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Abstract

We define populism as a politician's effort to appeal to a large group of voters with limited information regarding a policy-relevant state of nature. In our model, the populist motive makes it impossible for political candidates to communicate their information to voters credibly. We show that the presence of special interest groups (SIGs) with partisan preferences can mitigate this effect and thereby improve policy. This does *not* happen because SIGs are better informed than policy makers. Instead, campaign contributions by SIGs allow politicians to insulate themselves from the need to adopt populist platforms. We show that a regime in which SIGs are allowed to contribute to political campaigns Pareto-dominates (ex ante) regimes in which no such contributions are allowed, or where campaigns are publicly financed, or where they are funded by the candidates' private wealth.

Keywords: Elections, campaign finances, populism, special interest politics, lobbying.

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1 Introduction

Industry groups, labor unions, and wealthy individuals can influence electoral outcomes by donating to money political campaigns. Many voters intuitively regard the influence of wealthy special interests on politics as contrary to basic democratic ideals or as "drowning the voice of the people." This is especially true in the United States, a country whose last general election cost an estimated \$5.3 billion dollars in campaign expenditures[1] and where a recent Supreme Court ruling affirmed political advertising by corporations and other organizations as protected speech under its constitution. Despite this criticism, special interest groups can assume a beneficial role in the policy making process. Special interest groups do, after all, represent some citizens of society and thus have a right to be heard. At the same time, some groups possess expert knowledge on important policy issues and therefore *should* be heard.

The present paper investigates whether campaign spending by special interest groups can improve policy outcomes in a setting that does *not* feature the aforementioned characteristics. In our model, special interest groups represent an arbitrarily small portion of the electorate, are characterized by extreme preferences relative to most voters, and possess information that is no better (in fact, worse) than the politicians' or the voters'. We show that, under these conditions, the expected welfare of all voters can still increase when special interest groups are allowed to spend money on political campaigns.

In our model, politicians face a strong incentive to adopt "populist" policies favored by a majority of the electorate. This is bad because politicians are assumed to be better informed than many voters about a policy-relevant state of the world. By campaigning on a platform that maximizes the uninformed voters' ex-ante expected utility, a politician suppresses private information which may indicate a different optimal policy. Voters therefore cannot infer the state of the world from the politician's campaign choice—which in turn makes the populist's platfrom attractive to uninformed voters. This incentive leads to equilibria in which both candidates in a two-party election adopt populist platforms even if it contradicts a candidate's private information. Since populist policies are not always optimal given all available information, these equilibria are undesirable from the perspective of most voters, including the uninformed. When special interest groups are allowed to donate money to candidates, the politicians' incentives change: A candidate who campaigns on his private information may become less attractive to the uninformed voters, but also more attractive to one of the special interest groups. If a candidate can use donations from this group to increase his vote share through advertising, he can insulate himself from the need to adopt populist policies. As a consequence, electoral campaigns become more informative and voter welfare improves.

We also investigate whether alternative sources of campaign financing—in particular,

[1] Center for Responsive Politics (2008).

a public funding system and the candidates' private wealth—are preferable to a system in which funds are provided by special interest groups. Within the model we examine, the answer is negative. Consider, for example, a European-style system of public funding of elections in which candidates are compensated in proportion to their electoral success. Being populist now not only appeals to many voters, but also brings in the most funds. In fact, the monetary incentives a candidate faces in such elections are exactly the opposite of those provided by special interest groups. Similarly, a candidate who spends his private wealth to advertise may win an election even with a non-populist platform, but will recognize that being populist is a less expensive way to win. It is the combination of the fact that special interest groups have extreme preferences, do not set their own campaigns, but can use their wealth to support the campaigns of the politicians, which counteracts the populist motive.

This paper is related to two strands of literature. The first is the literature on elections where candidates are better informed than voters, an idea that originated in Downs (1957) and has since motivated many contributions that examine the interplay of ideology, uncertainty, and information in elections. Generally, truthful revelation of private information should not be expected when candidates are better informed than voters. For the case of policy-motivated candidates, this is demonstrated in Schultz (1995, 1996) who shows that ideological polarization of privately informed candidates is conducive to biased platforms, and thus generates pooling policies that do not reveal the candidates' information.[2] Martinelli and Matsui (2002) show that policy reversals may occur as a result of the candidates' incentive to manipulate voters' beliefs. In such equilibria, the left-wing party (if elected) implements policies to the right of the policies that would be implemented by the right-wing party, and vice versa. Canes-Wrone, Herron, and Shotts (2001) and Schultz (2002, 2008) introduce reelection concerns to models with policy-motivated and privately informed politicians. In these models, a trade-off can arise when choosing a wrong policy increases the chance to remain in office and choose a better policy later. Canes-Wrone et al. (2001) show that the incumbent may indeed choose populist but suboptimal policies before the election (the policy maker "panders" to the electorate). Schultz (2002) shows that the incumbent may adopt pre-election policies which are either too moderate to too extreme, depending on whether voters are uncertain about the government's ideology or about a state variable affecting the economy; a longer term length lessens these distortions (Schultz 2008).

The case of privately informed office-motivated candidates (which we consider in this paper) is examined in Heidhuess and Lagerlöf (2000), who obtain a populism result similar to ours: In equilibrium, both candidates propose policies that are optimal given the uninformed prior.[3] Jensen (2010) introduces state-dependent candidate quality and

[2] Martinelli (2001) shows that these results are weakened if voters receive some private information themselves.

[3] Loertscher (2010) extends their analysis to a continuum of states and policies. Felgenhauer (2010)

shows that candidates whose information indicates a state in which they are weaker than their opponent have an incentive set contrary platforms. Laslier and Van der Straeten (2004) introduce informed voters. The results are now reversed, and in the unique equilibrium both candidates set platforms that maximize the expected utility of the voters (given their private information). In our model, we assume that a fraction of the electorate is informed; however, a larger fraction is uninformed. In this case, politicians still pander to the uninformed by choosing populist policies in the benchmark model without advertising.

The second strand of literature this paper is related to is the literature on informational lobbying. This literature assumes that special interest groups possess better information than policy makers about some policy-relevant state variable, but that their (state-dependent) preferences over policy differ from those of the policy maker or voters, thus generating a credibility problem for the interest groups. In a seminal contribution, which can be applied to a game between an informed lobby group and an uninformed policy maker, Crawford and Sobel (1982) show that due to the informed agent's bias only coarse information can be revealed in equilibrium.[4] Allowing for monetary transfers between the interest group and the policy maker can overcome some of the credibility constraints, thus providing a rationale for why special interests should be allowed to give money to politicians. Potters and van Winden (1992) take a first step in this direction. In their model, the interest group's choice of whether or not to send a costly (but otherwise arbitrary) message can be a discriminating signal that reveals the interest group's information. Austen-Smith (1995) and Lohmann (1995) extend the signaling story by viewing campaign contributions as buying "access" to policy makers; again, whether or not a group wants to buy access can serve as a credible signal of what they know. Ball (1995) shows that when monetary transfers from the sender to the receiver (e.g., campaign contributions) are allowed in the Crawford-Sobel model, the interest group is generally able to reveal all its information credibly. Lohmann (1998) provides a different rationale: The special interest group's expert knowledge allows them to monitor the quality of a politician's decision better than a voter could. A politician who accepts special interest money in exchange for favorable policies thus puts himself under enhanced scrutiny. While political decisions are then biased, they are also of higher quality, which can ultimately enhance welfare.

Like some of the papers discussed in the previous paragraph, our's makes an argument that the monetary influence of special interest groups can improve policies by changing

shows that introducing an uninformed third competitor changes this result and induces the informed candidates to set platforms according to their private information.

[4]The Crafword-Sobel model has been extended in several directions. For example, Krishna and Morgan (2001) allow for multiple senders, Battaglini (2002) for multiple dimensions of the policy and state space, and Li and Madarász (2008) for senders with an unknown preference bias. These extensions as well can be readily applied to the analysis of informational lobbying.

information-related aspects of the policy making process. However, this works through a very different—and, to our knowledge, novel—mechanism: A special interest group's role is not to advise a policy maker but to counteract an informational problem that arises in elections, namely the problem of populism.

The rest of the paper is organized as follows. In Section 2 we specify all aspects of our model, except for the supply of campaign finances. In Section 3, we examine optimal policies and demonstrate that they can, in principle, be implemented in principle despite the communication constraints faced by the players. In Section 4 we characterize the policies that arise in equilibrium. We show that, due to the populist motive described above, equilibrium policies entail a welfare loss. In Section 5, we introduce campaign financing by special interest groups. We derive conditions under which special interest groups can counteract the populist incentive of politicians. In Section 6, we extend the analysis to alternative forms of campaign financing. Section 7 concludes. Proofs are in the Appendix.

2 The Basic Model

In this section we will present a model of elections and political competition whose timing is as follows. At the beginning of the game, nature chooses a state variable that determines the policy preferences of voters. Next, two political candidates and some voters receive partially informative signals about the state of nature. The candidates then set their campaign platforms, which the voters observe. Finally, an election is held and the winning candidate's platform is implemented. We now describes each of these elements in detail.

2.1 The political environment

A society must choose a policy $x \in X \equiv \{L, H\}$. The effect of the policy x depends on a state variable $\theta \in \Theta \equiv \{l, h\}$, which represents the ideal policy from the perspective of most voters. The state is drawn by nature, with

$$Pr[\theta = h] = p > \frac{1}{2}.$$

There are two candidates for office, denoted 1 and 2. The candidates compete in the election by choosing policy platforms $x^1 \in X$ and $x^2 \in X$. Platform choices are made simultaneously and, once chose, a candidate becomes committed to his platform. Thus, the winning candidate's platform will become policy. Candidates are purely office-motivated and maximize the probability of being elected.

The electorate consists of a continuum of voters, divided into three groups: Uninformed voters comprise a fraction γ^U of the electorate, and informed voters comprise a fraction γ^U. The remaining fraction $\gamma_M = 1 - \gamma_U - \gamma_I$ consists of impressionable voters. None of these voter groups holds a majority, and there are more uninformed voters than informed voters:

Assumption 1. $\gamma^U, \gamma^I, \gamma^M < \frac{1}{2}$ and $\gamma^U > \gamma^I$.

Uninformed and informed voters receive utility 1 if the policy agrees with the state (i.e., if $(x,\theta) = \{(H,h),(L,l)\}$) and utility 0 otherwise (i.e., if $(x,\theta) \in \{(H,l),(L,h)\}$). These voters are sincere: They vote for the candidate whose platform offers the larger expected utility, computed using the information the voter possesses at the time of the election. This will be made precise in Section 2.2 and Section 2.4.

Impressionable voters, on the other hand, do not maximize a utility function. Their voting behavior depends instead on the amount of campaign advertising they receive, described in Section 2.3.

2.2 Information structure

All agents in our model know the ex ante probability of the states, p and $1-p$. After the state θ is drawn but before candidates and voters make their decisions, the candidates and the informed voters receive additional private signals concerning the state θ. These signals are denoted s^1, s^2, and s^I, respectively, and can take on values in Θ. We assume that for $i \in \{1,2,I\}$, s^i is drawn according to

$$Pr[\, s^i \,|\, \theta \,] \;=\; \begin{cases} 1-\varepsilon & \text{if } s^i = \theta, \\ \varepsilon & \text{otherwise,} \end{cases}$$

where $0 < \varepsilon < 1/2$. That is, the candidates' and informed voters' private signals inform these agents imperfectly about the state θ. We will assume, however, that signals are precise enough for the probability of state l, conditional on signal l, to exceed $1/2$ (recall that state l is a priori less likely than state h). For this, we need

Assumption 2. $\varepsilon < 1-p$.[5]

All three signals s^1, s^2, s^I are independent conditional on θ, and the signal s^I is common to all informed voters. The uninformed and impressionable voters do not receive any signals.

2.3 Advertising

Impressionable voters are included in the model for the usual reason, namely, to provide a means through which non-informative campaign advertising can affect electoral out-

[5]The Bayesian posterior probability of state l, conditional on signal l, is $(1-p)(1-\varepsilon)/[(1-p)(1-\varepsilon)+p\varepsilon]$. This exceeds $1/2$ if and only if $\varepsilon < 1-p$.

comes.[6] Thus, impressionable voters do not care for the state θ, nor for the policy x. Instead, the fraction of impressionable voters voting for candidate 1 is

$$z(a^1, a^2) \;=\; \frac{1}{2} + a^1 - a^2 + \eta, \tag{1}$$

where $a^1 \geq 0$ and $a^2 \geq 0$ represent the amount of campaign advertising by (or on behalf of) the candidates, and η is an unobserved noise variable distributed uniformly on the interval $[-\overline{\eta}, \overline{\eta}]$. We require that the noise component in the impressionable voting behavior not be too large:

Assumption 3. $\overline{\eta} < \frac{\gamma^U - \gamma^I}{2\gamma^M}$ and $\overline{\eta} < \frac{\gamma^I}{2\gamma^M}$.

Note that campaign advertising is assumed uninformative about a politician's private signal.[7] We therefore interpret the variables a^1 and a^2 simply as the number of commercials aired for candidates 1 and 2, respectively, instead of their content.

Campaign advertising can come from several sources: It may be funded privately by the candidates, through a public system, or by special interest groups. We will introduce all three possibilities later in the paper. Until then, we assume $a^1 = a^2 = 0$. In this case, the following holds:

Lemma 1. *Suppose that $a^1 = a^2 = 0$. Then a politician is guaranteed to win if he attracts all uninformed voters, or if he attracts half of the uninformed voters and all informed voters.*

2.4 Strategies and beliefs

A campaign strategy for candidate $i = 1, 2$ is a mapping

$$\chi^i \;:\; \Theta \to [0, 1]$$

from the candidate's information to probability distributions over policies. Specifically, $\chi^i(s^i)$ is the probability with platform H is chosen by candidate i given the candidate's private signal $s^i \in \{l, h\}$. If $\chi^i(s^i) \in \{0, 1\}$, we may simply write $\chi^i(s^i) = L$ or $\chi^i(s^i) =$

[6] Baron (1994) is the first paper to introduce impressionable voters in order to examine issues related to campaign advertising by politicians. There, the impressionable voters are called "uninformed voters."

[7] This can be for two reasons. First, what we model as a simple signal is, in reality, most likely a combination of many different pieces of evidence for or against certain policies. Disclosure of such evidence may be infeasible: A nuanced case for or against a particular policy would have to be made that cannot be fit into a short commercial or a soundbite on cable news. Second, even if it was feasible, reporting one's information to the public may not be credible. Once a platform is chosen, a candidate has an incentive to state that his or her information indicates the chosen platform to be the optimal policy. Thus, the only way a candidate can communicate with the voters is through his or her commitment to a campaign platform itself.

H. We say that candidate i plays the ***truthful strategy*** if $\chi^i(h) = H$ and $\chi^i(l) = L$. On the other hand, a strategy such that $\chi^i(l) = \chi^i(h)$ is called ***uninformative***.

Voting strategies for the uninformed and informed voters are mappings

$$\begin{aligned} \nu^U &: X \times X \to [0,1], \\ \nu^I &: X \times X \times \Theta \to [0,1] \end{aligned}$$

from the voters's information to probability distributions over candidates. Specifically, $\nu^U(x^1, x^2)$ is the probability with which an uninformed voter votes for candidate 1 if the campaign platforms are x^1 and x^2. The strategy for the informed voters is similarly defined and includes the informed voters' private signal $s^I \in \Theta$ in its domain.[8]

A strategy profile is then a tuple $(\chi^1, \chi^2, \nu^U, \nu^I)$, consisting of strategies for each candidate as well as the uninformed and informed voters. The profile $(\chi^1, \chi^2, \nu^U, \nu^I)$ is called ***symmetric*** if $\chi^1 = \chi^2$, $\nu^U(x^1, x^2) = 1 - \nu^U(x^2, x^1)$, and $\nu^I(x^1, x^2, s^I) = 1 - \nu^I(x^2, x^1, s^I)$. Note that symmetry implies that if both candidates choose the same platform, each candidate receives half of the informed and uninformed vote.

Beliefs are mappings from the agents' information sets to probability distributions over states:

$$\begin{aligned} \mu^i &: \{l, h\} && \to [0,1] \;\; (i = 1, 2), \\ \mu^U &: X \times X && \to [0,1], \\ \mu^I &: X \times X \times \{l, h\} && \to [0,1]. \end{aligned}$$

For example, $\mu^I(x^1, x^2, s^I)$ is an informed voter's belief that the state is $\theta = h$ if the two platforms are x^1 and x^2 and the voters' private signal is s^I. Beliefs for candidates and uninformed voters are defined similarly.

Beliefs are ***Bayesian*** if they are derived from the strategies chosen by the players (as well as nature) through Bayes' rule whenever possibe; that is, at all information sets that are not null.[9] Finally, given beliefs μ^U and μ^I the voting strategies ν^U and ν^I are ***sincere*** if they place positive weight on a candidate's platform only if it offers a weakly larger expected utility as the opposing candidate's platform. Note that voters prefer

[8] Note that we require that all uninformed voters play the same strategy ν^U, and all informed voters play the same strategy ν^I. This is without loss of generality: Any voting strategy that is asymmetric within a voter group can be recast as an appropriately chosen strategy that is symmetric within the group.

[9] For the two candidates, this means that

$$\mu^i(h) = \frac{p(1-\varepsilon)}{p(1-\varepsilon) + (1-p)\varepsilon}, \;\; \mu^i(l) = \frac{p\varepsilon}{p\varepsilon + (1-p)(1-\varepsilon)}. \tag{2}$$

For the uninformed voters, define $\chi^i(H|s^i) \equiv \chi^i(s^i)$ and $\chi^i(L|s^i) \equiv 1 - \chi^i(s^i)$. The Bayesian requirement means that $\chi^i(x^i|h) + \chi^i(x^i|l) > 0 \; \forall i$ implies

$$\mu^U(x^1, x^2) \;=\; \frac{p \prod_{i=1,2} \left[(1-\varepsilon)\chi^i(x^i|h) + \varepsilon\chi^i(x^i|l)\right]}{p \prod_{i=1,2} \left[(1-\varepsilon)\chi^i(x^i|h) + \varepsilon\chi^i(x^i|l)\right] + (1-p) \prod_{i=1,2} \left[\varepsilon\chi^i(x^i|h) + (1-\varepsilon)\chi^i(x^i|l)\right]}. \tag{3}$$

platform H over L if they believe state h to be more likely than state l, and vice versa. Thus, a sincere strategy for the uninformed voters satisfies

$$\nu^U(H,L)\begin{cases} > 0 \\ < 1 \end{cases} \quad \text{or} \quad \nu^U(L,H)\begin{cases} < 1 \\ > 0 \end{cases} \quad \Rightarrow \quad \mu^U(x^1,x^2)\begin{cases} \geq 1/2 \\ \leq 1/2 \end{cases}$$

and a sincere strategy for the informed voters satisfies

$$\nu^I(H,L,s^I)\begin{cases} > 0 \\ < 1 \end{cases} \quad \text{or} \quad \nu^I(L,H,s^I)\begin{cases} < 1 \\ > 0 \end{cases} \quad \Rightarrow \quad \mu^I(x^1,x^2,s^I)\begin{cases} \geq 1/2 \\ \leq 1/2 \end{cases}$$

for all $s^I \in \{h,l\}$.

3 First-Best Policy

The policy that maximizes the expected welfare of the voters, conditional on (s^1,s^2,s^I), is called the ***full information policy*** and denoted $x^{FI}(s^1,s^2,s^I)$. Note that the likelihood that the state is h, conditional on (s^1,s^2,s^I), can be written as

$$\mu(k) \;\equiv\; Pr[\theta = h|s^1,s^2,s^I] \;=\; \frac{p(1-\varepsilon)^k\varepsilon^{3-k}}{p(1-\varepsilon)^k\varepsilon^{3-k}+(1-p)\varepsilon^k(1-\varepsilon)^{3-k}},$$

where $k = \#\{s \in (s^1,s^2,s^I) : s = h\}$. The expected utility of an uninformed or informed voter from policy x is then either $\mu(k)$ (for $x = H$) or $1-\mu(k)$ (for $x = L$). If Assumption 2 holds, $\mu(k) >/< 1/2$ if and only if $k >/< 2$. Therefore, the full information policy must be set according to the majority of the three signals:

$$x^{FI}(s^1,s^2,s^I) \;=\; \begin{cases} H & \text{if } \#\{s \in (s^1,s^2,s^I) : s = h\} \geq 2, \\ L & \text{otherwise.} \end{cases} \tag{5}$$

Of course, no single agent in our model knows all three signals. Information can flow from candidates to voters only via the candidates' choice of campaign platforms, and from voters to candidates only through their voting behavior in the election (at which point candidates are already commited to their platforms). These communication constraints do not affect the implementability of the full information policy, however. To

Finally, the informed voters' Bayesian beliefs can be expressed using μ^U defined above:

$$\mu^I(x^1,x^2,h) = \frac{\mu^U(x^1,x^2)(1-\varepsilon)}{\mu^U(x^1,x^2)(1-\varepsilon)+(1-\mu^U(x^1,x^2))\varepsilon},\; \mu^I(x^1,x^2,l) = \frac{\mu^U(x^1,x^2)\varepsilon}{\mu^U(x^1,x^2)\varepsilon+(1-\mu^U(x^1,x^2))(1-\varepsilon)}. \tag{4}$$

see why, consider the strategy profile

$$\chi^i(s^i) = s^i \quad \forall i, \tag{6}$$

$$\nu^U(x^1, x^2) = 1/2 \quad \forall (x^1, x^2), \tag{7}$$

$$\nu^I(s^I, x^1, x^2) = \begin{cases} 1 & \text{if } x^1 = s^I \neq x^2, \\ 0 & \text{if } x^1 \neq s^I = x^2, \\ 1/2 & \text{otherwise.} \end{cases} \tag{8}$$

In this profile, the candidates adopt truthful strategies, uninformed voters split their vote, and informed voters vote for the candidate whose plaform agrees agrees with the informed voters' private signal (if both candidates offer the same platform the informed voters split their vote as well).[10] By Lemma 1, the candidate who attracts the informed voters wins. Thus, the policy which is implemented under the profile (6)–(8) must agree with at least two private signals. This, by (5), is the full information policy.

Notice that the voting strategy used by the uninformed voters, (7), is *not* a sincere strategy: If candidates use the truthful strategies given in (6), the uninformed voters' Bayesian belief when both platforms are offeres must be

$$\mu^U(H, L) \;=\; \mu^U(L, H) \;=\; \frac{p(1-\varepsilon)\varepsilon}{p(1-\varepsilon)\varepsilon + (1-p)\varepsilon(1-\varepsilon)} \;=\; p > \frac{1}{2}. \tag{9}$$

In this case, the uninformed voters strictly prefer H over L, and thus any sincere voting strategy must satisfy $\nu^U(H, L) = 1$. Truthful candidate strategies and *in*sincere voting are, in fact, necessary for welfare maximization:

Lemma 2. *Suppose that $a^1 = a^2 = 0$. The profile* (6)–(8) *implements the full information policy with probability one. Moreover, any profile in which the candidate strategies are not truthful or in which the uninformed voters vote sincerely, implements the full information policy with probability strictly less than one.*

It is important to understand that an increase in the probability of x^{FI} being implemented does not in itself imply an increase in welfare. The reason is that failing to implement policy $x^{FI}(h, h, h) = H$ is costlier than failing to implement, say, policy $x^{FI}(h, h, l) = H$: In the former case, the likelihood that the state $\theta = h$ instead of $\theta = l$ is relatively large, and choosing policy L instead of H implies a larger loss in expected welfare than it does in the latter case. Thus, it is possible that a strategy profile implements the full information policy with a higher probability than another profile, yet results in lower expected welfare. However, for expected welfare to be *maximized*, it is necessary and sufficient that x^{FI} be implemented with probability one.

[10]Note that the uninformed voting strategy (7) essentially amounts to these voters abstaining from the election.

Lemma 2 hence identifies two sources of inefficient policies in the absence of advertising: Sincere voting and non-truthful campaign platforms. Sincere voting, of course, is an assumption we make on voters' behavior. Thus, in equilibrium of the model (to be defined formally in the next section), welfare cannot be maximized owing to this assumption alone. On the other hand, campaign strategies will be endogenously determined and chosen by the candidates in order to maximize their chances of electoral success. Candidates will choose truthful strategies only if doing so is optimal, but the optimality of any particular campaign strategies depends on what is assumed about voter behavior. We will discuss the assumption of sincere voting, and what it implies for the politicians' incentives to set their platforms, in Section 4.4.

4 Equilibrium without Advertising

Our notion of equilibrium in the model postulates that candidates maximize their chance of winning, voters vote sincerely, and beliefs be Bayesian:

Definition 1. A ***sincere Bayesian equilibrium*** in the game without advertising is a profile of strategies $(\chi^1, \chi^2, \nu^U, \nu^I)$ and a profile of beliefs $(\mu^1, \mu^2, \mu^U, \mu^I)$ such that the following conditions are satisfied:

(i) Campaign strategy χ^i $(i = 1, 2)$ maximizes candidate i's probability of winning, given μ^i, ν^U, ν^I, and χ^{-i}.[11]

(ii) The voting strategies ν^U and ν^I are sincere, given μ^U and μ^I.

(iii) Beliefs $\mu^1, \mu^2, \mu^U, \mu^I$ are Bayesian, given χ^1 and χ^2.

Note that condition (iii) poses no restrictions on beliefs at unreached information sets. While our model always has equilibria in which all information sets are reached, it also has equilibria where this is not the case. When this happens, we will discuss the reasonableness of out-of-equilibrium beliefs as we go along.

4.1 The candidates' problem

The main strategic choices in equilibrium concern the campaign platforms of the politicians. Given x^1, x^2, and s^I, the probability that candidate 1 wins is

$$\pi^1(x^1|x^2, s^I) \equiv Pr\left[\nu^U(x^1, x^2)\gamma^U + \nu^I(x^1, x^2, s^I)\gamma^I + z(0,0)\gamma^M > \frac{1}{2}\right]. \qquad (10)$$

[11] When considering candidate $i \in \{1, 2\}$ we adopt the usual convention of calling i's opponent $-i$.

For $r \in \mathbb{R}$, define $H(r) \equiv \min\{1, \max\{0, r\}\}$. Using (1), (10) can be expressed as

$$\pi^1(x^1|x^2, s^I) \;=\; H\left(\frac{1}{2} + \frac{1}{2}\frac{\left(\nu^U(x^1, x^2) - \frac{1}{2}\right)\gamma^U + \left(\nu^I(x^1, x^2, s^I) - \frac{1}{2}\right)\gamma^I}{\overline{\eta}\gamma^M}\right), \qquad (11)$$

A similar expression $\pi^2(x^2|s^1, s^I)$ can be derived for candidate 2.

If candidate $-i$ generates his campaign platform x^{-i} by applying the strategy χ^{-i}, candidate i's probability of winning with platform x^i conditional on s^{-i} and s^I is

$$\widetilde{\pi}^i(x^i|s^{-i}, s^I) \;\equiv\; \chi^{-i}(s^{-i})\pi^i(x^i|H, s^I) + (1 - \chi^{-i}(s^{-i}))\pi^i(x^i|L, s^I).$$

Given candidate i's belief μ^i, candidate i's chance of winning with platform x^i, conditional on i's own signal s^i, is then

$$W^i(x^i|s^i) \;\equiv\; \sum_{(s^{-i}, s^I) \in \{h,l\}^2} \Big(\mu^i(s^i)Pr[s^{-i}|h]Pr[s^I|h] + (1 - \mu^i(s^i)Pr[s^{-i}|l]Pr[s^I|l]\Big) \times \widetilde{\pi}^i(x^i|s^{-i}, s^I).$$

Thus, in equilibrium we require that

$$\chi^i(s^i)W^i(H|s^i) + (1 - \chi^i(s^i))W^i(L|s^i) \;\geq\; W^i(x|s^i)$$

for $i = 1, 2$, $s^i \in \{h, l\}$, and $x \in \{H, L\}$.

4.2 Populism

In principle, elections can aggregate the information held by politicians and voters into policies that are optimal conditional on this information. This requires both truthful campains and insincere voting, as shown in Lemma 2. Our equilibrium concept assumes sincere voting, so it is clear that equilibrium policies do not maximize welfare. We now examine if the requirement that candidates are truthful can be satisfied in equilibrium. Our first result shows that the answer is negative.

Proposition 3. ***(No truthful campaigns)*** *In the game without advertising, there does not exist a sincere Bayesian equilibrium in which both candidates play truthful strategies.*

The intuition for Proposition 3 can easily be seen when considering the limiting case where $\varepsilon \to 0$. Assume that candidate 1 obtains private signal $s^1 = l$. He must believe that (with probability almost one) the state of nature is l, and thus that candidate 2 has private signal $s^2 = l$. Thus, assuming truthful candidate strategies, the platforms offered are $x^1 = x^2 = L$ with probability almost one. Further assuming symmetric voting strategies, each candidate wins with probability 1/2 (the result does not depend on this assumption). On the other hand, suppose candidate 1 offered platform H. With probability almost one, the platforms offered would be $x^1 = H$ and $x^2 = L$ and the voters would infer that $s^1 = h$ and $s^2 = l$. In this rare but possible event, the uninformed voters would maintain their prior belief that $\theta = h$ with probability p. Since $p > 1/2$, candidate 1's platform offers the larger expected utility, so that all uninformed voters vote for 1. By Lemma 1, candidate 1 now wins with probability 1.

We call the effect that prevents truthful strategies from being an equilibrium strategy "populism," for the following reason. A politician who sets platform H, even when his private signal indicates otherwise, affects the uninformed voters in two ways: First, he manipulates information about his signal; second, he makes himself more attractive to the uninformed voters *given their manipulated beliefs about the state.* These two effects are closely linked: Policy H would *not* be an attractive policy if the uninformed were sufficiently certain that the state of the world was l. But it is precisely the fact that the candidate offers H which prevents the uninformed from learning too much about the state.

4.3 Equilibrium characterization

The above reasoning suggests that candidates might simply choose to offer policy H, regardless of their signals. Because voters learn nothing from the campaign platforms, the ex-ante optimal policy H is still optimal for the uninformed voters. These uninformative strategies are equilibrium strategies for the candidates, and the resulting equilibrium can be called a "populist equilibrium". Similarly, there are equilibria in which both candidates always offer platform L; these equilibria can be called "contrarian".

Proposition 4. ***(Pooling equilibrium)*** *In the game without advertising, there exists a sincere Bayesian equilibrium in which both candidates choose platform H regardless of their signals, and a sincere Bayesian equilibrium in which both candidates choose platform L regardless of their signals.*

In these pooling equilibria, there will be unreached information sets at which beliefs cannot be computed using Bayes' Rule. In a populist equilibrium, for example, enough uninformed voters must vote for H should a candidate deviate and offer L. For this to be sincerely optimal, the uninformed voters must believe that $\theta = h$ with probability $1/2$ or more in the event L is offered. Similarly, if H was offered in the contrarian equilibrium, the uninformed voters must believe that $\theta = h$ with probability of $1/2$ or less, and vote for L.[12]

[12]These beliefs do not satisfy basic forward induction criteria, such as D1 (Cho and Kreps, 1987). To see why, consider the populist equilibrium and suppose candidate i surprisingly chose platform $x^i = L$. The set of voting strategies for which i has at least the same chance of winning as in equilibrium, given s^i, is strictly larger when $s^i = l$ than when $s^i = h$. The reason is that informed voters with an h-signal would never vote for platform L, even if they were certain that $s^i = l$. On the other hand, informed voters with an l-signal will vote for L if they deem it sufficiently probable that $s^i = l$. From the perspective of the candidate, an l-signal makes it more likely that the informed voters also have an l-signal. Thus, a

There also exists an equilibrium in which in which all information sets are reached with positive probability. This equilibrium is in mixed strategies. In this case, beliefs can be computed via Bayes' rule everywhere.

Proposition 5. ***(Semi-separating equilibrium)*** *In the game without advertising, the following are sincere Bayesian equilibrium strategies: A candidate with an h-signal chooses platform H with probability one, and a candidate with an l-signal chooses platform H with probability*

$$\chi^1(l) = \chi^2(l) \;=\; \frac{(2p-1)\varepsilon(1-\varepsilon)}{(1-p)(1-\varepsilon)^2 - p\varepsilon^2}.$$

If two different platforms are offered, the informed voters vote for the candidate who offers H if and only if $s^I = h$, and the uninformed voters vote for the candidate who offers H with probability

$$\nu^U(H,L) = 1-\nu^U(L,H) \;=\; \frac{1}{2\gamma^U}\left(\gamma^U+\gamma^I-2\overline{\eta}\gamma^M\frac{\varepsilon(1-\varepsilon)}{(1-p)(1-\varepsilon)^2+p\varepsilon^2}\right).$$

In the equilibrium characterized in Proposition 5, the probability that a candidate with an l-signal sets platform H, $\chi^i(l)$, is strictly between zero and one for all $\varepsilon \in (0,1-p)$. The voters therefore learn from the candidates' campaign platforms, albeit imperfectly. Furthermore, $\chi^i(l)$ increases in ε, with $\lim_{\varepsilon\to 0}\chi^i(l) = 0$ and $\lim_{\varepsilon\to 1-p}\chi^i(l) = 1$. Thus, as information becomes more precise the platforms become more truthful, and as information become less precise the platforms become more populist. Note also that $\nu^U(H,L)$ decreases in ε. Thus, as the signal precision increases more uninformed voters vote for platform H (if both H and L are offered).

All equilibria characterized so far were in symmetric candidate strategies. There do exist asymmetric equilibria in which exactly one candidate is truthful, while the other is pooling (i.e., uninformative). As long as the "pooling" candidate's strategy is fully mixed, there will be no unreached information sets, so that all beliefs are computed by Bayes' rule.

Proposition 6. ***(Asymmetric equilibrium)*** *In the game without advertising, there exists an asymmetric sincere Bayesian equilibrium in which one candidate uses the truthful strategy and wins with probability one, while the other plays any uninformative strategy and never wins.*

As $\varepsilon \to 0$ the probability that the full information platform is implemented in the equilibria of Proposition 5 and Proposition 6 approaches one. Thus, if signal noise is low,

candidate with an l-signals wants to deviate to L whenever a candidate with an h-signal does, but not vice versa. D1 requires that, in such a case, voters must believe that candidate 1 has an l-signal with probability one. But then $Pr[\theta = h|s^i = l] = p\varepsilon/[p\varepsilon + (1-p)(1-\varepsilon)] < 1/2$, given that $\varepsilon < 1-p < 1/2$. The case against the contrarian equilibrium is similar.

these equilibria entail relatively little welfare loss. As ε increases, however, the mixed equilibrium converges to the populist equilibrium of Proposition 4, in which no information is transmitted and in which the enacted policy is incorrect (ex post) with probability $1 - p$. For large ε the welfare loss in the asymmetric equilibrium is less severe, because policy is sensitive to one of the three signals. We nevertheless think that these equilibria are unrealistic: Proposition 6 describes uncontested elections in which one candidate is essentially not competiting, while the other candidate is assured to win and therefore has no incentive to offer non-truthful platforms. On the other hand, the non-existence of equilibria in which *both* candidates offer truthful platforms, as described by Proposition 3, is directly linked to the fact that, with truthful strategies, the election would be contested. If we take seriously the idea of political competition, uncontested elections simply do not appear realistic, regardless of the information aggregation properties they may possess in this model.

4.4 Remarks

Proposition 3 shows that truthful campaigns do not occur in a sincere Bayesian equilibrium. Note that, for populist deviations from the truthful strategy to be profitable, it is necessary that the uninformed voters are sincere when casting their votes. In fact, if they abstained from voting (i.e., if they voted as in (7)), the candidates' desire to appeal to the uninformed voters would be eliminated. Instead, they would want to attract the informed voters by choosing platforms that match their private signals. The first-best policy is then implemented with probability one, increasing the uninformed voters' welfare. It is hence the assumption of sincere voting that fuels populism.

Suboptimal policies emerge as a consequence of three factors: (A) A lack of information on part of some voters, (B) the failure of these voters to abstain (or otherwise vote strategically), and (C) a willingness on part of candidates to exploit (A) and (B) for political gain. This raises the question: Why should voters be able to process information in a Bayesian way (or even draw inferences at null events) and at the same time fail to realize that, by not abstaining, they are actually making matters worse?

We have two answers to this question. For one, it does not help if a single uninformed voter deviated from sincere voting and abstained instead. To change the equilibrium outcome, it is necessary that sufficiently many uninformed voters engage in a coordinated abstention. Thus, sincere voting should not be viewed as a subotimal behavior for any single voter, although it is obviously suboptimal in the aggregate. Second, for many voters casting sincere ballots is as much a way of expressing a point of view as it is a way of influencing the election outcome. We suspect that these voters would not happily abstain from an election simply because they are less well informed than others. The sincerity condition in our equilibrium definition therefore can be viewed as describing the behavior of "expressive" voters. In a model that is at the same time about populism, this seems quite reasonable, and perhaps more so than strategic voting or strategic non-voting.

5 Campaign Advertising by Special Interests

In the previous section, we examined the equilibria of our model under the assumption that no campaign advertising takes place. We will now change this assumption. Campaign advertising can be financed in several ways: By the politicians themselves, through a public system of funding political parties, or through special interest groups (SIGs). The focus of this section will be on the last case.

5.1 Partisanship

We think of SIGs as groups of citizens that are small in size, have preferences are different from those of most voters, and are wealthy enough to influence elections by buying political ads. To incorporate these characteristics, we assume the presence of two single (i.e., atomistic) voters, called SIG H and SIG L. SIG H receives a benefit $\Pi_H > 0$ if the policy is H and zero otherwise. Likewise, SIG L receives a benefit $\Pi_L > 0$ if the policy is L and zero otherwise. These values are independent of the state θ; we therefore say that the groups have ***partisan*** preferences.

The timing of the model with special interests is as follows. As before, nature chooses the state, the candidates and informed voters observe their signals, and the candidates then choose their campaign platforms. The voters and the SIGs observe the platforms. At this point, the SIGs make simultaneous advertising choices. We let $a_j^i \geq 0$ denote the amount of advertising by SIG $j \in \{H, L\}$ for candidate $i \in \{1, 2\}$. Thus, the total amount of advertising bought by SIG j is $a_j = a_j^1 + a_j^2$, and the total amount of advertising for candidate $i \in \{1, 2\}$ is $a^i = a_H^i + a_L^i$. The variables a^1 and a^2 influence the impressionable voters through equation (1). After all adverts have aired, the election is held and the politician who attracts a majority of voters wins. The cost of advertising by SIG j is assumed to be $\beta_j a_j$, with $\beta_j > 0$. These costs are paid by the groups.[13]

Note that in our model the SIGs do *not* spend money in order to influence the policy platforms of the candidates. Instead, they spend in order to help the candidates win elections once the policy platforms are chosen. Grossman and Helpman (2001) call the former motive the "influence motive" and the latter the "electoral motive." The electoral motive first appears in Austen-Smith (1987). The technical difference is timing: In a model with the influence motive, SIGs commit to schedules specifying

[13] The possibility of cost differences can reflect the fact that one special interest group may be less well funded, or less well organized, than the other. Alternatively, one group may be less efficient in producing campaign ads, or may be utilizing less effective advertising channels.

campaign contributions for each policy, to which the politicians react. In a model with the electoral motive, as is this, politicians commit to policies to which the SIG's react.

5.2 The interest groups' problem

We assume that each interest group maximizes its expected payoff—the probability of obtaining Π_j minus the cost $\beta_j a_j$—by choosing its own advertising and taking that of the opposing SIG as given. SIG j's strategy is then a mapping

$$(\alpha_j^1, \alpha_j^2) : X \times X \ \rightarrow \ [0, \infty) \times [0, \infty),$$

where $\alpha_j^i(x^1, x^2)$ denotes the advertising bought by SIG j on behalf of politician i after observing campaign platforms x^1 and x^2. Clearly, if $x^1 = x^2$ the final policy does not depend on advertising, and because advertising is costly we can set $\alpha_j^i(H, H) = \alpha_j^i(L, L) = 0$ for $i, j = 1, 2$. On the other hand, if $x^1 \neq x^2$ then the SIGs have opposing interests and can influence the election outcome by setting positive advertising levels. Because SIG H (L) cannot benefit from advertising for a candidate whose platform is L (H), we also have $\alpha_H^1(L, H) = \alpha_H^2(H, L) = \alpha_L^1(H, L) = \alpha_L^2(L, H) = 0$. Thus, the only components of SIG H's strategy which are possibly non-zero are

$$\alpha_H \ \equiv \ \alpha_H^1(H, :) = \alpha_H^2(L, H),$$

and the only components of SIG L's strategy which are possibly non-zero are

$$\alpha_L \ \equiv \ \alpha_L^1 2(L, H) = \alpha_L^2(H, L).$$

(Note that the continuation game at the platform pair (H, L) is entirely symmetric to the game at (L, H). A single number α_j is hence sufficient to describe SIG j's strategy in these games.)

In order to define equilibrium, we maintain our requirements that voters vote sincerely and candidates maximize their chance of being elected (the candidates' choices are now made in anticipation of the SIGs' advertising decisions). Because the SIGs do not observe any private signals and campaign ads do not contain information concerning what the politicians know, voters cannot learn anything from the variables a_j^i. Thus, the uninformed and informed voters' Bayesian updating problem is unchanged and their beliefs are still described by (2)–(4). Note also that, from an informational perspective, each SIG is an uninformed voter and its beliefs about the state θ after observing platforms (x^1, x^2) are given by $\mu^U(x^1, x^2)$.

In the extended model with special interest financing of campaigns, a sincere Bayesian equilibrium is thus a strategy profile $(\chi^1, \chi^2, \nu^U, \nu^I)$, a belief profile $(\mu^1, \mu^2, \mu^U, \mu^I)$, and a pair of advertising levels (α_1, α_2), which satisfies the conditions in Definition 1; *and* the new condition that α_H and α_L maximize the expected payoffs of SIG 1 and SIG 2 in case one candidate offers platform H and the other offers L.

5.3 Equilibrium with truthful campaigns

Under certain conditions there exists an equilibrium in the model with special interest groups in which the politicians' strategies are truthful. The presence of special interest groups therefore overrides the populist motive to choose platform H in cases when a candidate's signal is l. Even though the uninformed and informed voters are still assumed to follow sincere strategies, voter welfare is maximized. Thus, if advertising is possible, sincere voting does *not* prevent implementation of the full information policy with probability one—overturning the result of Lemma 2. The reason is that the impressionable voting behavior is now responsive to the advertising provided by the SIGs.

Proposition 7. *Suppose that advertising is provided by special interest groups. If*

$$\frac{\Pi_L}{\beta_L} \geq \frac{\dfrac{\gamma^U - \gamma^I}{2\gamma^M} + \overline{\eta}}{p\varepsilon + (1-p)(1-\varepsilon)} > \frac{2\overline{\eta}}{p\varepsilon + (1-p)(1-\varepsilon)} \geq \frac{\Pi_H}{\beta_H}$$

holds, there exists a sincere Bayesian equilibrium with truthful campaigns. If one candidate offers platform H and the other offers platform L, SIG L spends

$$\alpha_L = \frac{\gamma^U - \gamma^I}{2\gamma^M} + \overline{\eta} > 0$$

on advertising for the candidate who offers L, while SIG H spends zero. The candidate who offers L wins if and only if the informed voters' signal is $s^I = l$. Therefore, the full information policy is implemented with probability one and voter welfare is maximized.

Proposition 7 contains a condition on the benefit-cost ratios Π_j/β_j for the special interest groups. This condition is that there be a wedge between Π_L/β_L and Π_H/β_H: The group that favors the non-populist policy L must be "stronger" than the group that favors the populist policy H (in the sense of either having a sufficiently larger benefit from obtaining its favored policy relative to the other group, or a sufficiently lower cost of advertising, or both). In this case, the weaker SIG stays out of the game and does not advertise, while the stronger SIG advertises a positive amount. This amount makes platform L win if and only if it is supported by the informed voters.

To see this, suppose the candidates are truthful and both platforms are offered. The uninformed beliefs are given in (9). All uninformed voters therefore vote for the candidate who offers the populist platform H. In the absence of advertising, this implies platform H would win with certainty (Lemma 1). With advertising, the mass of impressionable voters that votes for L is

$$z(\alpha_1, 0)\gamma^M = \left(\frac{1}{2} + \frac{\gamma^U - \gamma^I}{2\gamma^M} + \overline{\eta} + \eta\right)\gamma^M$$
$$= \left(\frac{1 - 2\gamma^I}{2\gamma^M} + \overline{\eta} + \eta\right)\gamma^M = \frac{1}{2} - \gamma^I + (\overline{\eta} + \eta)\gamma^M.$$

In the worst case ($\eta = -\overline{\eta}$) this amounts to $\frac{1}{2} - \gamma^I$ impressionable voters supporting platform L. Hence if the informed voters vote for L, advertising by SIG L is enough to overcome the populist advantage of H. This, in turn, allows a candidate with an l-signal to resist the desire to campaign on the populist platform H, and offer platform L instead. Of course, there is a chance (larger than 1/2) that the informed voters do *not* vote for L. In this case SIG L's advertising effort is wasted, which is the reason why the benefit-cost ratio Π_L/β_L must be sufficiently large for this group wanting to advertise.

5.4 Remarks

We conclude this section with a few remarks. First, the truthful equilibrium we found is such that only SIG L advertises. If SIG H also advertised in equilibrium, voter welfare would not be maximized. To see this, note that SIG H would set a positive α_H only if this increased the probability of platform H winning against L. If the informed signal is h, then platform H wins even without advertising. Thus, an increased probability of H winning requires that H wins with positive probability in case the informed signal is l and the full information policy is L.

Second, given that SIG H is inactive in equilibrium one may wonder why we need this group in the model to begin with. We do not. Our point is that SIG-funded campaigns have appealing welfare properties when there is a relatively *strong* special interest group that favors a policy that is *not* preferred by a majority of citizens ex-ante. It does not matter if a group with the opposite preference exists, as long as this group is not too strong.

Third, observe that in the model without advertising both politicians were trying to attract the uninformed voters by offering policy H, regardless of whether their signals indicated that this was a good policy or not. When special interest groups are added, the group favoring policy L is trying to attract impressionable voters by advertising for policy L, without regard for whether this is good for the voters or not. Yet, on balance the politicians' incentive to offer H and the group's incentive to advertise for L offset one another. This effect is somewhat reminiscent of the advocacy effect in Dewatripont and Tirole (1999). There it is shown that an agent charged with discovering decision-relevant information for the principal often has an incentive to shirk, even if offered an optimal contract. On the other hand, competition between agents with opposing goals, neither of whom sharing the principal's interests, can produce more information at a lesser cost.

6 Alternative Funding Systems

The last section demonstrated that campaign advertising by special interest groups can improve voter welfare by giving candidates an incentive to set their platforms truthfully. This was true only under certain conditions on the groups' valuations and cost coefficients. Importantly, however, it did not require the groups to have superior information or share the voters' preferences.

In this section, we consider two alternative systems through which campaign funds can be provided: By the candidates privately, and by the state.

6.1 Private candidate wealth

Political candidates often use their own money to fund their campaigns, and the sums spent by wealthy politician can dwarf even lavishly funded special-interest campaigns. In the 2010 California governor's race, for example, billionaire Republican candidate and former Ebay CEO Meg Whitman spent more than \$140 million of her own wealth on her election campaign, approximately \$110 million of which was allocated to broadcast advertising (Los Angeles Times, 2010). We now examine the question whether a wealthy candidate can afford the "luxury" of being honest with voters.

To do so, let us assume that candidate $i = 1, 2$ values office at $\Pi^i > 0$ and has a marginal advertising cost of $\beta^i > 0$. Both candidates choose their advertising expenditures after observing each other's platform choices. That is, after the platforms are chosen the candidates become engaged in an advertising contest for impressionable voters. A pure advertising strategy for Candidate i's is a mapping

$$\alpha^i : X \times X \times \Theta \ \rightarrow \ [0, \infty),$$

where $\alpha^i(x^1, x^2, s^i)$ denotes the advertising bought by candidate i when the campaign platforms are x^1 and x^2 and the candidate's private signal is s^i.

Our equilibrium notion will be that of sincere Bayesian equilibrium in Definition 1, with one added requirement: The candidates' advertising strategies α^1 and α^2 form a Bayesian Nash equilibrium in the advertising contest for every (x^1, x^2) and (s^1, s^2) (taken the strategies of uninformed and informed voters as given). If the benefit-cost ratio Π^i/β^i is sufficiently low for both candidates, there will be no advertising in equilibrium. This happens when $\Pi^i/\beta^i < 1/(2\overline{\eta})$, in which case the game with private candidate wealth then boils down to the game examined in Section 4. If exactly one candidate has $\Pi^i/\beta^i > 1/(2\overline{\eta})$, the advertising contest will have a pure strategy equilibrium similar to the one in Proposition 7, and only one candidate advertises. In all other cases, the equilibrium involves mixed advertising strategies. It is not difficult to compute mixed strategy equilibria; however, this is not needed for our result.

Proposition 8. *Suppose that advertising is provided by the candidates. Then for all* Π^1*,* Π^2*,* β^1*,* β^2 *there does not exist a sincere Bayesian equilibrium with truthful campaigns. Furthermore, in every equilibrium the full information policy is implemented with probability strictly less than one, and voter welfare is not maximized.*

Why is this different from the model of Section 5? Note that special interest groups care only about the policy outcome, but not about the candidates per se. SIGs therefore do not advertise when $x^1 = x^2$. The candidates, on the other hand, care only about being elected but not about policy per se. Thus, the candidates can benefit from advertising *especially* when $x^1 = x^2$: In this case advertising is the only variable that distinguishes one candidate from the other. If both candidates choose truthful platforms, this case is likely to arise. By deviating to the populist platform H when a candidate's signal is l, a candidate can differentiate himself from his opponent on the basis of policy as well, and thereby attract the uninformed voters.

6.2 Public campaign financing

Next, we consider a Eruopean-style system of public funding of elections. That is, we imagine a pool of public funds of overall size Γ, to be awarded to the candidates after the election and in proportion to their vote share. Such a system is examined by Ortuno-Ortín and Schultz (2004), who show that it gives policy-motivated candidates a strong incentive to set convergent platforms.

As in Oruno-Ortín and Schultz (2004), we assume that both candidates have access to credit markets that allow them to borow (at a zero interest rate) against public funds to be awarded after the election. Furthermore, candidates have access to actuarily fair insurance and can exchange any probability distribution over public funds received after the election for a fixed payment equal to the expected value of this distribution. Funds for the election are acquired on the credit and insurance market after both candidates have set their platforms, and insurers have the same information as uninformed voters (in particular, candidates cannot credibly communicate their signals to them). Thus, we denote by $\Gamma^i(x^1, x^2)$ the funds acquired (on the credit/insurance market) by candidate i when the platforms are (x^1, x^2).

Because candidates have no private wealth and because publicly provided campaign funds have no alternative uses, the advertising bought by candidate i is $\Gamma^i(x^1, x^2)/\beta^i$, where $\beta^i > 0$ is i's advertising cost coefficient. Our equilibrium notion in the game with a public funding system will once again be that of sincere Bayesian equilibrium in

Definition 1, together with an added requirement: For all $i \in \{1, 2\}$ and for all (x^1, x^2),

$$\Gamma^i(x^1, x^2) \;=\; \Gamma \times \mathbb{E}_{s^I}\Bigg[\nu^U(x^1, x^2)\gamma^U + \nu^I(x^1, x^2, s^I)\gamma^I + z\left(\frac{\Gamma^1(x^1, x^2)}{\beta^1}, \frac{\Gamma(x^1, x^2)}{\beta^2}\right)\gamma^M \,\Bigg|\, x^1, x^1\Bigg].$$

This condition says that the funds available to a candidate, given platforms (x^1, x^2), are a proportion of the available funds which equals the expected vote share of the candidate conditional on (x^1, x^2).

Proposition 9. *Suppose that advertising is provided by a public system of election financing. Then for all* Γ*,* β^1*, and* β^2 *there does not exist a sincere Bayesian equilibrium with truthful campaigns. Furthermore, in every equilibrium the full information policy is implemented with probability strictly less than one, and voter welfare is not maximized.*

The intuition for this result are similar to the intuition for the convergence result in Ortuno-Ortín and Schultz (2004). There, in a Hotelling-type setup, moving one's platform closer to the median voter increases votes, which leads to a larger share of campaign funds awarded for the candidate, which in turn can be spent to attract more impressionable voters. Here, choosing a populist platform does the same: By the arguments given in Section 4.2, it always results in a higher expected vote share than the non-populist platform, which leads to more campaign funds, which in turn can be spent to attract more impressionable voters.

7 Conclusion

[To be completed.]

Appendix

Proof of Lemma 1

If a candidate attracts all uninformed voters, this candidate's vote share is at least

$$\gamma^U + \left(\frac{1}{2} - \overline{\eta}\right)\gamma^M = \frac{1}{2}(1 + \gamma^U - \gamma^I) - \overline{\eta}\gamma^M > \frac{1}{2}(1 + \gamma^U - \gamma^I) - \frac{1}{2}(\gamma^U - \gamma^I) = \frac{1}{2},$$

where the inequality follows from Assumption 3, namely $(\gamma^U - \gamma^I)/(2\gamma^M) > \overline{\eta}$. If a candidate attracts all informed voters and half of the uninformed voters, this candidate's vote share is at least

$$\frac{1}{2}\gamma^U + \gamma^I + \left(\frac{1}{2} - \overline{\eta}\right)\gamma^M = \frac{1}{2}(1 + \gamma^I) - \overline{\eta}\gamma^M > \frac{1}{2},$$

where the inequality follows from Assumption 3 again, namely $\gamma^I/(2\gamma^M) > \overline{\eta}$. In both cases, the candidate receives more than half of all votes and therefore wins. □

Proof of Lemma 2

In the text we already showed that (6)–(8) implements x^{FI} with probability one. We now show that truthful platforms and insencere voting are necessary for x^{FI} to be implemented with probability one. Strategy χ^i is truthful if $\chi^i(l) = 0$ and $\chi^i(h) = 1$ for $i = 1, 2$. Consider the following four cases:

(a) $s^1 = s^2 = l$. In this case $x^{FI} = L$, and for x^{FI} to be implemented with probability one it is necessary that at least one candidate offers L with probability one: $\chi^1(l) = 0$ or $\chi^2(l) = 0$.

(b) $s^1 = s^2 = h$. In this case $x^{FI} = H$, and for x^{FI} to be implemented with probability one it is necessary that at least one candidate offers H with probability one: $\chi^1(h) = 1$ or $\chi^2(h) = 1$.

(c) $s^1 = l, s^2 = h$. In this case $x^{FI} = H$ if and only if $s^I = h$, and for x^{FI} to be implemented with probability one it is necessary that one candidate offers H with probability one and the other candidate offers L with probability one: $\chi^1(l) = 0$, $\chi^2(h) = 1$ or $\chi^1(l) = 1$, $\chi^2(h) = 0$.

(d) $s^1 = h, s^2 = l$. In this case $x^{FI} = H$ if and only if $s^I = h$, and for x^{FI} to be implemented with probability one it is necessary that one candidate offers H with probability one and the other candidate offers L with probability one: $\chi^1(h) = 0$, $\chi^2(l) = 1$ or $\chi^1(h) = 1$, $\chi^2(l) = 0$.

Suppose that χ^i is not truthful for some $i = 1, 2$. Without loss of generality, assume $\chi^1(l) > 0$. (The cases $\chi^2(l) > 0$, $\chi^1(h) < 1$, and $\chi^2(h) < 1$ are similar.) By (a) we have $\chi^2(l) = 0$ and by (c) we have $\chi^1(l) = 1$ and $\chi^2(h) = 0$. Using (b) and (d), this implies $\chi^1(h) = 1$. Thus, candidate 1 offers H regardless of s^1 and candidate 2 offers L regardless of s^2. Consider now the case $s^1 = s^2 = s^I = h$. In this case $x^{FI} = H$. For policy H to be implemented, candidate 1 must be elected with probability one, which implies

$$\gamma^U \nu^U(H, L) + \gamma^I \nu^I(H, L, h) + \gamma^M(1/2 - \overline{\eta}) \;\geq\; \frac{1}{2}. \tag{12}$$

Next, consider the case $s^1 = s^2 = l$ and $s^I = h$, so that $x^{FI} = L$. For policy L to be implemented, candidate 2 must be elected with probability one, which implies

$$\gamma^U \nu^U(H, L) + \gamma^I \nu^I(H, L, h) + \gamma^M(1/2 + \overline{\eta}) \;\leq\; \frac{1}{2}. \tag{13}$$

Because $\overline{\eta} > 0$, (12) and (13) cannot be true at the same time. It follows that, unless χ^i is truthful for $i = 1, 2$, x^{FI} cannot be implemented with probability one.

Let us now turn to the voting strategy ν^U. We know that truthful χ^1 and χ^2 are necessary for x^{FI} to be implemented with probability one, so assume this to be the case and consider the signals $(s^1, s^2, s^I) = (l, h, l)$. The full information policy is $x^{FI}(l, h, l) = L$. Given truthful χ^1 and χ^2, the policy platforms offered are $x^1 = L$ and $x^2 = H$ and the uninformed beliefs are

$$\mu^U(L, H) = Pr[\theta = h | x^1 = L, x^2 = H] = \frac{p\varepsilon(1-\varepsilon)}{p\varepsilon(1-\varepsilon) + (1-p)(1-\varepsilon)\varepsilon} = p.$$

Since $p > 1/2$, the uninformed voters strictly prefer policy $x^2 = H$ over policy $x^1 = L$. Sincere voting implies that all uninformed voters vote for candidate 2 ($\nu^U(L, H) = 0$). By Lemma 1, candidate 2 wins and policy $x^2 = H \neq x^{FI}$ is implemented. It follows that for x^{FI} to be implemented with probability 1, ν^U must not be sincere. □

Proof of Proposition 3

Consider the pair of platforms (L, L). There must be at least one candidate who wins with probability strictly less than one. Without loss of generality, suppose candidate 1 wins with probability $\alpha < 1$ in this case. Let $\beta \geq 0$ be the probability that candidate 1 wins if the platforms offered are (H, H). Now consider the pair of platforms (L, H). Assuming that candidates choose truthful platforms, the uninformed voters' Bayesian beliefs are

$$\mu^U(L, H) = Pr[\theta = h | x^1 = L, x^2 = H] = \frac{p(1-\varepsilon)\varepsilon}{p(1-\varepsilon)\varepsilon + (1-p)\varepsilon(1-\varepsilon)} = p > \frac{1}{2}.$$

Thus, the uninformed voters prefer platform H over L. All uninformed voters therefore sincerely vote for candidate 2, who then wins by Lemma 1. Similarly, if $(x^1, x^2) = (H, L)$, all uninformed voters vote for candidate 1, who wins.

The following must then be true: If $x^1 = L$, candidate 1 wins with probability $\alpha < 1$ if $x^2 = L$ and with probability zero if $x^2 = H$. If $x^1 = H$, candidate 1 wins with probability one if $x^2 = L$ and with probability $\beta \geq 0$ if $x^2 = H$. If candidate 2 plays a truthful strategy, then there is a positive probability that $x^2 = L$ and a positive probability that $x^2 = H$. Therefore, regardless of the signal s^1, candidate 1 has a strictly larger chance of winning with platform $x^1 = H$ than with $x^1 = L$. A truthful equilibrium hence cannot exist. □

Proof of Proposition 4

Consider first the populist equilibrium, where $\chi^1(s^1) = \chi^2(s^2) = H$. Suppose voting strategies are symmetric; this means, in equilibrium each candidate wins with probability 1/2. Consider now a deviation by candidate 1 to platform L. If the uninformed voters believed that $\mu^U(L, H) < 1/2$, they would vote for candidate 1, who would then win by Lemma 1. On the other hand, if $\mu^U(L, H) \geq 1/2$, it is optimal for all uninformed voters to vote for candidate 2, so that candidate loses as a result of the deviation. A similar argument applies for a deviation by candidate 2. Thus, it is possible to support the equilibrium by beliefs μ^U if and only if $\mu^U(L, H) \geq 1/2$ $\mu^U(H, L) \geq 1/2$. For the contrarian equilibrium, where $\chi^1(s^1) = \chi^2(s^2) = L$, the opposite holds: $\mu^U(H, L) \leq 1/2$ $\mu^U(L, H) \leq 1/2$. □

Proof of Proposition 5

Suppose $\chi^i(h) = 1$ and $\chi^i(l) = q$ for $i = 1, 2$. Consider the cases $(x^1, x^2) = (H, L), (L, H)$. Using (3), the uninformed voters' Bayesian belief at these information sets satisfies

$$\mu^U(H, L) = \frac{p(1 - \varepsilon + \varepsilon q)\varepsilon(1 - q)}{p(1 - \varepsilon + \varepsilon q)\varepsilon(1 - q) + (1 - p)(\varepsilon + (1 - \varepsilon)q)(1 - \varepsilon)(1 - q)} = \mu(L, H).$$

For $\nu^U(H, L) = 1 - \nu^U(L, H) \in (0, 1)$, the uninformed voters must be indifferent between H and L. This requires $\mu^U(H, L) = \mu^U(L, H) = 1/2$, which in turn implies

$$q = \chi^i(l) = \frac{(2p - 1)\varepsilon(1 - \varepsilon)}{(1 - p)(1 - \varepsilon)^2 - p\varepsilon^2}. \tag{14}$$

(14) is the probability that a candidate sets platform H after having received an l-signal, as stated in the Proposition. Since $\varepsilon < 1 - p$ (Assumption 2), $\chi^i(l) \in (0, 1)$.

Using (4), the uninformed voters' belief are now given by

$$\mu^I(H,L,h) \;=\; \mu^I(L,H,h) \;=\; \frac{\frac{1}{2}(1-\varepsilon)}{\frac{1}{2}(1-\varepsilon)+\frac{1}{2}\varepsilon} \;=\; 1-\varepsilon \;>\; \frac{1}{2}$$
$$> \; \varepsilon \;=\; \frac{\frac{1}{2}\varepsilon}{\frac{1}{2}(1-\varepsilon)+\frac{1}{2}\varepsilon} \;=\; \mu^I(H,L,l) \;=\; \mu^I(L,H,l).$$

Clearly, then, the informed voters vote according to their own signal s^I: $\nu^I(H,L,h) = \nu^I(L,H,l) = 1$ and $\nu^I(H,L,l) = \nu^I(L,H,h) = 0$.

Given symmetric voting strategies, if both candidates offer the same platform then each wins with probability 1/2. If two different platforms are offered, denote by f_θ the probability that platform H wins against platform L, conditional on the state being θ. Candidate i's probability of winning can then be expressed as follows:

$$\begin{aligned} W^i(H|s^i) \;&=\; \mu^i(s^i)\left[(1-e)\frac{1}{2}+\varepsilon\left(q\frac{1}{2}+(1-q)f_h\right)\right] \\ &\quad +(1-\mu^i(s^i))\left[\varepsilon\frac{1}{2}+(1-e)\left(q\frac{1}{2}+(1-q)f_l\right)\right], \\ W^i(L|s^i) \;&=\; \mu^i(s^i)\left[(1-e)(1-f_h)+\varepsilon\left(q(1-f_h)+(1-q)\frac{1}{2}\right)\right] \\ &\quad +(1-\mu^i(s^i))\left[\varepsilon(1-f_l)+(1-e)\left(q(1-f_l)+(1-q)\frac{1}{2}\right)\right]. \end{aligned}$$

For equilibrium, we need $W^i(H|l) = W^i(L|l)$ and $W^i(H,h) \geq W^i(L|h)$. These conditions can be written as

$$\mu^i(l)f_h + (1-\mu^i(l))f_l \;=\; \frac{1}{2} \;\leq\; \mu^i(h)f_h + (1-\mu^i(h))f_l. \tag{15}$$

Since $\mu^i(h) > \mu^i(l)$, if $f_h > f_l$ then the equality in (15) implies the inequality.

Using (2), the first condition in (15) implies that

$$f_h \;=\; \frac{1}{2} + \frac{1-p}{p}\frac{1-\varepsilon}{\varepsilon}\left(\frac{1}{2}-f_l\right). \tag{16}$$

We also know that

$$f_h \;=\; (1-\varepsilon)\pi^i(H|L,h) + \varepsilon\pi^i(H|L,l), \tag{17}$$

where $\pi^i(x^i|x^{-i},s^I)$ was defined in (10). Assume now that $\pi^i(H|L,h) = 1$ and that $\pi^i(H|L,l) \in (0,1)$. Replacing $\pi^i(H|L,l)$ by (11) and recalling that $\nu^I(H,L,l) = 0$, (17) becomes

$$f_h \;=\; (1-\varepsilon) + \varepsilon\left(\frac{1}{2} + \frac{(\nu^U(H,L)-\frac{1}{2})\gamma^U - \frac{1}{2}\gamma^I}{2\overline{\eta}\gamma^M}\right). \tag{18}$$

Similarly,

$$
\begin{aligned}
f_l &= \varepsilon\pi^i(H|L,h) + (1-\varepsilon)\pi^i(H|L,l)(1-\varepsilon) \\
&= \varepsilon + (1-\varepsilon)\left(\frac{1}{2} + \frac{(\nu^U(H,L)-\frac{1}{2})\gamma^U - \frac{1}{2}\gamma^I}{2\overline{\eta}\gamma^M}\right). \quad (19)
\end{aligned}
$$

Equations (16), (18), and (19) can simultaneously be solved for

$$\nu^U(H,L) = \frac{1}{2\gamma^U}\left(\gamma^U + \gamma^I - 2\overline{\eta}\gamma^M \cdot K\right), \quad (20)$$

$$f_h = \frac{1}{2}\frac{(1-p)(2-5\varepsilon+2\varepsilon^2)+\varepsilon^2}{(1-p)(1-\varepsilon)^2+p\varepsilon^2}, \quad f_l = \frac{1}{2}\frac{(1-e)^2 - p(1-\varepsilon(1+2)}{(1-p)(1-\varepsilon)^2+p\varepsilon^2},$$

where

$$K \equiv \frac{\varepsilon(1-\varepsilon)}{(1-p)(1-\varepsilon)^2+p\varepsilon^2}.$$

Note that $\varepsilon < 1-p$ (Assumption 2) implies $K \in (0,1)$. (20) is the probability that the uninformed voters vote for candidate 1 if $(x^1,x^2) = (H,L)$, as stated in the Proposition. By symmetry, $\nu^U(H,L) = 1-\nu^U(L,H)$. It is easily verified that $\nu^U(H,L) < 1$. On the other hand, $\nu^U(H,L) \geq 0$ if and only if $\overline{\eta} \leq (\gamma^U+\gamma^I)/(2K\gamma^M)$. This holds because $\overline{\eta} < \gamma^I/(2\gamma^M)$ (Assumption 3) and $K \in (0,1)$.

Some remaining conditions must still be checked. First, we need to verify that $f_h > f_l$ (so the second condition in (15) is satisfied). This can be shown to hold, given $p > 1/2$ and $\varepsilon < 1-p$ (Assumption 2). Second, we need to verify that $\pi^i(H|L,h) = 1$, as was assumed earlier in the proof. Using (11) and recalling that $\nu^I(H,L,h) = 1$, this condition boils down to

$$\frac{1}{2} + \frac{(\nu^U(H,L)-\frac{1}{2})\gamma^U + \frac{1}{2}\gamma^I}{2\overline{\eta}\gamma^M} \geq 1. \quad (21)$$

Plugging (20) into (21) and rearranging, we get $\overline{\eta} \leq \gamma^I/((K+1)\gamma^M)$, which is implied by $\overline{\eta} < \gamma^I/(2\gamma^M)$ (Assumption 3) and $K \in (0,1)$. Finally, we need to verify that $\pi^i(H|L,l) \in (0,1)$. Again using (11) (and again recalling that $\nu^I(H,L,l) = 0$), this condition boils down to

$$0 < \frac{1}{2} + \frac{(\nu^U(H,L)-\frac{1}{2})\gamma^U - \frac{1}{2}\gamma^I}{2\overline{\eta}\gamma^M} < 1. \quad (22)$$

Pluging (20) into (22) and rearranging, we get $(K-1)\overline{\eta}\gamma^M < 0 < (K+1)\overline{\eta}\gamma^M$. Since $K \in (0,1)$, (22) is satisfied as well. □

Proof of Proposition 6

Without loss of generality, suppose candidate 1 is truthful and candidate 2 is uninformative: $\chi^1(l) = L$, $\chi^1(h) = H$, $\chi^2(l) = \chi^2(h)$. Then the uninformed beliefs are

$$\mu^U(H, x^2) = Pr[\theta = h | x^1 = H] = \frac{p(1-\varepsilon)}{p(1-\varepsilon) + (1-p)\varepsilon} > \frac{1}{2}$$

(the inequality follows from $p > 1/2$, $\varepsilon < 1/2$) and

$$\mu^U(L, x^2) = Pr[\theta = h | x^1 = L] = \frac{p\varepsilon}{p\varepsilon + (1-p)(1-\varepsilon)} < \frac{1}{2}$$

(the inequality follows from $\varepsilon < 1 - p$). Thus, the uninformed voters prefer platform H over L if $x^1 = H$, and platform L over H if $x^1 = L$. The voting strategy $\nu^U(x^1, x^2) = 1$ is therefore optimal for all (x^1, x^2). By Lemma 1, candidate 1 wins with probability one for all (x^1, x^2) and cannot possibly improve his chance of winning by deviating to a non-truthful strategy. But this implies that candidate 2 wins with probability zero for all (x^1, x^2), and so deviating to any other strategy is also not profitable for candidate 2. □

Proof of Proposition 7

We demonstrate existence of the equilibrium in two steps. First, we assume truthful campaign strategies and derive the equilibrium advertising levels for the SIGs. Then we show that, given these advertising levels, the candidates' equilibrium strategies are in fact truthful.

Step 1: Optimal advertising strategies. Without loss of generality, consider the case $(x^1, x^2) = (L, H)$. With these platforms being offered, SIG L will advertise for candidate 1 (so that $a^1 = \alpha_L$) and SIG H will advertise for candidate 2 (so that $a^2 = \alpha_H$). If these platforms are generated by truthful strategies, then the uninformed voters' belief is as in (9):

$$\mu^U(L, H) \;=\; \frac{p(1-\varepsilon)\varepsilon}{p(1-\varepsilon)\varepsilon + (1-p)\varepsilon(1-\varepsilon)} \;=\; p > \frac{1}{2}.$$

The informed voters' belief can be computed using (4):

$$\mu^I(L, H, h) = \frac{p(1-\varepsilon)}{p(1-\varepsilon) + (1-p)\varepsilon} > \frac{1}{2} > \frac{p\varepsilon}{p\varepsilon + (1-p)(1-\varepsilon)} = \mu^I(L, H, l),$$

where the inequalities are because $\varepsilon < 1 - p < \frac{1}{2}$. Thus, the uninformed voters vote for candidate 2, and the informed voters vote for candidate 1 if $s^I = l$ and for candidate 2 if $s^I = h$. In the latter case, only candidate 2 wins with certainty owing to Assumption

1 (i.e., $\gamma^U + \gamma^I > 1/2$).

Note that $\mu^U(L,H) = p$ is also each SIG's belief. Thus, from the perspective of the groups, the probability that $s^I = h$ is $M \equiv p(1-\varepsilon) + (1-p)\varepsilon$. The probability that platform L wins is therefore

$$\begin{aligned} \widetilde{V}_L(\alpha_L, \alpha_H) &= (1-M)Pr\left[\gamma^I + z(\alpha_L,\alpha_H)\gamma^M > \frac{1}{2}\right] \\ &= (1-M)\cdot H\left(\frac{1}{2} + \frac{1}{2\overline{\eta}}\left[\frac{\gamma^I - \frac{1}{2}}{\gamma^M} + \frac{1}{2} + \alpha_L - \alpha_H\right]\right). \end{aligned}$$

Similarly, the probability that platform H wins is

$$\begin{aligned} \widetilde{V}_H(\alpha_1, \alpha_2) &= M + (1-M)Pr\left[\gamma^U + (1-z(\alpha_L,\alpha_H))\gamma^M > \frac{1}{2}\right] \\ &= M + (1-M)\cdot H\left(\frac{1}{2} + \frac{1}{2\overline{\eta}}\left[\frac{\gamma^U - \frac{1}{2}}{\gamma^M} + \frac{1}{2} - \alpha_L + \alpha_H\right]\right). \end{aligned}$$

We will now derive a condition under which $\alpha_L > 0$ and $\alpha_H = 0$ is an equilibrium in the game played between the SIGs after observing the platforms (L, H). Define

$$\alpha_L^- \equiv \frac{\gamma^U - \gamma^I}{2\gamma^M} - \overline{\eta}, \quad \alpha_L^+ \equiv \frac{\gamma^U - \gamma^I}{2\gamma^M} + \overline{\eta}.$$

The equilibrium advertising levels will be $\alpha_L = \alpha_L^+$ and $\alpha_H = 0$. Observe that $\widetilde{V}_L(\alpha_L, 0) = 0$ for $\alpha_L < \alpha_L^-$ and $\widetilde{V}_L(\alpha_L, 0) = 1$ for $\alpha_L > \alpha_L^+$. For $\alpha_L \in [\alpha_L^-, \alpha_L^+]$, $\widetilde{V}_L(\alpha_L, 0)$ increases linearly in α_L from zero to $1-M$. Assuming that $\alpha_H = 0$, the payoff for SIG L is given by

$$V_L(\alpha_L, 0) = \begin{cases} -\beta_L\alpha_L & \text{if } \alpha_L < \alpha_L^-, \\ \widetilde{V}_L(\alpha_L, 0)\Pi_L - \beta_L\alpha_L & \text{if } \alpha_L^- \leq \alpha_L \leq \alpha_L^+, \\ \Pi_L - \beta_L\alpha_L & \text{if } \alpha_L > \alpha_L^+. \end{cases}$$

For $\alpha_H \in [0, 2\overline{\eta}]$, $\widetilde{V}_H(\alpha_L^+, \alpha_H)$ increases linearly in α_H from M to one; and $\widetilde{V}_H(\alpha_L^+, \alpha_H) = 1$ for $\alpha_H > 2\overline{\eta}$. The payoff for SIG L is thus given by

$$V_H(\alpha_L^+, \alpha_H) = \begin{cases} \widetilde{V}_H(\alpha_L^+, \alpha_H)\Pi_H - \beta_H\alpha_H & \text{if } \alpha_H < 2\overline{\eta}, \\ -\beta_H\alpha_H & \text{if } \alpha_H \geq 2\overline{\eta}. \end{cases}$$

If $V_L(\alpha_L^+, 0) \geq 0$ and $\partial V_H(\alpha_L^+, 0)/\partial\alpha_H \leq 0$, the advertising levels $(\alpha_L, \alpha_H) = (\alpha_L^+, 0)$ are mutual best responses for the SIGs. These inequalities hold if and only if

$$\frac{\Pi_L}{\beta_L} \geq \frac{\dfrac{\gamma^U - \gamma^I}{2\gamma^M} + \overline{\eta}}{1-M} > \frac{2\overline{\eta}}{1-M} \geq \frac{\Pi_H}{\beta_H}, \tag{23}$$

the condition in Proposition 7 (the middle inequality is by Assumption 3).

Step 2: Optimal campaign strategies. We now examine the incentives for candidates to set truthful platforms, given the advertising strategies of the SIGs. If the voting profile is symmetric, each candidate wins with probability 1/2 if $(x^1, x^2) \in \{(H,H),(L,L)\}$. On the other hand, if $(x^1, x^2) \in \{(H,L),(L,H)\}$ then the candidate who offers L wins with probability one if $s^I = l$, and with probability zero if $s^I = h$.

Consider now candidate i, and suppose candidate $-i$ follows a truthful strategy. If $s^i = h$ then i's chance of winning with platform H is

$$\begin{aligned} W^i(H|h) &= \overset{\theta=h}{\mu^i(h)}\left[\overset{s^{-i}=h}{(1-\varepsilon)}\frac{1}{2} + \overset{s^{-i}=l}{\varepsilon}\overset{s^I=h}{(1-\varepsilon)}\right] + \overset{\theta=l}{(1-\mu^i(h))}\left[\overset{s^{-i}=h}{\varepsilon}\frac{1}{2} + \overset{s^{-i}=l}{(1-\varepsilon)}\overset{s^I=h}{\varepsilon}\right] \\ &= (1-\varepsilon)\varepsilon + \frac{1}{2}\frac{p(1-\varepsilon)^2 + (1-p)\varepsilon^2}{p(1-\varepsilon)+(1-p)\varepsilon}, \end{aligned}$$

and i's chance of winning with platform L is

$$\begin{aligned} W^i(L|h) &= \overset{\theta=h}{\mu^i(h)}\left[\overset{s^{-i}=h}{(1-\varepsilon)}\overset{s^I=h}{\varepsilon} + \overset{s^{-i}=l}{\varepsilon}\frac{1}{2}\right] + \overset{\theta=l}{(1-\mu^i(h))}\left[\overset{s^{-i}=h}{\varepsilon}\,\overset{s^I=h}{(1-\varepsilon)} + \overset{s^{-i}=l}{(1-\varepsilon)}\frac{1}{2}\right]. \\ &= (1-\varepsilon)\varepsilon + \frac{1}{2}\frac{\varepsilon(1-\varepsilon)}{p(1-\varepsilon)+(1-p)\varepsilon}. \end{aligned}$$

For i to set a truthful campaign if $s^i = h$, we need $W^i(H|h) \geq W^i(L|h)$ or $p(1-\varepsilon)^2 + (1-p)\varepsilon^2 \geq \varepsilon(1-\varepsilon)$. This is satisfied due to $\varepsilon < \frac{1}{2} < p$. Similarly, if $s^i = l$ then i's chance of winning with platforms H and L is given by

$$\begin{aligned} W^i(H|l) &= \mu^i(l)\left[(1-\varepsilon)\frac{1}{2} + \varepsilon(1-\varepsilon)\right] + (1-\mu^i(l))\left[\varepsilon\frac{1}{2} + (1-\varepsilon)\varepsilon\right] \\ &= (1-\varepsilon)\varepsilon + \frac{1}{2}\frac{\varepsilon(1-\varepsilon)}{p\varepsilon + (1-p)(1-\varepsilon)}, \\ W^i(L|l) &= \mu^i(l)\left[(1-\varepsilon)\varepsilon + \varepsilon\frac{1}{2}\right] + (1-\mu^i(l))\left[\varepsilon(1-\varepsilon) + (1-\varepsilon)\frac{1}{2}\right]. \\ &= (1-\varepsilon)\varepsilon + \frac{1}{2}\frac{p\varepsilon^2 + (1-p)(1-\varepsilon)^2}{p\varepsilon + (1-p)(1-\varepsilon)}. \end{aligned}$$

For i to set a truthful campaign if $s^i = l$, we need $W^i(L|l) \geq W^i(H|l)$ or $p\varepsilon^2 + (1 - p)(1 - \varepsilon)^2 \geq \varepsilon(1 - \varepsilon)$. This is satisfied due to $\varepsilon < 1 - p$ (Assumption 2). Thus, given the advertising strategies of the SIGs and sincere voting strategies of the informed and uninformed voters, each candidate wants to adopt a truthful campaign strategy provided the other candidate does. □

Proof of Proposition 8

[To be completed.]

Proof of Proposition 9

[To be completed.]

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