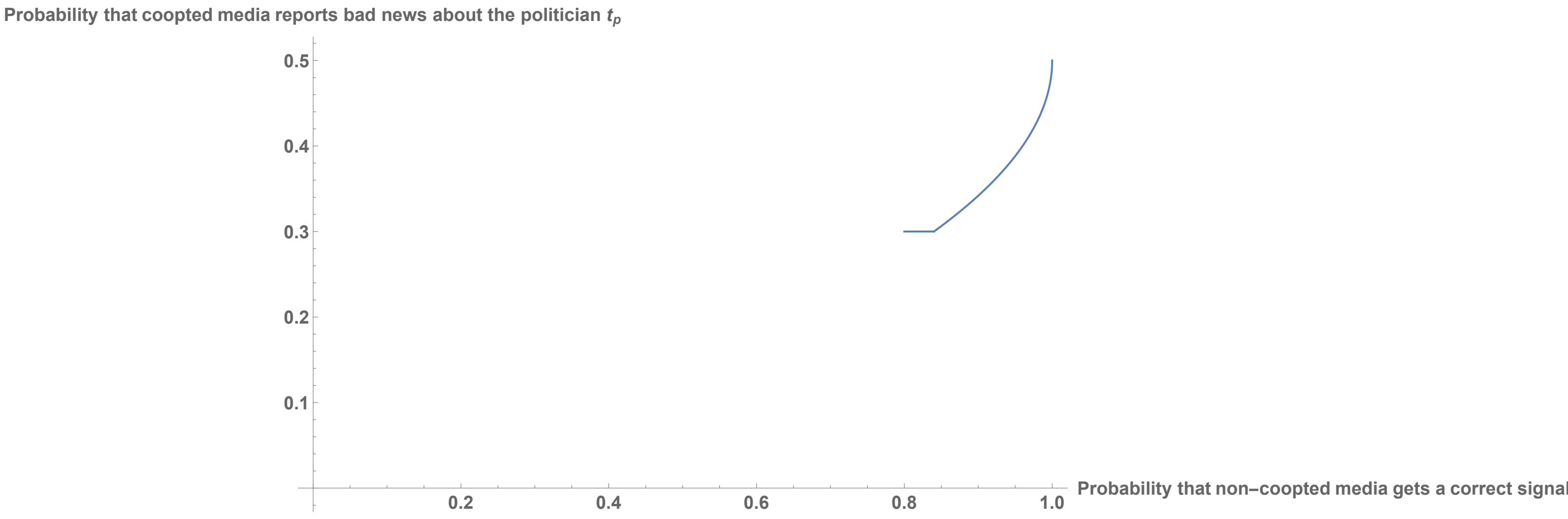

Figure 3 The probability that the coopted media outlet reports bad news for the politician, t_p, as a function of the probability p that the non-coopted media gets correct information. Here $a = 0.3$ and $b = 0.7$.

Conclusion

The paper provides a theory of media bias. There are two main goals. First, the paper seeks to explain why do people read biased sources and trust them. The second goal is to explain why do media become biased. In the model, politicians offer exclusive information to media in exchange for favorable coverage. These politicians give interviews to journalists, let them see how their party or government works, or let them visit places that other journalists cannot reach. I provide Fox News in the United States, Kronen Zeitung in Austria, and Russian state TV as examples. In Germany, unlike Austria, far-right parties enjoyed moderate success. A possible reason is that in Germany government is more transparent than in Austria. Because of this, politicians can offer less exclusive information to the media in exchange for bias.

Appendix

Proof of Proposition 1. 1. First, we need to specify the behavior of citizens if outlet 1 does not accept the offer. Recall that each citizen votes as if she were pivotal. In the proof, when I write that a citizen gets a certain payoff by voting, I mean that she would get this payoff if she were pivotal. First, I show that a citizen will never play

0 if the media sends message 1 and vice versa. Indeed, suppose citizen x reads media outlet i and plays a voting strategy:$v_x = 1 - m_i$.

Then by the formula of total expectation her expected payoff is:

$$Prob[S_i = \Theta] \times [Prob[\Theta < t_i] \times E[\Theta - x \mid \Theta < t_i] + Prob[\Theta > t_i] \times E[x - \Theta \mid \Theta > t_i]] +$$

$$+ Prob[S_i = R_i] \times [Prob[R_i < t_i] \times E[\Theta - x] + Prob[R_i > t_i] \times E[x - \Theta \mid \Theta > t_i]] \tag{1}$$

Now, $Prob[S_i = \Theta] = p$, $Prob[S_i = R_i] = 1 - p$, $Prob[\Theta < t_i] = Prob[R_i < t_i] = t_i$, $E[\Theta \mid \Theta < t_i] = \frac{t_i}{2}$, $E[\Theta \mid \Theta > t_i] = \frac{1+t_i}{2}$, and $E[\Theta] = \frac{1}{2}$, so the expression above becomes:

$$p\left[t_i(\frac{t_i}{2} - x) + (1 - t_i)(x - \frac{1 + t_i}{2})\right] + (1 - p)\left[t_i(\frac{1}{2} - x) + (1 - t_i)(x - \frac{1}{2})\right] \tag{2}$$

If $v_x = 1$, then the voter's expected payoff is:

$$E[\Theta - x] = \frac{1}{2} - x \tag{3}$$

and if $v_x = 0$, her expected payoff is:

$$E[x - \Theta] = x - \frac{1}{2} \tag{4}$$

If some citizen plays $v_x = 1 - m_i$ then both expressions 3) and 4) must be weakly smaller than 2). Solving the corresponding system of inequalities gives a contradiction for $x, t, p \in [0, 1]$. Hence, if citizen x reads outlet i, she plays the voting strategy $v_x = m_i$.

Now we can find which media outlet is better for a generic citizen indexed x. If x plays $v_x = m_i$ and outlet i has a threshold t_i, then by the formula of total expectation her expected payoff is:

$$Prob[S_i = \Theta] \times [Prob[\Theta < t_i] \times E[x - \Theta \mid \Theta < t_i] + Prob[\Theta > t_i] \times E[\Theta - x \mid \Theta > t_i]] +$$

$$+Prob[S_i = R_i] \times [Prob[R_i < t_i] \times E[x - \Theta] + Prob[R_i > t_i] \times E[\Theta - x \mid \Theta > t_i]] =$$

$$= p\left[t_i(x - \frac{t_i}{2}) + (1 - t_i)(\frac{1 + t_i}{2} - x)\right] + (1 - p)\left[t_i(x - \frac{1}{2}) + (1 - t_i)(\frac{1}{2} - x)\right] \tag{5}$$

Let $F(x, t_i)$ define the expected payoff given by expression 5) above. Then solving the inequality $F(x, s) < F(x, t)$ for some $s, t : a < s < t < b < 1$ gives:

$$x < \frac{s + t}{2} \tag{6}$$

Recall that by Assumption,

$$\frac{1}{2}\left(\frac{1}{2}p(a+b)-p+1\right)<a \text{ and } b<\frac{1}{2}\left(\frac{1}{2}p(a+b)+1\right) \tag{7}$$

Given that, the inequalities

$$F(a,\frac{a+b}{2})>\frac{1}{2}-a \tag{8}$$

and

$$F(b,\frac{a+b}{2})>b-\frac{1}{2} \tag{9}$$

are true.

In words, citizens b and a would both prefer to read the outlet located at $\frac{a+b}{2}$ then to always vote for 1 or 0. Moreover:

$$\frac{d}{dx}\left[F(x,t)-(\frac{1}{2}-x)\right]=2t>0 \tag{10}$$

so for all players $x>a: F(x,\frac{a+b}{2})>\frac{1}{2}-x$, hence these players would prefer to read the outlet located at $\frac{a+b}{2}$ than to play a constant strategy. Similarly:

$$\frac{d}{dx}\left[F(x,t)-(x-\frac{1}{2})\right]=2(t-1)<0 \tag{11}$$

so all players $x<b$ would also prefer to read the outlet located at $\frac{a+b}{2}$ than to play a constant strategy. It follows from the media voter theorem (Black 1948) that both outlets will select $t_1=t_2=\frac{a+b}{2}$ which proves part 1.

2. I start by describing the preference of citizens of outlet 1 over outlet 2 if outlet 1 accepts the offer t_p. Note that now outlet 1 provides a more precise signal and this affects the choice of the citizen. If voter x reads outlet 1, her expected payoff is:

$$Prob[\Theta<t_p]\times E[x-\Theta \mid \Theta<t_p]+Prob[\Theta>t_p]\times E[\Theta-x \mid \Theta>t_p]=$$

$$=t_p(x-\frac{t_p}{2})+(1-t_p)(\frac{1+t_p}{2}-x) \tag{12}$$

Define the function above as $G(x,t_p)$. Citizen x is indifferent between reading outlets 1 or 2 iff:

$$G(x,t_p)=F(x,t_2) \tag{13}$$

which gives:

$$x = \frac{t_2(p - pt_2 - 1) + t_p^2}{2(t_p - t_2)} \tag{14}$$

Define the value of x above as $T(t_p, t_2)$.

Taking the derivative gives:

$$\frac{d}{dx}\left[G(x,t_p) - F(x,t_2)\right] = 2(t_p - t_2) \tag{15}$$

Hence, the derivative is positive if $t_p > t_2$ and negative if $t_p < t_2$. Thus, if $t_p > t_2$, then $x > T(t_p,t_2)$ prefer outlet 1 to outlet 2 and $x < T(t_p,t_2)$ prefer outlet 2 to outlet 1. Vice versa, if $t_p < t_2$, then $x < T(t_p,t_2)$ prefer outlet 1 to outlet 2 and $x > T(t_p,t_2)$ prefer outlet 2 to outlet 1.

We are now going to show that outlet 2 always has a best response if outlet 1 accepts the offer. I start by finding the optimal choice of t_2 in the set $[t_p, b]$.

First consider the best responses for outlet 2 on a set $t_2 \in [t_p, b]$. If $t_p < t_2$, then citizens x such that:

$$T(t_p,t_2) < x < \frac{1 + pt_p}{2} \tag{16}$$

prefer $v_x = m_2$ to any other option. The reason is as follows. We have already shown that on this interval $v_x = m_2$ is better than $v_x = m_1$. Moreover, $v_x = m_2$ is better than $v_x = 0$. Indeed, citizen x is indifferent between $v_x = m_2$ and voting $v_x = 0$ iff:

$$F(x,t_2) = x - \frac{1}{2} \tag{17}$$

which gives:

$$x = \frac{1 + pt_p}{2} \tag{18}$$

Recall that:

$$\frac{d}{dx}\left[F(x,t_2) - (x - \frac{1}{2})\right] = 2t > 0 \tag{19}$$

which proves the statement. Finally, citizen $x = t_p$ prefers $v_x = m_1$ to $v_x = 1$ and the same is true for any $x' > t_p$. Thus, no $x > t_2 > t_p$ will play $v_x = 1$.

This proves the statement that all x that satisfy 16) will indeed read outlet 2 and play $v_x = m_2$. It follows from the same reasoning that $x > \frac{1+pt_p}{2}$ will prefer $v_x = 0$ to $v_x = m_2$ and $x < T(t_p,t_2)$ will prefer $v_x = m_1$ to $v_x = m_2$. Hence, citizen x will vote $v_x = m_2$ iff x satisfies 16).

Finally, notice that

$$T(t_p, t_2) > a \tag{20}$$

if $0 < a < t_p < t_2 < 1$. For now it is not important to us how citizens vote that do not read outlet 2 because we are interested in the best response for outlet 2.

If

$$T(t_p, t_2) \geq \frac{1 + pt_2}{2} \tag{21}$$

then no citizen reads outlet 2 and outlet 2 gets 0. The same is true if:

$$T(t_p, t_2) \geq b \tag{22}$$

Clearly, if for all $t_2 \in [t_p, b]$: either 27) or 28) holds, then outlet 2 is indifferent between these values of t_2 because all of them yield a payoff of 0.

Let

$$a < T(t_p, t_2) < \frac{1 + pt_2}{2} < b \tag{23}$$

Then outlet 2 gets a payoff of:

$$\frac{1 + pt_2}{2} - T(t_p, t_2) \tag{24}$$

Differentiating by t_2 yields:

$$\frac{d}{dt_2}\left[\frac{1 + pt_2}{2} - T(t_p, t_2)\right] =$$

$$= \frac{(1 - t_p)t_p(1 - p)}{2(t_p - t_2)^2} > 0 \tag{25}$$

So, outlet 2 prefers to increase t_2. If 29) holds for $t_2 = b$, then $t_2 = b$ is the best choice in the set $[t_p, b]$.

Suppose that:

$$a < T(t_p, t_2) < b \leq \frac{1 + pt_2}{2} \tag{26}$$

Then outlet 2 gets a payoff of:

$$b - T(t_p, t_2) \tag{27}$$

Define the expression above as: $H[t_p, t_2]$.

Differentiating by t_2 gives:

$$\frac{d}{dt_2}H(t_p,t_2) =$$

$$\frac{t_p p(2t-1)+t_p - pt_2^2 - t_p^2}{2(t_p-t_2)^2} \tag{28}$$

Solving the equation

$$\frac{t_p p(2t-1)+t_p - pt_2^2 - t_p^2}{2(t_p-t_2)^2} = 0 \tag{29}$$

gives two solutions:

$$t_2 = t_p - \frac{\sqrt{(p-1)p(t_p-1)t_p}}{p} < t_p \tag{30}$$

and

$$t_2 = \frac{pt_p + \sqrt{(p-1)p(t_p-1)t_p}}{p} \tag{31}$$

We are now considering cases in which $t_2 > t_p$ so only the second solution is feasible.

Define:

$$t_2^* = \frac{pt_p + \sqrt{(p-1)p(t_p-1)t_p}}{p}$$

Taking the second derivative of $H[t_p,t_2]$ gives:

$$\frac{d^2}{dt_2^2}\left[b - T(t_p,t_2)\right] = -\frac{(1-p)(1-t_p)s}{(t_2-t_p)} \tag{32}$$

If $t_2 > t_p$, then the expression above is negative. Notice that $t_2^* > t_p$, so t_2^* is a local maximum.

Suppose that $t_2^* \leq b$. Then t_2^* is the unique local maximum of $H(t_p,t_2)$ on $(t_p,b]$. Also, $H(t_2,t_p)$ is continuous on $(t_p,b]$, $\frac{d}{dt_2}H(t_2,t_p) > 0$ if $t_2 < t_2^*$ and $\frac{d}{dt_2}H(t_2,t_p) < 0$ otherwise. Hence, t_2^* maximizes $H(t_2,t_p)$ on $(t_p,b]$. Finally, notice that if $t_2 = t_p$, then no citizen will choose to read outlet 2, so outlet 2 will get a 0 payoff. So if inequality 26) holds for some values of $t_2 \in [t_p,b]$, then $\text{Min}\{t_2,b\}$ is the best choice of $t_2 \in [t_p,b]$.

We have shown so far that there is a best response for outlet 2 on the set $[t_p,b]$. It is left to show that there is also a best response on the set $[a,t_p)$. In equilibrium, outlet 2 will always choose $t_2 > t_p$, but we still need to show the existence of best response because otherwise it is not clear whether equilibrium exists.

To start with, we must characterize the behavior of citizens if $t_2 < t_p$.

First, notice that if $t_2 < t_p$, then no citizen $x < t_2$ will vote $v_x = 0$ because voting $v_x = m_1$ will be a better option.

Indeed, a citizen prefers voting $v_x = m_1$ to voting $v_x = 0$ iff:

$$G(t_p, x) - (x - \frac{1}{2}) > 0 \tag{33}$$

Differentiating gives:

$$\frac{d}{dt}\left[G(t_p, x) - (x - \frac{1}{2})\right] = -2(1-t) < 0 \tag{34}$$

So, if some citizen x prefers to vote $v_x = m_1$ to $v_x = 0$, then all citizens $x' < x$ also have this preference.

Clearly,

$$G(t_p, t_p) > t_p - \frac{1}{2} \tag{35}$$

hence every $x < t_p$ prefers to vote $v_x = m_1$ to $v_x = 0$. Because $t_2 < t_p$, it is true that no $x < t_2$ will vote $v_x = 0$ since $v_x = m_1$ is strictly better.

A citizen is indifferent between $v_x = 1$ and $v_x = m_2$ iff

$$F(x, t_2) = x - \frac{1}{2} \tag{36}$$

Which gives:

$$x = \frac{1}{2}(p(t_2 - 1) + 1) \tag{37}$$

We have already shown that all greater then this value will prefer $v_x = m_2$ and all x that are smaller will prefer $v_x = 1$.

Thus, if $t_2 < t_p$, we can write the payoff for outlet 1 as:

$$T(t_p, t_2) - \text{Max}\{a, \frac{1}{2}(p(t_2 - 1) + 1)\} \tag{38}$$

Let $\frac{1}{2}(p(t_2 - 1) + 1) > a$. Then the payoff is given by:

$$T(t_p, t_2) - \frac{1}{2}(p(t_2 - 1) + 1) \tag{39}$$

Taking the derivative gives:

$$\frac{d}{dt_2}\left[T(t_p, t_2) - \frac{1}{2}(p(t_2 - 1) + 1)\right] = -\frac{(1-p)(1-s)s}{2(s-t)^2} < 0 \tag{40}$$

Hence, if $\frac{1}{2}(p(t_2-1)+1) > a$, outlet 2 has an incentive to decrease t_2. Suppose that $\frac{1}{2}(p(t_2-1)+1) \leq a$. Then the payoff is given by:

$$T(t_p,t_2) - a \tag{41}$$

Solving the expression:

$$\frac{d}{dt_2}\left[T(t_p,t_2) - a\right] = 0 \tag{42}$$

gives two solutions:

$$t_2 = t_p - \frac{\sqrt{(1-p)p(1-t_p)t_p}}{p} < t_p \tag{43}$$

and

$$t_2 = \frac{pt_p + \sqrt{(1-p)p(1-t_p)t_p}}{p} > t_p \tag{44}$$

The first solution is the unique extremum on the set $\{t_2 : t_2 < t_p\}$. Let $\tilde{t}_2$ define the first solution. Taking the second derivative gives:

$$\frac{d^2}{dt_2^2}\left[T(t_p,t_2) - a\right] = -\frac{t_p(1-p-t_p(1-p))}{(t_p-t_2)^3}$$

which is negative for $t_2 < t_p$. Hence, $\tilde{t}_2$ is the unique local maximum on the set $\{t_2 : t_2 < t_p\}$. Thus, $\text{Max}\{\tilde{t}_2, a\}$ maximizes 41) on $[a,t_p]$. This shows that outlet 2 always has a best response.

We can now find the optimal proposal for the politician t_p:

Let $t_p = a$. Then clearly $t_2 \geq t_p = a$. Suppose that:

$$\left(a - \frac{1}{2}\right)p + \sqrt{(a-1)a(p-1)p} + \frac{1}{2} > \frac{a+b}{2} \tag{45}$$

Then solving the corresponding inequality shows that for any $t_2 \in [a,b]$:

$$T(a,t_2) \leq \frac{a+b}{2} \tag{46}$$

so, no matter which strategy outlet 2 plays, the majority of citizens prefer outlet 1 to outlet 2. Moreover, solving the corresponding inequality shows that for any $x < \frac{a+b}{2}$:

$$G(x,a) > x - \frac{1}{2} \tag{47}$$

so citizens $x < \frac{a+b}{2}$ prefer to read outlet 1 and play $v_x = m_1$ than to always vote 0. It is also true that for every $x < \frac{a+b}{2}$:

$$G(x,a) > \frac{1}{2} - x \tag{48}$$

so these citizens prefer to read outlet 1 and play $v_x = m_1$ than to always vote 1. Hence, outlet 1 gets a payoff of at least

$$\frac{a+b}{2} - a = \frac{b-a}{2} \tag{49}$$

Hence, it agrees to the politician's offer. In this case, the majority selects policy 1 with probability $1-a$, which is the highest possible probability in the game. Hence, the politician chooses to make offer the $t_p = a$. This completes the proof of 2.

3.

I start by showing that the politician can always guarantee a payoff of $\frac{a+b}{2}$. It is clear that by Assumption for any x :

$$G(x, \frac{a+b}{2}) > F(x, \frac{a+b}{2}) > \text{Max}\{\frac{1}{2} - x, x - \frac{1}{2}\} \tag{50}$$

So all citizens either read outlet 1 and vote $v_x = m_1$ or read outlet 2 and vote $v_x = m_2$. We are now going to see that if $t_p = \frac{a+b}{2}$, then media outlet 1 gets at least half of the citizens, no matter what outlet 2 does in response. We have shown that if $t_2 > t_p$ then x prefers outlet 1 iff:

$$x > T(t_2, t_p) \tag{51}$$

and if $t_2 < t_p$, then x prefers outlet 1 iff:

$$x < T(t_2, t_p) \tag{52}$$

Let $t_2 < t_p = \frac{a+b}{2}$. Then solving the corresponding inequality given $0 < a < b < 1$ and $a < t_2 < \frac{a+b}{2}$ yields that:

$$T(t_2, t_p) < \frac{a+b}{2} \tag{53}$$

Similarly, if $t_2 > t_p = \frac{a+b}{2}$, then:

$$T(t_2, t_p) > \frac{a+b}{2}$$

It follows that if $t_p = \frac{a+b}{2}$ then the majority of citizens reads outlet 1. So, outlet 1 accepts the offer. Citizens who read outlet 1 vote 1 with probability $\frac{a+b}{2}$, so the politician gets an expected payoff of $\frac{a+b}{2}$.

We can now show that the politician will only propose $t_p \leq \frac{a+b}{2}$. Suppose that she proposes $t_p > \frac{a+b}{2}$. If outlet 2 chooses a best response such that the majority subscribes to outlet 2, then outlet 1 rejects the offer. We have just shown that setting $t_p = \frac{a+b}{2}$ is better, so such actions will not be taken. If outlet 2 chooses a best response such that the majority subscribes to outlet 1, then the majority votes for 1 with probability $t_p > \frac{a+b}{2}$, so, again, a better move for the politician is to propose $t_p = \frac{a+b}{2}$. We can now show that for any $t_p \leq \frac{a+b}{2}$, the best response for outlet 2 is some $t_2 \geq t_p$. Indeed, fix some $t_p \leq \frac{a+b}{2}$. If $t_2 < t_p$, outlet 2 gets a payoff of at most:

$$T(t_2, t_p) - a \tag{54}$$

Suppose instead that $t_2 = \frac{a+b}{2} \geq t_P$. Then all citizens x read either outlet 1 or outlet 2. Then solving the corresponding inequality shows that

$$T(\frac{a+b}{2}, t_p) < b \tag{55}$$

So outlet 2 gets a payoff of:

$$b - T(\frac{a+b}{2}, t_p) \tag{56}$$

Solving the corresponding inequality shows that for any t_2 and t_p: $t_2 < t_p \leq \frac{a+b}{2}$:

$$b - T(\frac{a+b}{2}, t_p) > T(t_2, t_p) - a \tag{57}$$

Hence, setting $t_2 = \frac{a+b}{2}$ is strictly better for outlet 2 than choosing some $t_2 \leq t_p$. Inequality 55) and the fact that all citizens read either outlet 1 or outlet 2 shows that outlet 2 can guarantee a positive payoff. The reasoning in part 2 shows that the best response is $\text{Min}\{t_2^*, b\}$.

We can now analyze the possible choices of the politician. First suppose that the politician chooses t_p such that $t_2^* < b$ and therefore outlet 2 chooses t_2^*.

Recall that $t_p < \frac{a+b}{2}$. This implies that no citizen prefers $v_x = 1$ to $v_x = m_1$. Hence, the mass of citizens who read outlet 1 if it accepts offer t_p is:

$$T(t_p, t_2^*) - a =$$

$$= \frac{1}{2} - a + p\left(t_p - \frac{1}{2}\right) + \sqrt{(p-1)p(t_p-1)t_p} \tag{58}$$

If this amount is greater than $\frac{b-a}{2}$, then outlet 1 accepts the politician's offer and the politician's payoff is $1 - t_p$. Hence, the politician minimizes t_p such that:

$$T(t_p, t_2^*) - a \geq \frac{b-a}{2} \tag{59}$$

If

$$\left(a - \frac{1}{2}\right)p + \sqrt{(a-1)a(p-1)p} + \frac{1}{2} < \frac{a+b}{2} \tag{60}$$

then inequality 59) does not hold for $t_p = a$. Notice that 58) is continuous in t_p, so if inequality 59) is strict, then there exists ε such that

$$T(t_p - \varepsilon, t_2^*) - a > \frac{b-a}{2} \tag{61}$$

in other words, the politician can get a higher payoff by decreasing t_p. So, in equilibrium:

$$T(t_p, t_2^*) - a = \frac{b-a}{2} \tag{62}$$

This equation has two solutions:

$$t_p = \frac{ap + bp - \sqrt{(p-1)p\,(a^2 + 2a(b-1) + b^2 - 2b - p + 1)}}{2p} < \frac{a+b}{2} \tag{63}$$

and

$$t_p = \frac{\sqrt{(p-1)p\,(a^2 + 2a(b-1) + b^2 - 2b - p + 1)} + ap + bp}{2p} > \frac{a+b}{2} \tag{64}$$

where the last strict inequality follows from solving it together with the Assumption. We have shown that $t_p < \frac{a+b}{2}$ so only the first solution is a candidate for equilibrium action. Moreover, solving the corresponding inequality together with inequality 60) shows that 63) is larger than a.

We have so far assumed that t_p is such that the best response for outlet 2 is some $t_2 < b$. It is left to show that the politician cannot select any lower t_p such that outlet 1 accepts her offer and the best response for outlet 2 is b. Indeed, assume that t_p is such that $t_2^* > b$. Then, because t_2^* is continuous in t_p, the politician can decrease t_p by a small ε and it will still be true that $t_2^* > b$. Hence, in equilibrium, t_p is such that $t_2^* \leq b$. This completes the proof of 3 and of the Proposition.

Proof of Corollary 1 The equilibrium value of t_p depends on two things: the constraint

$$\left(a - \frac{1}{2}\right)p + \sqrt{(a-1)a(p-1)p} + \frac{1}{2} - \frac{a+b}{2} \geq 0 \tag{65}$$

and the value:

$$\frac{1}{2}\left(-\frac{\sqrt{(p-1)\left(a^2+2a(b-1)+b^2-2b-p+1\right)}}{\sqrt{p}}+a+b\right) \tag{66}$$

Define the value above as t_p^*. If inequality 65) above is true, then the politician chooses $t_p = a$ and if it does not, then she chooses $t_p = t_p^*$.

Clearly, the LHS of inequality 65) decreases in b. Thus, if 65) is not true for some b, then it is also not true for any $b' > b$. Which means that if the politician chooses t_p^* for some b, then she also chooses t_p^* for any $b' > b$. Recall from the proof of the Proposition that if 65) is not true, then $t_p^* > t_p$. Finally, notice that

$$\frac{d}{db}t_p^* = \frac{1}{2} - \frac{(p-1)(a+b-1)}{2\sqrt{p}\sqrt{(p-1)\left(a^2+2a(b-1)+b^2-2b-p+1\right)}} \tag{67}$$

which is positive if 65) is not true. This completes the proof.

Proof of Corollary 2 Recall from the Proof of Corollary 1 our definition:

$$t_p^* = \frac{1}{2}\left(-\frac{\sqrt{(p-1)\left(a^2+2a(b-1)+b^2-2b-p+1\right)}}{\sqrt{p}}+a+b\right) \tag{68}$$

In equilibrium, $t_p = a$ if inequality 65) holds and $t_p = t_p^*$ otherwise.

Differentiating yields:

$$\frac{d}{da}t_p^* = \frac{1}{2} - \frac{(p-1)(a+b-1)}{2\sqrt{p}\sqrt{(p-1)\left(a^2+2a(b-1)+b^2-2b-p+1\right)}} \tag{69}$$

Notice that $\frac{d}{da}t_p^* > 0$ given the Assumption, $0 < a < b < 1$ and $0 < p < 1$. Thus, if $t_p = t_p^*$ and if $t_p = a$, it increases in a. It is left to show that there are no discontinuous jumps at points where inequality 65) is an equality.

Solving the corresponding inequality shows that if inequality 65) is an equality, that is, if:

$$\left(a-\frac{1}{2}\right)p+\sqrt{(a-1)a(p-1)p}+\frac{1}{2}-\frac{a+b}{2}=0 \tag{70}$$

then:

$$t_p^* = a \tag{71}$$

Hence, t_p is continuous. This completes the proof.

Proof of Corollary 3 Notice that

$$\lim_{p\to 1}\left[\left(a-\frac{1}{2}\right)p+\sqrt{(a-1)a(p-1)p}+\frac{1}{2}-\frac{a+b}{2}\right]=\frac{a-b}{2}<0 \tag{72}$$

So if p is sufficiently large, then $t_p = t_p^*$.

Also notice that

$$\lim_{p\to 1} t_p^* = \frac{a+b}{2} \tag{73}$$

which completes the proof.

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