

Populism, Partisanship, and the Funding of Political Campaigns*

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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 welfare-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: Campaign finances, political advertising, privately informed candidates, pandering, populism, special interest politics.

JEL codes: D72, D82.

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1 Introduction

In elections, money matters. This is especially true in the United States, a country whose last general election cost an estimated \$5.3 billion dollars in total campaign expenditures, or \$40 per voter.¹ Approximately half of the funds used in the 2008 election cycle were contributed to candidates' campaigns by special interest groups such as businesses, labor unions, and ideological and religious groups. A smaller portion tends to come from outside groups who pay directly for political advertising on behalf of either candidates or issues. In the 2008 cycle, \$301 million were spent by outside groups not affiliated with a political party. The influence of these groups on elections is nonetheless significant and likely to grow, given a recent Supreme Court decision affirming political advertising by corporations and other organizations as protected speech under its constitution.²

In terms of campaign donations as well as outside spending, candidates of both major political parties have received roughly equal support from special interests in past elections. However, business interests have outspent labor interests by a ratio of as much as 15 to 1 historically.³ Thus, while special interest groups support a broad range of candidates, the source of these funds exhibits a partisan bias if the term is understood in the sense of supporting a particular interest or cause. The popular response to the influence of wealthy special interests, and particularly corporate interests, is that it represents an attempt at “buying elections” or “drowning the voice of the people.” In his dissent to the *Citizens United* ruling, Justice John Stevens echoes these sentiments by noting that “the court’s ruling threatens to undermine the integrity of elected institutions across the nation” (Supreme Court 2010).

Despite these concerns, special interest groups can play a legitimate and beneficial role in the political process. Special interests 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 interests 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,

¹These figures, and all other election statistics and estimates reported herein, are from the *Center for Responsive Politics* and can be found at www.opensecrets.org.

²*Citizens United vs. Federal Election Commission* (Supreme Court 2010). The case was decided on January 21, 2010 and led to the creation of so-called *expenditure-only committees*, or “Super-PACs”. These groups can raise unlimited amounts from individuals and businesses and use their funds to advertise for issues as well as for the election or defeat of specific candidates. They are, however, prohibited from making campaign contributions. Non-party outside spending subsequently grew to 12.8% of total spending in the 2010 midterm election—more than twice the rate it was in 2008 (5.7%), and more than five times the rate it was in the 2006 midterm election (2.4%).

³An exact ratio is difficult to determine because a contribution by an individual business to a campaign or group is usually made by some employee of the business, blurring the demarcation line between business interests and labor interests.

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 nevertheless increase when special interest groups are allowed to spend money on political campaigns.

The reason is the following. In our model, politicians face a strong incentive to adopt “populist” policies favored by a majority of the electorate *ex ante*. This is bad because politicians are assumed to be better informed than a majority of voters about a policy-relevant state of the world. By campaigning on a platform that maximizes the uninformed voters' expected utility, a politician suppresses private information that may indicate a different optimal policy. Voters therefore cannot learn much from the politician's platform—which in turn makes the populist's platform attractive to voters. This incentive leads to equilibria in which both candidates in a two-party election adopt populist platforms even when it contradicts a candidate's private information. Since populist policies are not always optimal given all available information, these equilibria are undesirable from the voters' perspective. 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, or if the group itself advertises for the candidate, he can insulate himself from the need to adopt populist policies. As a consequence, electoral campaigns become more informative and voter welfare improves.

We obtain this result even though advertising is assumed to be entirely uninformative about a politician's private knowledge. In our model, advertising is simply an effort to attract “impressionable” voters. These are citizens who vote for a candidate if exposed to sufficiently many ads backing the candidate (or denigrating his opponent). Uninformative advertising by partisan groups can nonetheless improve electoral outcomes by changing the politicians' incentives. Interestingly, a necessary condition for this to happen is that an asymmetry exists among the interest groups: Groups favoring policies *not* preferred by a majority of voters *ex ante* must have a sufficiently strong advantage (in terms of funding, advertising costs, or other variable) over groups favoring more popular policies.

We also investigate whether alternative sources of campaign financing—specifically, a public funding system and the candidates' private wealth—are preferable to a system where 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.

The rest of the paper is organized as follows. In Section 2 we review the theoretical literature related to this paper. In Section 3 we specify all aspects of our model, with the exception of the supply of campaign finances. In Section 4, we describe the first-best policy and show that it can be implemented in spite of the communication constraints faced by the players. In Section 5 we characterize the policies that arise in equilibrium when advertising is not possible. We show that equilibrium policies entail a welfare loss due to the populist motive described above. In Sections 6 and 7 we introduce campaign financing, at last. Section 6 examines funding by special interest groups and develops a necessary and sufficient condition under which special interest advertising maximizes voter welfare. Section 7 extends the analysis to public funding and funding by the candidates themselves. Section 8 concludes. All proofs are in the Appendix.

2 Related Literature

The main results of this paper, contained in Sections 5 and 6, are related to two strands of literature: The literature on elections with privately informed candidates, and the literature on special interest politics. Both will be reviewed briefly below. Work that is less directly related to our model and results will be discussed in the text as we go along.

2.1 Elections with privately informed candidates

The idea that candidates may be better informed than voters in elections originated with Downs (1957). It 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.

Policy-motivated candidates. For the case of policy-motivated candidates, this is demonstrated in Schultz (1995, 1996) who derives a pooling equilibrium that does not reveal the candidates' information. Martinelli (2001) shows that these results are weakened if voters receive some private information themselves. Martinelli and Matsui (2002) show that policy reversals may occur as a result of the candidates' incentive to manipulate voters' beliefs (e.g., the left-wing party implements policies to the right of those implemented by the right-wing party). Canes-Wrone, Herron, and Shotts (2001) and Schultz (2002) introduce reelection concerns. In this case, the following tradeoff arises: Choosing an inferior policy before the election increases the policy maker's chance of

remaining in office, and choosing a better policy after the election. A longer term length lessens this distortion (Schultz 2008).

Office-motivated candidates. The case of privately informed office-motivated candidates (which we consider in this paper) is examined in Heidhues and Lagerlöf (2003), who obtain a populism result similar to ours: In equilibrium, both candidates propose policies that are optimal given the uninformed prior. Loertscher (2010) extends their analysis to a continuum of states and policies. Felgenhauer (2010) shows that introducing an uninformed third competitor changes the populism result and induces the informed candidates to set platforms according to their private information. Jensen (2010) introduces state-dependent candidate quality and shows that candidates who receive information that they are weaker than their opponent have an incentive to 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. 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).

2.2 Special Interest Politics

The second strand of literature this paper is related to examines the influence of special interest groups on political processes.⁴ This strand, too, can be broken up into two parts.

Pre-election influence. The first part is concerned with special interest influence on electoral competition (the case we consider in this paper). Austen-Smith (1987) develops a model in which interest groups invest in political campaigns after policies are set, and contributions are used to better inform voters of the candidates' platforms. As in our model, outside contributions affect the politicians' platforms. Unlike our result, however, the resulting distortion reduces the welfare of voters. In a model that contains some impressionable voters, Baron (1994) shows that campaign contributions by special interest groups can create platform divergence if the benefits of a policy can be targeted to a particular interest group without affecting the other. Prat (2002) views advertising by special interest groups as a (credible) signal of the group's private information regarding valence characteristics of candidates in an election. The group's ability to signal to voters can be used to extract policy concessions from the candidates. A cap on advertising reduces its value as a signal but increases the degree to which policies are aligned with the voters' preferences. Coate (2004) develops a model where partisan interest groups have a moderating effect on policy. The reason is that, in equilibrium, groups give to moderate candidates of the opposing part of the political spectrum, who can use these

⁴A good introduction to some of this literature is in Grossman and Helpman (2001).

funds to advertise their position to voters. Capping contributions encourages the entry of partisan candidates, resulting in more partisan policies.

Post-election influence. The second part of this strand is concerned with lobbying. It assumes that special interest groups possess better information than a policy maker about some policy-relevant state variable. However, a group’s state-dependent preferences differ from those of the policy maker, generating a credibility problem for the groups. In a seminal contribution, which can be applied to lobbying, Crawford and Sobel (1982) show that due to the informed agent’s bias only coarse information can be revealed in equilibrium. Allowing for monetary transfers between the interest group and the policy maker can overcome some of these credibility constraints, thereby providing a social 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 message can be a discriminating signal that reveals the group’s information. Austen-Smith (1995) and Lohmann (1995) extend the signaling story by viewing campaign contributions as buying “access” to policy makers. In this case, whether a group wants to buy access can serve as a credible signal of its type. Ball (1995) shows that when monetary transfers from the sender to the receiver are allowed in the Crawford-Sobel model the interest group is generally able to reveal all of its information credibly.⁵

Like some of the papers discussed above, ours makes an argument that money spent by special interest groups can improve policy outcomes by changing information-related aspects of the policy making process. However, this works through a different—and, to our knowledge, novel—mechanism: A special interest group’s role is not to advise or monitor a policy maker, or to provide information to voters, but merely to counterbalance an informational problem in elections (namely the problem of populism).

3 The Basic Model

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.

⁵Lohmann (1998) provides yet another rationale for monetary transfers by special interests: The interest group’s expert knowledge allows it to monitor the quality of a politician’s decision better than a voter would be able to. A politician who accepts money in exchange for favorable policies thus puts himself under enhanced scrutiny. While political decisions are then biased, they are also of higher quality.

3.1 The political environment

A society must choose a policy $x \in X \equiv \{L, H\}$. One may think of L as low taxes, or a low level of public spending, or a low degree of regulation. Likewise H could mean high taxes, or a high level of spending, or a high degree of regulation. Nothing, however, depends on these interpretations. The effect of 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 chosen, 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^I . 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 3.2 and Section 3.4.

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 3.3.

3.2 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. $\varepsilon < 1 - p$.⁶

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.⁷

3.3 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 outcomes.⁸ 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

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

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 $[-\bar{\eta}, \bar{\eta}]$. We implicitly assume that (1) is always bounded between zero and one.⁹ We also require that the noise component in the impressionable voting behavior not be too large:

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

Note that campaign advertising is assumed uninformative about a politician's private signal.¹⁰ 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.

⁶The 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 $\varepsilon < 1-p$.

⁷With these assumptions, if $\gamma^U = 1$ our model would essentially be that of Heidhues and Lagerlöf (2003) and if $\gamma^I = 1$ it would essentially be that of Laslier and Van der Straeten (2004).

⁸Baron (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."

⁹That is, the fraction of impressionable voters voting for candidate 1 is $\min\{1, \max\{0, 1/2 + a^1 - a^2 + \eta\}\}$. For the sake of reducing clutter in our equations we suppress this more precise notation throughout the paper, except for the Appendix.

¹⁰This 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 sound bite 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.

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.*

3.4 Strategies and beliefs

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

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

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 $\chi^i(s^i) = H$. 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

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

from the voters' 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.¹¹

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.

Thus, the only way a candidate can communicate with the voters is through his or her commitment to a campaign platform itself.

¹¹Note 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.

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

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

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 possible; that is, at all information sets that are not null.¹² 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.¹³

4 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

¹²For the two candidates, this means that

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

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

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

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

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

¹³Note that voters prefer platform H over L if they believe state h to be more likely than state l , and vice versa. Thus, a sincere voting strategy for the uninformed voters satisfies

$$\left[\nu^U(H, L) \geq \frac{0}{1} \text{ or } \nu^U(L, H) \leq \frac{1}{0} \right] \Rightarrow \mu^U(x^1, x^2) \geq \frac{1}{2}, \quad (5)$$

and a sincere strategy for the informed voters satisfies

$$\left[\nu^I(H, L, s^I) \geq \frac{0}{1} \text{ or } \nu^I(L, H, s^I) \leq \frac{1}{0} \right] \Rightarrow \mu^I(x^1, x^2, s^I) \geq \frac{1}{2} \text{ for all } s^I \in \{h, l\}. \quad (6)$$

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:

$$x^{FI}(s^1, s^2, s^I) = \begin{cases} H & \text{if } \#\{s \in (s^1, s^2, s^I) : s = h\} \geq 2, \\ L & \text{otherwise.} \end{cases} \quad (7)$$

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 committed to their platforms). These communication constraints do not affect the implementability of the full information policy, however. To see why, consider the strategy profile

$$\chi^i(s^i) = s^i \quad \forall i, \quad (8)$$

$$\nu^U(x^1, x^2) = 1/2 \quad \forall (x^1, x^2), \quad (9)$$

$$\nu^I(s^I, x^1, x^2) = \begin{cases} 1 & \text{if } x^1 = s^I \neq x^2, \\ 0 & \text{if } x^1 \neq s^I = x^2, \\ 1/2 & \text{otherwise.} \end{cases} \quad (10)$$

In this profile, the candidates adopt truthful strategies, uninformed voters split their vote, and informed voters vote for the candidate whose platform agrees with the informed voters' private signal (if both candidates offer the same platform the informed voters split their vote as well).¹⁴ By Lemma 1, the candidate who attracts the informed voters wins. Thus, the policy implemented under the profile (8)–(10) must agree with at least two private signals. This, by (7), is the full information policy.

Notice that the voting strategy used by the uninformed voters, (9), is *not* a sincere strategy: If candidates use the truthful strategies given in (8), the uninformed voters' Bayesian belief when both platforms are offered must be

$$\mu^U(H, L) = \mu^U(L, H) = \frac{p(1-\varepsilon)\varepsilon}{p(1-\varepsilon)\varepsilon + (1-p)\varepsilon(1-\varepsilon)} = p > \frac{1}{2}. \quad (11)$$

¹⁴Note that (9) essentially amounts to uninformed voters abstaining from the election.

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 *insincere* voting are, in fact, necessary for welfare maximization:

Lemma 2. *Any profile in which the candidate strategies are not truthful implements the full information policy with probability strictly less than one. Furthermore, if $a^1 = a^2 = 0$ then the same is true for any profile in which the uninformed voters vote sincerely.*

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 one 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.

Lemma 2 hence identifies two sources of inefficient policies: 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 without advertising (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 determined endogenously and chosen by the candidates in order to maximize their chances of electoral success. Candidates will choose truthful strategies if and only if doing so is optimal. The optimality of any particular campaign strategy in turn depends on what is assumed about voter behavior, as well as on the whether and how campaign ads influence the electoral outcome. The rest of the paper examines the relationship between voting, advertising, and the politicians' incentive to set truthful platforms.

5 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} .¹⁵

¹⁵When considering candidate $i \in \{1, 2\}$ we adopt the usual convention of calling i 's opponent $-i$.

- (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.

5.1 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

$$\pi^1(x^1|x^2, s^I) \equiv Pr \left[\nu^U(x^1, x^2)\gamma^U + \nu^I(x^1, x^2, s^I)\gamma^I + z(0, 0)\gamma^M > \frac{1}{2} \right]. \quad (12)$$

Using (1), (12) can be expressed as

$$\pi^1(x^1|x^2, s^I) = \frac{1}{2} + \frac{1}{2} \frac{(\nu^U(x^1, x^2) - \frac{1}{2})\gamma^U + (\nu^I(x^1, x^2, s^I) - \frac{1}{2})\gamma^I}{\bar{\eta}\gamma^M}. \quad (13)$$

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

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

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

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

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 $x \in \{H, L\}$.

5.2 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 campaigns 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 $\varepsilon \rightarrow 0$. 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 that prevents the uninformed from learning too much about the state.

5.3 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 a priori 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 higher 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 .¹⁶

There also exists an equilibrium 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

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

¹⁶These 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 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 $Pr[\theta = h | s^i = l] = p\varepsilon/[p\varepsilon + (1-p)(1-\varepsilon)] < 1/2$ (because $\varepsilon < 1-p < 1/2$). The case against the contrarian equilibrium is similar.

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, but only imperfectly. Furthermore, $\chi^i(l)$ increases in ε , with $\lim_{\varepsilon \rightarrow 0} \chi^i(l) = 0$ and $\lim_{\varepsilon \rightarrow 1-p} \chi^i(l) = 1$. 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 $\varepsilon \rightarrow 0$ 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, 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 the enacted policy is incorrect 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 asymmetric equilibria are unrealistic: Proposition 6 describes uncontested elections in which one candidate is essentially not competing, 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 will 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.

5.4 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 (9)), the candidates' desire to appeal

to the uninformed voters would be eliminated. Instead, they would want to attract the informed vote by choosing platforms that match their private signals. The first-best policy is then implemented with probability one, increasing also the uninformed voters' welfare. It is hence the assumption of sincere voting that fuels populism.

To summarize the arguments made so far, 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 things worse?

We have two answers to this question. For one, it would not help if a single uninformed voter deviated from a sincere voting strategy and abstained instead. To change the equilibrium outcome, it is necessary that sufficiently many uninformed voters engage in a coordinated abstention. Thus, sincere voting cannot easily be regarded as suboptimal 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 who fail to overcome the swing voter’s curse (Feddersen and Pesendorfer 1996). In a model that is at the same time about populism, this seems quite reasonable—perhaps more so than strategic voting or strategic non-voting.

6 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 by the candidates themselves, through a public system of funding political parties, or by special interest groups (SIGs). The focus of this section will be on the last case.

Note that a special interest group can influence electoral outcomes by providing political advertising in one of two ways: It can make contributions to a candidate’s campaign, who then uses the donated funds to advertise. This is the case with traditional PACs. Or it can advertise for the candidate directly, as is the case with Super-PACs. The results will be the same in either case, and we present our model in a way where the SIGs advertise directly.

6.1 Partisanship

We think of SIGs as groups of citizens that are small, have preferences different from those of most voters, and are wealthy enough to influence elections by financing political advertising. 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 choose their campaign 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 the function (1). The election then takes place and the candidate 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.¹⁷

Note that the SIGs do *not* spend money in order to influence the policy platforms of the candidates. Instead, they spend in order to help a candidate win the election once the policy platforms are chosen. Grossman and Helpman (2001) call the former motive the “influence motive” and the latter the “electoral motive.”¹⁸ In a model with the influence motive, SIGs commit to schedules specifying an amount of spending 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.

6.2 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

¹⁷Differences in β_j reflect the possibility that one 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 a less effective advertising channel.

¹⁸The electoral motive first appears in Austen-Smith (1987).

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 that are possibly non-zero are

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

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

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

(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, with the candidates' choices now being made in anticipation of the SIGs' advertising decisions. Because the SIGs do not observe any private signals, and campaign ads cannot contain information about what the politicians know, voters cannot learn anything from the advertising variables a_j^i . Thus the uninformed and informed voters' updating problem remains unchanged. Thus the voters' beliefs, as functions of platforms as well as the strategies that generated them, are still described by (2)–(4). Note also that 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 then 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) , that satisfies the conditions in Definition 1; *and* the new condition that α_H and α_L maximize the expected payoffs of SIG H and SIG L in case one candidate offers platform H and the other offers L .

6.3 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 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 the full information policy from always being implemented, overturning the result in Lemma 2.

Proposition 7. (*Special interest-funded campaigns*) *Suppose that advertising is provided by special interest groups. there exists a sincere Bayesian equilibrium with symmetric voting strategies and truthful campaigns if and only if*

$$\frac{\Pi_L}{\beta_L} \geq \frac{\frac{\gamma^U - \gamma^I}{2\gamma^M} + \bar{\eta}}{p\varepsilon + (1-p)(1-\varepsilon)} > \frac{2\bar{\eta}}{p\varepsilon + (1-p)(1-\varepsilon)} \geq \frac{\Pi_H}{\beta_H}. \quad (14)$$

In this equilibrium, if one candidate offers platform L and the other offers platform H then SIG L spends

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

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 being offered. The uninformed beliefs are given in (11). All uninformed voters therefore vote for the candidate who offers the populist platform H ; in the absence of advertising, platform H would then win with certainty (Lemma 1). *With* advertising, the mass of impressionable voters voting for L is

$$\begin{aligned} z(\alpha_L, 0)\gamma^M &= \left(\frac{1}{2} + \frac{\gamma^U - \gamma^I}{2\gamma^M} + \bar{\eta} + \eta \right) \gamma^M \\ &= \left(\frac{1 - 2\gamma^I}{2\gamma^M} + \bar{\eta} + \eta \right) \gamma^M = \frac{1}{2} - \gamma^I + (\bar{\eta} + \eta)\gamma^M. \end{aligned}$$

In the worst case ($\eta = -\bar{\eta}$) 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 just 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 . Note, however, that SIG L is at a double disadvantage relative to SIG H . First, with probability larger than $1/2$ the informed voters do *not* vote for L ; in this case SIG L 's advertising effort is wasted. Second, even if $s^I = l$, all things equal L has a smaller chance of winning

than H . The reason is that the uninformed voters still vote for H and outnumber the informed voters. To overcome this double disadvantage, the benefit-cost ratio Π_L/β_L must be sufficiently large for group L wanting to advertise.

6.4 Discussion and implications

We conclude this section with a few remarks. First, the truthful equilibrium we found is such that only SIG L advertises. In fact, if SIG H also advertised in equilibrium voter welfare would not be maximized. 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.

Second, recall that in our original model both candidates were trying to attract the uninformed voters by offering policy H , regardless of whether their signals indicated this being the right policy or not. Interest group L , on the other hand, is trying to attract impressionable voters by advertising for policy L , also without regard for whether this is the right policy or not. Neither of these players has the voters' welfare in mind when making their decisions. Yet, on balance the politicians' incentive to campaign on platform H and the group's incentive to advertise for platform L offset one another, resulting in beneficial policies for the voters. This effect is reminiscent of the advocacy effect in Dewatripont and Tirole (1999).¹⁹ It is important to note that advocacy effects could not be relied upon if the groups had state-dependent preferences (i.e., if their interests weren't special). If candidates are truthful and offer different platforms, a group who shared the voters' preferences would want to advertise for platform H . This would exaggerate, instead of reduce, the politicians' incentive to deviate to populist platforms.²⁰

Because interest groups are partisan advocates, their presence can also improve welfare if groups must advertise for particular policies before platform choices are made (instead of advertising for particular candidates after platform choices are made). For example, election law may prohibit independent political advertising during election periods, but not before.²¹ In this case, interest groups may spend money on "issue ads" that

¹⁹There, an agent charged with discovering decision-relevant information for the principal has an incentive to shirk, even if offered an optimal contract. Competition between two agents with opposing goals, neither of which is aligned the principal's interests, can improve the principal's outcome by generating more information at a lesser cost.

²⁰What would be needed for welfare maximization in this case is that interest groups also shared the informed voters signal.

²¹The U.S. election law prior to *Citizens United* is an example. Similarly, Canadian campaign law restricts independent advertising during the so-called *writ period* of an election but not at other times.

promote specific policy goals or causes, without references to any running candidates. Issue advertising can easily be introduced in our model by modifying the impressionable voting behavior as follows: If both policies (L and H) are offered by the candidates, the fraction of impressionable voters voting for the candidate who offers policy L is

$$z(a_L, a_H) = \frac{1}{2} + a_L - a_H + \eta \quad (\eta \sim U[-\bar{\eta}, \bar{\eta}]), \quad (15)$$

where a_L and a_H represent the amount of issue advertising for policies L and H , respectively. If both candidates offer the same platform, then a fraction $\frac{1}{2} + \eta$ of impressionable voters vote for candidate 1, and the rest for candidate 2. Now suppose that SIGs first invest in issue ads, which politicians then observe before committing to their campaigns. It can be shown that the result in Proposition 7 continues to hold if condition (14) is replaced by

$$\frac{\Pi_L}{\beta_L} \geq \frac{\frac{\gamma^U - \gamma^I}{2\gamma^M} + \bar{\eta}}{2\varepsilon(1-\varepsilon) \cdot [p\varepsilon + (1-p)(1-\varepsilon)]} > \frac{2\bar{\eta}}{2\varepsilon(1-\varepsilon) \cdot [p\varepsilon + (1-p)(1-\varepsilon)]} \geq \frac{\Pi_H}{\beta_H}. \quad (16)$$

As before, SIG L has to be sufficiently strong, and SIG H to sufficiently weak, to correct for the candidate's incentive to campaign on populist platforms. Since $2\varepsilon(1-\varepsilon) < 1$, however, the interval separating the benefit-cost ratios of the two groups has shifted to the right.²²

Finally, an implication of Proposition 7 is that limiting campaign contributions or advertising by special interest groups can have a detrimental effect on voter welfare. Assuming that the “wedge condition” (14) or (16) holds, an advertising cap below the equilibrium advertising level α_L will eliminate the first-best policy as an equilibrium outcome. The direct effect of such a cap is that SIG L will no longer be able to capture as many impressionable voters as needed to make platform L win with probability one when $s^I = h$. In addition, there exists an indirect effect: With a cap on advertising, special interest support becomes a less attractive compensation for candidates who resist the urge of being populist and instead campaign on non-populist policies. Implementing a binding cap would thus restore (at least partially) the candidates' incentive to set populist policies.

²²The reason is the following. If special interest groups can observe campaigns before they advertise, they do not advertise if the two candidates offer identical platforms. If the groups must advertise before observing the candidate's campaigns, then a group's investment in issue ads is wasted if both candidates campaign on the same policy platform. Accounting for the possibility that issue ads are wasted with positive probability, SIG L 's benefit-cost ratio must be higher than before, for this group to advertise for policy L . Similarly, SIG H 's benefit-cost ratio can be higher than before without inducing it to advertise for H .

7 Alternative Funding Systems

The previous 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 to share the voters' preferences. In this section, we consider two alternative systems through which campaign funds can be provided: By the candidates and by the state.

7.1 Private candidate wealth

Political candidates often use their own money to fund their campaigns, and the sums spent by wealthy politicians 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 \$118 million of which was allocated to television advertising (California Watch 2011). In March of 2011, Donald Trump announced that he was prepared to spend \$600 million of his fortune on a potential presidential bid (Wall Street Journal 2011). We now examine the question whether wealthy candidates can "afford the luxury" of maximizing their voters' welfare.

To do so, let us assume that candidate $i = 1, 2$ values office at $\Pi^i > 0$ and has a marginal advertising cost of $\beta^i > 0$. A wealthy candidate would then be one with a very low β^i , or a very high Π^i . 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 the impressionable voters.²³ 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).²⁴ We can say the following:

²³Herrera, Levine, and Martinelli (2008) and Ashworth and Bueno de Mesquita (2009) study models with a similar timing of platform choice and advertising, but without private candidate information. Meirowitz (2008) assumes the opposite order of events.

²⁴If the benefit-cost ratio Π^i/β^i is sufficiently low for both candidates, there will be no advertising in equilibrium. This happens when $\Pi^i/\beta^i \leq 1/(2\bar{\eta})$, in which case the model with private candidate wealth boils down to the game examined in Section 5. Second, if exactly one candidate has $\Pi^i/\beta^i > 1/(2\bar{\eta})$,

Proposition 8. (*Candidate-funded campaigns*) *Suppose that advertising is provided by the candidates. Then in equilibrium the full information policy is implemented with probability strictly less than one and voter welfare is not maximized. This is true for all Π^1 , Π^2 , β^1 , and β^2 .*

Why is this different from the result in Section 6, where advertising is provided by outside groups? Note that special interest groups care only about the policy outcome, but not about the candidates per se. The candidates, on the other hand, care only about being elected but not about policy per se. If advertising competition between the politicians were to emulate competition between interest groups, a candidate offering L would have to be stronger than a candidate offering H (in the sense of the L -candidate's benefit-cost ratio being sufficiently high compared to that of his opponent). Since each of the two candidate can receive signal l and offer platform L , the required kind of asymmetry between the candidates is clearly impossible.

7.2 Public campaign financing

Next, we consider a European-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 theoretically examined by Ortuno-Ortín and Schultz (2004), who show that it provides policy-motivated candidates with a strong incentive to set convergent platforms.

As in Ortuno-Ortín and Schultz (2004), we assume that both candidates have access to credit markets that allow them to borrow (at a zero interest rate) against public funds to be awarded after the election. Furthermore, candidates have access to actuarially 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 markets after both candidates have set their platforms. Insurers have the same information as uninformed voters (in particular, candidates cannot credibly communicate their signals to them).

Our equilibrium notion will once again be that of sincere Bayesian equilibrium, with one added requirement. Denote by $\Gamma^1(x^1, x^2)$ the funds acquired (on the credit/insurance market) by candidate 1 when the platforms are (x^1, x^2) ; the funds acquired by candidate 2 are then given by $\Gamma^2(x^1, x^2) = \Gamma - \Gamma^1(x^1, x^2)$. Because publicly provided campaign funds have no alternative uses, the advertising bought by candidate i is $\Gamma^i(x^1, x^2)/\beta$, where $\beta > 0$ is the common advertising cost coefficient. For equilibrium, we impose that

the advertising contest will have a pure strategy equilibrium similar to the one in Section 6. In this equilibrium, only one candidate advertises. In all other cases, the equilibrium involves mixed advertising strategies for both candidates. These mixed strategy equilibria are partly characterized in Che and Gale (2000) and converge to the equilibrium of the standard all-pay auction with complete information as $\bar{\eta} \rightarrow 0$ (Hillman and Riley 1989; Baye, Kovenock, and de Vries 1996). None of these results are needed here, however.

the following holds for all (x^1, x^2) :

$$\Gamma^1(x^1, x^2) = \Gamma \times \mathbb{E}_{s^I} \left[\nu^U(x^1, x^2) \gamma^U + \nu^I(x^1, x^2, s^I) \gamma^I \right. \\ \left. + z \left(\frac{\Gamma^1(x^1, x^2)}{\beta}, \frac{\Gamma - \Gamma^1(x^1, x^2)}{\beta} \right) \gamma^M \middle| x^1, x^2 \right]. \quad (17)$$

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

Note that for every pair of platforms (x^1, x^2) there exists a $\Gamma^1(x^1, x^2)$ that satisfies requirement (17); an equilibrium hence exists. To see this, use the right-hand side of (17) to define a function $T : [0, \Gamma] \rightarrow [0, \Gamma]$ (given x^1 and x^2). Because the conditions of Brouwer’s Theorem hold, T has a fixed point. We assume that this fixed point is unique. This is a mild assumption that says that the public funding system is *deterministic* and does not lead to multiple “self-enforcing” funding levels for the political candidates.²⁵

Proposition 9. (*Publicly funded campaigns*) *Suppose that advertising is provided by a deterministic system of public election funding. There does not exist an equilibrium in which candidates play truthful strategies. Furthermore, in every equilibrium the full information policy is implemented with probability strictly less than one, and voter welfare is not maximized. This is true for all Γ and all β (as long as the funding system remains deterministic).*

The intuition for this result is similar to the reason behind 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 to 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 5.2, the populist policy always results in a higher expected vote share than the non-populist policy, which leads to more campaign funds, which in turn can be spent to attract more impressionable voters.

8 Conclusion

This paper examined a model in which privately informed candidates compete in an election. We showed that the presence of partisan special interest groups can improve voter welfare. Unlike previous papers, ours does not require interest groups to possess

²⁵A sufficient condition to rule out funding indeterminacies, given (x^1, x^2) , is that the right-hand side of (17) has slope less than one in Γ^1 . This is the case if $\Gamma/\beta < 2\gamma^M$.

private information, or that advertising messages are informative. Instead, our results relied on advocacy effects: The combination of populism and partisanship resulted in balanced policies that were responsive to the state of nature and maximized the voters' welfare.

While partisan interest groups have always used their wealth to influence elections, it is important to discuss our results in the context of the contemporary debate concerning the U.S. Supreme Court's 2010 ruling in *Citizens United vs. FEC*. Commentators across the political spectrum have harshly criticized the court's decision as an "opening of the floodgates" for special interest money, with the potential to distort the democratic process in unprecedented ways. It is indeed hard to imagine that the growing influence of Super-PACs and other wealthy groups would not have a distortive impact on the electoral process. However, one must also recognize that democratic institutions hardly ever work as well as they should. In particular, there is no reason to expect candidates running for elected office to campaign in a way that maximizes their voters' welfare. In the model presented here, politicians themselves distort the electoral process by campaigning on populist platforms. Populism reduces welfare in the absence of any outside influence, but the effect of populism can be corrected by partisan special interest spending. Any investigation of the effects of *Citizens United* must therefore involve a careful study of the mechanisms through which special interest money and advertising interact with voting behavior and campaign incentives. The present paper is a step in this direction.

We point out that we did not fully characterize the advertising equilibrium between the interest groups. When the wedge condition (14) does not hold, the pure strategy equilibrium identified in Proposition 7 fails to exist. Our analysis is incomplete in this respect, and the same is true for our treatment of the game with self-funded candidates.²⁶ A more general exploration of the welfare properties of different funding regimes will require a more detailed examination of the advertising subgames than we were able to provide in this paper. Nevertheless, we did derive necessary and sufficient conditions under which political campaign funding by special interest groups are able to counter the populism problem that exists in elections with privately informed candidates. At the same time, public funding or candidate funding could not achieve the same result in our model. We believe that these results contribute new insights not only to our understanding of the welfare effects of special interest influence in elections, but also to our understanding of the properties of alternative campaign funding sources.

²⁶The basic structure of advertising equilibrium in this case is known (see Che and Gale 2000), even though its uniqueness properties are only established for the limiting case when advertising noise is zero (i.e., $\bar{\eta} = 0$; see Baye, Kovenock, and de Vries 1996).

Appendix

Proof of Lemma 1

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

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

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

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

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

Proof of Lemma 2

We first show that truthful platforms and insincere voting are necessary for x^{FI} to be implemented with probability one. Recall that 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

$$\gamma^U \nu^U(H, L) + \gamma^I \nu^I(H, L, h) + \gamma^M(1/2 - \bar{\eta}) \geq \frac{1}{2}. \quad (18)$$

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

$$\gamma^U \nu^U(H, L) + \gamma^I \nu^I(H, L, h) + \gamma^M(1/2 + \bar{\eta}) \leq \frac{1}{2}. \quad (19)$$

Because $\bar{\eta} > 0$, (18) and (19) 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 . Assume $a^1 = a^2 = 0$. 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. 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 one, ν^U must not be sincere. \square

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 $\alpha' \geq 0$ 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 $\alpha' \geq 0$ 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. \square

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 candidate 1 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: $\mu^U(H, L) \leq 1/2$ $\mu^U(L, H) \leq 1/2$. \square

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

$$q = \chi^i(l) = \frac{(2p - 1)\varepsilon(1 - \varepsilon)}{(1 - p)(1 - \varepsilon)^2 - p\varepsilon^2}. \quad (20)$$

(20) 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 informed voters' belief is now given by

$$\begin{aligned}\mu^I(H, L, h) &= \mu^I(L, H, h) = \frac{\frac{1}{2}(1-\varepsilon)}{\frac{1}{2}(1-\varepsilon) + \frac{1}{2}\varepsilon} = 1 - \varepsilon > \frac{1}{2} \\ &> \varepsilon = \frac{\frac{1}{2}\varepsilon}{\frac{1}{2}(1-\varepsilon) + \frac{1}{2}\varepsilon} = \mu^I(H, L, l) = \mu^I(L, H, l).\end{aligned}\quad (21)$$

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 of nature being θ . Candidate i 's probability of winning can be expressed as follows:

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

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

$$\mu^i(l) f_h + (1 - \mu^i(l)) f_l = \frac{1}{2} \leq \mu^i(h) f_h + (1 - \mu^i(h)) f_l. \quad (22)$$

Since $\mu^i(h) > \mu^i(l)$, if $f_h > f_l$ then the equality in (22) implies the inequality in (22).

Using (2), the first condition in (22) implies that

$$f_h = \frac{1}{2} + \frac{1-p}{p} \frac{1-\varepsilon}{\varepsilon} \left(\frac{1}{2} - f_l \right). \quad (23)$$

We also know that

$$f_h = (1-\varepsilon)\pi^i(H|L, h) + \varepsilon\pi^i(H|L, l), \quad (24)$$

where $\pi^i(x^i|x^{-i}, s^I)$ was defined in (12). 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 (13) and recalling that $\nu^I(H, L, l) = 0$, (24)

becomes

$$f_h = (1 - \varepsilon) + \varepsilon \left(\frac{1}{2} + \frac{(\nu^U(H, L) - \frac{1}{2})\gamma^U - \frac{1}{2}\gamma^I}{2\bar{\eta}\gamma^M} \right). \quad (25)$$

Similarly,

$$\begin{aligned} f_l &= \varepsilon\pi^i(H|L, h) + (1 - \varepsilon)\pi^i(H|L, l) \\ &= \varepsilon + (1 - \varepsilon) \left(\frac{1}{2} + \frac{(\nu^U(H, L) - \frac{1}{2})\gamma^U - \frac{1}{2}\gamma^I}{2\bar{\eta}\gamma^M} \right). \end{aligned} \quad (26)$$

Equations (23), (25), and (26) can simultaneously be solved for

$$\nu^U(H, L) = \frac{1}{2\gamma^U} (\gamma^U + \gamma^I - 2\bar{\eta}\gamma^M \cdot K), \quad (27)$$

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

where

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

Note that $\varepsilon < 1 - p$ (Assumption 2) implies $K \in (0, 1)$. (27) 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 $\bar{\eta} \leq (\gamma^U + \gamma^I)/(2K\gamma^M)$. This holds because $\bar{\eta} < \gamma^I/(2\gamma^M)$ (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 (22) 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 (13) and recalling that $\nu^I(H, L, h) = 1$, this condition boils down to

$$\frac{1}{2} + \frac{(\nu^U(H, L) - \frac{1}{2})\gamma^U + \frac{1}{2}\gamma^I}{2\bar{\eta}\gamma^M} \geq 1. \quad (28)$$

Plugging (27) into (28) and rearranging, we get $\bar{\eta} \leq \gamma^I/((K+1)\gamma^M)$, which is implied by $\bar{\eta} < \gamma^I/(2\gamma^M)$ (Assumption 3) and $K \in (0, 1)$. Finally, we need to verify that $\pi^i(H|L, l) \in (0, 1)$. Again using (13), and recalling that $\nu^I(H, L, l) = 0$, this condition boils down to

$$0 < \frac{1}{2} + \frac{(\nu^U(H, L) - \frac{1}{2})\gamma^U - \frac{1}{2}\gamma^I}{2\bar{\eta}\gamma^M} < 1. \quad (29)$$

Plugging (27) into (29) and rearranging, we get $(K-1)\bar{\eta}\gamma^M < 0 < (K+1)\bar{\eta}\gamma^M$. Since $K \in (0, 1)$, (29) is satisfied as well. \square

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 not profitable for candidate 2. \square

Proof of Proposition 7

We demonstrate existence of the equilibrium in three steps. First, assuming truthful campaign strategies, we derive the equilibrium advertising levels for the SIGs as well as condition (14). Then we show that, given the advertising levels derived, the candidates' equilibrium strategies are in fact truthful. Finally, we show that (14) is necessary for welfare maximization.

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 the platforms were generated by truthful strategies, then the uninformed voters' belief is as in (11):

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

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, 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

$$\begin{aligned} V_L(\alpha_L, \alpha_H) &= (1 - M) \cdot Pr \left[\gamma^I + z(\alpha_L, \alpha_H)\gamma^M > \frac{1}{2} \right] \\ &= (1 - M) \cdot \min \left\{ 1, \max \left\{ 0, \frac{1}{2} + \frac{1}{2\bar{\eta}} \left(\frac{\gamma^I - \frac{1}{2}}{\gamma^M} + \frac{1}{2} + \alpha_L - \alpha_H \right) \right\} \right\}. \end{aligned}$$

Similarly, the probability that platform H wins is

$$\begin{aligned} V_H(\alpha_L, \alpha_H) &= M + (1 - M) \cdot Pr \left[\gamma^U + (1 - z(\alpha_L, \alpha_H))\gamma^M > \frac{1}{2} \right] \\ &= M + (1 - M) \cdot \min \left\{ 1, \max \left\{ 0, \frac{1}{2} + \frac{1}{2\bar{\eta}} \left(\frac{\gamma^U - \frac{1}{2}}{\gamma^M} + \frac{1}{2} - \alpha_L + \alpha_H \right) \right\} \right\}. \end{aligned}$$

We 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

$$\alpha_L^- \equiv \frac{\gamma^U - \gamma^I}{2\gamma^M} - \bar{\eta}, \quad \alpha_L^+ \equiv \frac{\gamma^U - \gamma^I}{2\gamma^M} + \bar{\eta}. \quad (30)$$

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

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

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

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

Now observe that if

$$\tilde{V}_L(\alpha_L^+, 0) \geq 0 \geq \left. \frac{\partial \tilde{V}_H(\alpha_L^+, \alpha_H)}{\partial \alpha_H} \right|_{\alpha_H=0}$$

the advertising levels $(\alpha_L, \alpha_H) = (\alpha_L^+, 0)$ are mutual best responses for the SIGs. These inequalities hold if and only if

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

which is condition (14) 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

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

and i 's chance of winning with platform L is

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

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

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

and

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

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.

Step 3: Necessity of condition (14). Assume that voter welfare is maximized. This implies that x^{FI} is implemented with probability one, which by Lemma 2 implies that the candidates' campaign strategies are truthful. Now suppose that $s^i = h$ and $s^j = l$, so that $x^i = H$ and $x^j = L$. It follows that SIG H does not advertise while SIG L advertises the amount α_L^+ as defined in (30). (To see why, note that if $s^I = h$ then candidate i wins without advertising. If $s^I = l$, on the other hand, candidate i wins with probability zero because $x^{FI}(h, l, l) = L$ is implemented by assumption. Because advertising is costly, this means that SIG H does not advertise. An amount of advertising exactly equal to α_L^+ is then required for SIG L to win with probability one whenever $s^I = l$. Clearly, SIG L will not find it optimal to spend more than that.) Assume now that (14) does not hold. The argument in Step 1 then implies that

$$\tilde{V}_L(\alpha_L^+, 0) < 0 \quad \text{or} \quad \left. \frac{\partial \tilde{V}_H(\alpha_L^+, \alpha_H)}{\partial \alpha_H} \right|_{\alpha_H=0} > 0$$

or both. In the first case, α_L^+ cannot be a best response for SIG L against zero, and in the second case zero cannot be a best response for SIG H against α_L^+ . Thus, the supposed equilibrium does not exist. \square

Proof of Proposition 8

Assume, contrary to the result, that there exists an equilibrium in which voter welfare is maximized and the full-information policy x^{FI} is implemented with probability one. By Lemma 2 this implies that the candidates' strategies are truthful. Following the same argument as in Step 3 of the proof of Proposition 7, we can show that if $x^i = H$ and $x^j = L$ then $a^i = 0$ and $a^j = \alpha_L^+$.

Now, using the argument given in Step 1 of the proof of Proposition 7, if $(x^1, x^2) = (L, H)$ the advertising levels $(a^1, a^2) = (\alpha_L^+, 0)$ are mutually optimal for the candidates

if and only if

$$\frac{\Pi^1}{\beta^1} \geq \frac{\frac{\gamma^U - \gamma^I}{2\gamma^M} + \bar{\eta}}{p\varepsilon + (1-p)(1-\varepsilon)} > \frac{2\bar{\eta}}{p\varepsilon + (1-p)(1-\varepsilon)} \geq \frac{\Pi^2}{\beta^2}. \quad (31)$$

Similarly, if $(x^1, x^2) = (H, L)$ the advertising levels $(a^1, a^2) = (0, \alpha_L^+)$ are mutually optimal for the candidates if and only if

$$\frac{\Pi^2}{\beta^2} \geq \frac{\frac{\gamma^U - \gamma^I}{2\gamma^M} + \bar{\eta}}{p\varepsilon + (1-p)(1-\varepsilon)} > \frac{2\bar{\eta}}{p\varepsilon + (1-p)(1-\varepsilon)} \geq \frac{\Pi^1}{\beta^1}. \quad (32)$$

Clearly (31) and (32) cannot hold at the same time, so we have a contradiction. \square

Proof of Proposition 9

We first show that if the funding system is deterministic and candidates are truthful, a candidate always wins with platform H against platform L . Note that truthful χ^1 and χ^2 imply that $\nu^U(H, L) = \nu^I(H, L, h) = 1$ and $\nu^I(H, L, l) = 0$ (the arguments are given in the proof of Proposition 3), as well as

$$Pr [s^I = h \mid x^1 = H, x^2 = L] = p(1-\varepsilon) + (1-p)\varepsilon.$$

Also note that $a^1 = a^2$ implies $z(a^1, a^2) = z(0, 0) = \frac{1}{2} + \eta$. Using the fact that $\gamma^U > \gamma^I$, it follows that

$$\begin{aligned} \Gamma \times \mathbb{E}_{s^I} \left[\nu^U(H, L)\gamma^U + \nu^I(H, L, s^I)\gamma^I + z\left(\frac{\Gamma/2}{\beta}, \frac{\Gamma/2}{\beta}\right)\gamma^M \mid H, L \right] \\ = \Gamma \times \left[\gamma^U + [p(1-\varepsilon) + (1-p)\varepsilon]\gamma^I + \frac{1}{2}\gamma^M \right] > \Gamma/2. \end{aligned}$$

Because the public funding system is deterministic, if $(x^1, x^2) = (H, L)$ the fixed point of the mapping (17) lies to the right of $\Gamma/2$. In turn, this implies that if $(x^1, x^2) = (L, H)$ then candidate 1 attracts all uninformed voters *and* receives more public funding than candidate 2. Lemma 1, by extension, implies that candidate 1 must win with probability one. A similar argument shows that if $(x^1, x^2) = (L, H)$ then candidate 2 must win with probability one. One can now proceed as in the proof of Proposition 3 to show that, if one candidate plays a truthful strategy, the other has an incentive to always set platform H . By Lemma 2 the full information policy is implemented with probability less than one, and voter welfare is not maximized. \square

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