Helping Friends or Influencing Foes: Electoral and Policy Effects of Campaign Finance Contributions*

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Abstract

Campaign finance contributions may influence policy by affecting elections or influencing the choices of politicians once in office. To study the trade-offs between these two paths to influence, we use a game in which contributions may affect electoral outcomes and signal policy-relevant information to politicians. In the model, an interest group and two politicians each possess private information correlated with a policy-relevant state of the world. The interest group may allocate its budget to either a candidate who shares its preferences or a moderate candidate whose preferences may diverge from the group's preferred policy. Contributions that increase the likelihood of the moderate being elected can signal good news about the interest group's preferred policy and influence the moderate's policy choice. However, when the electoral effect of contributions is too small to demand sufficiently high costs to deter imitation by groups with negative information, this informational effect breaks down.

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How can interest groups influence policy using campaign contributions? The literature emphasizes two mechanisms, namely influencing who wins the election (i.e., the "electoral mechanism")[1] or influencing the policy chosen by the winner (i.e., the "persuasion mechanism").[2] Though existing research, both empirical and theoretical, separately examines contributions harnessing the electoral mechanism[3] and the persuasion mechanism,[4] effective policymaking requires an understanding of when and why groups choose one tactic rather than another.

We argue that interest groups contributing money face a steep trade-off between aiming to influence electoral outcomes and seeking to persuading winning candidates to set policy in line with group interests. This is because contributions to one candidate may reduce the group's credibility with an opposing candidate. Suppose a manufacturing firm seeks to avoid regulation of its product and can allocate contributions to either an anti-regulation candidate or a moderate candidate who will impose regulations if the firm's product is found to be unsafe. The firm possesses internal research about its product's safety and expects the winning candidate to have access to independent information after gaining office.

One option for the firm is to contribute money to increase the probability of the anti-regulation candidate taking office (i.e., the electoral mechanism). However, observing these contributions, the moderate candidate may infer the firm believes its product to be unsafe, to the extent that only the anti-regulation candidate's election could ensure a favorable policy. Thus, contributions to the anti-regulation candidate may lead to more extensive or stricter regulation if the moderate candidate is elected. Alternatively, the firm may contribute to the moderate candidate (i.e., the persuasion mechanism). Though this may reduce the probability of the firm's most preferred candidate being elected, it might cause the moderate candidate to infer the firm believes its product to be safe. Thus, in influencing policy, there is a direct trade-off between using the electoral mechanism and

[1] See Erikson and Palfrey (1998, 2000) and Hall (Forthcoming) on the effects of campaign fundraising on electoral outcomes.

[2] See Fouirnaies and Hall (2014), Gordon, Hafer and Landa (2007), and Stratmann (1991, 1992), for instance.

[3] Bonica (2013, 2014) estimates the preferences of donors and legislators under the assumption of (sincere) ideologically motivated giving.

[4] Examples include vote-buying (e.g., Denzau and Munger, 1986; Grossman and Helpman, 1994; Groseclose and Snyder, 1996; Diermeier and Myerson, 1999) and seeking to gain access (e.g., Cotton, 2012, Forthcoming; Grimmer and Powell, 2015; Kalla and Broockman, Forthcoming).

targeting persuasion: a contribution beneficial to one goal is detrimental to the other.

We consider how this trade-off impacts contribution decisions by interest groups and policy choices by politicians. In our model, an interest group may contribute to either an ally candidate (more closely sharing its policy preferences) or a moderate candidate, whose ideal policy is one that matches the unknown state of the world. The interest group and politicians each possess noisy and private signals correlated with the state of the world. The interest group may receive good news (indicating that its preferred policy more closely matches the state of the world) or bad news (indicating the opposite). Thus, in addition to affecting electoral outcomes, campaign contributions may also be used by interest groups to communicate private information to politicians. Contributions' informational value is generated by their electoral effects. Interest groups who receive good news (*good types*) expect that the moderate candidate will also receive positive information and, therefore, choose a favorable policy. In contrast, interest groups who receive negative information (*bad types*) expect that the moderate candidate will likewise receive bad news, increasing the policy-related disutility associated with the moderate, rather than the ally, winning the election. This informational dynamic implies that good types are more willing to sacrifice electoral gains to influence the moderate's policy choice, even though both types of interest groups strictly prefer the sympathetic ally over the moderate. Since the electoral costs (i.e. the costs of helping the moderate win) are felt more sharply by bad types, who expect larger differences in policy between the two candidates, a contribution schedule that improves the moderate's electoral chances can credibly reveal positive information that helps persuade the moderate to set a favorable policy should she win the election. Meanwhile, bad types use contributions to attempt to influence policy through the electoral mechanism by contributing to their most preferred candidate (the ally).

Our model suggests a link between the electoral and persuasion mechanisms through which contributions can affect policy: policy influence occurs when the electoral effect of contributions is strong enough to make contributions to ideologically distant candidates a credible signal of policy information. Thus, we propose different ways of predicting and identifying contributions predicated on persuading politicians to set a favorable policy. Our model's key predictor of persuasion-oriented versus election-oriented giving is the interest group's policy-relevant private information, which is unlikely to be observed by researchers. Though researchers use groups' observed characteristics, such as whether they are single-issue or have partisan affiliations, to distinguish between election-oriented and persuasion-oriented groups (e.g., Fouirnaies and Hall, 2014, 2015; Hall, 2014, Forthcoming; Snyder, 1992), our argument implies that much of the variation is due to informational heterogeneity between groups with similar observable characteristics.

While other researchers have attempted to identify donor motivations from contribution patterns, our model suggests different patterns to those usually assumed in such models. For instance, since contributions tend to more effectively change electoral outcomes in close races, it is often assumed that strategic persuasion-oriented donors will favor candidates highly likely to win, whereas strategic election-oriented donors will target close races in competitive districts (e.g., Bonica (2014)). Instead, we predict that both tactics will be more effective in close races and less effective in landslides. The key insight is that credible policy influence is derived from contributions electorally costly to the group: if *every* group were to give to the moderate to influence her policy choice upon gaining office, contributions would lose their informational value, thus precluding persuasion and eliminating interest group policy influence.

Additionally, we provide a rationale for why contributions may flow to a donor's least preferred candidate. In contrast to ideological models of political donations, in which persuasion-oriented and election-oriented donors each give to candidates that most closely match their preferences, we predict that contributions aimed at persuading winning candidates are insincere. In fact, contributions are only persuasive when they contradict the donor's electoral preferences. From this perspective, it could be difficult to infer the policy preferences of donors and candidates from contributions when both mechanisms for policy influence – persuasion and electoral – are relevant.

1 Relationship to the Literature

Our argument relates to previous models in which contributions inform politicians about the desirability of different policy alternatives. Cotton (2009, Forthcoming) considers models in which the politician sells her attention, rather than directly selling policy favors. Both articles show how a politician gains policy information by observing the contributions by groups competing for attention. Whereas these papers include one politician and focus on the effects of competition between interest groups, we focus on a model with one interest group and explore the effects of competition between candidates vying for office. Both here and in Cotton's papers, informative contributions are driven by politicians' access to an independent source of policy information. In Cotton's models, the politician verifies (i.e., directly observes) the private information about the policy advocated by the largest donor, which limits groups' temptation to exaggerate. In our model, the state of the world generates correlation between the signals of interest groups and politicians. Thus, the interest group's signals affect the intensity of its electoral preference for the sympathetic candidate, implying good types' greater willingness to forgo electoral gains to influence the moderate's policy choices.

Though we do not explicitly model lobbying in this paper, the informational function of contributions relates to models of informational lobbying in which contributions pay for access (Austen-Smith, 1995, 1998; Cotton, 2012; Lohmann, 1995; Schnakenberg, Forthcoming). In Austen-Smith (1995) and Lohmann (1995), interest groups' information is unverifiable but the credibility of informational lobbying can be enhanced by costly political contributions. In Austen-Smith (1998) and Cotton (2012), interest groups pay access fees in order to deliver verifiable information to the politician. Policymakers impose access fees in order to extract rent from interest groups; therefore, they tend to grant more access to wealthy groups. In Schnakenberg (Forthcoming), interest groups buy access to sympathetic policymakers, who serve as intermediaries to engage in informational lobbying of opponents. The mechanism in this paper differs substantially from this literature, since the informational credibility of contributions rests upon the trade-off between electoral and informational motivations for giving.

Other informational models of campaign finance focus on informational benefits to voters, rather than politicians. In Ashworth (2006), candidates offer favors for campaign contributions. Voters face a trade-off in campaign finance: while they receive valuable information from advertisements purchased with contributions, favors to interest groups are costly to them. Ashworth illustrates how this trade-off affects the desirability of different campaign finance policies. For instance, an outright ban on contributions avoids favors but also eliminates all informational benefits from contributions, while public financing offers informational benefits without the costly political favors. Prat (2002) shows how interest groups' campaign contributions may transmit information to voters about candidate characteristics. We do not explicitly include rational voters in our model, focusing instead on how contributions transmit policy information to politicians. Though contributions have an informational effect on policy in our model, the electoral effect of contributions is exogenous and does not operate through informational mechanisms. One way to conceptualize the effect of contributions in our model is that money increases the valence of the receiving candidates, as in the activist valence models of Miller and Schofield (2003) and Schofield (2006).

Other research highlights the trade-off between electing friends and lobbying enemies. Felli and Merlo (2007) study a citizen-candidate model in which interest groups may donate campaign funds and make ex post transfers in exchange for policy favors. In equilibrium, interest groups only donate campaign funds to their most preferred candidate and only make ex post transfers when their least preferred candidate wins the election. Thus, interest groups either influence electoral outcomes or buy policy, but not both. The mechanism for policy influence in our model differs from that of Felli and Merlo (2007): we assume that interest groups cannot contract with politicians and posit that policy influence occurs when contributions transmit policy-relevant information to politicians.

In contrast to Felli and Merlo (2007), this study complements Fox and Rothenberg (2011) in that both models explain how contributions might influence policy when politicians cannot commit to binding contracts with donors. A problem with traditional models of contributions as bribery (e.g., Grossman and Helpman, 1994) is that politicians may be incentivized to renege on policy favor promises once they gain office. In vote-buying models, politicians are often assumed able to commit to keeping these promises, but this assumption may be untenable (see McCarty and Rothenberg, 1996, for instance). Fox and Rothenberg (2011) provide an alternative mechanism that does not rely on contracting. In their model, politicians have private information about their policy preferences and the incumbent may bias policy toward an interest group to signal preference similarity, aiming to prevent the group from withholding contributions or giving to the challenger. Our model also provides a non-contracting explanation for the influence of contributions, but information flows in the opposite direction: contributions signal policy information to politicians.

Finally, recent work by Wolton (2017) also highlights multiple channels of interest group influence on policy outcomes. In his model, groups can engage in both inside lobbying (contributions or informational lobbying), which may affect policy content, and outside lobbying (grassroots mobilization or advertising), which may affect whether a policy succeeds or fails. Inside lobbying can signal group capacity for outside lobbying. Thus, overall influence depends on both channels, even when outside lobbying is never employed. In our model, contributions can persuade electoral winners to shift policy by providing (private) policy-relevant information to the politician, but only when the electoral effects of contributions are sufficiently large. The avenues of influence in our model are simultaneous – contributions aim to either persuade enemies or elect friends – whereas those in Wolton (2017) are closer to the ex ante and ex post mechanisms in Felli and Merlo (2007).

2 A model of campaign contributions

We model a situation in which a single interest group may spend money to influence the outcome of a two-candidate election. There are three players: a moderate candidate M, an ally candidate A, and an interest group G. The set of feasible policies is $X = [0,1]$, where larger numbers denote policies that are more favorable to G. Thus, we may interpret $x \in X$ to be the intensity of regulation of the industry represented by G, assuming that the industry prefers to avoid regulation. Additionally, there is a state of the world $\theta \in [0,1]$ that may affect players' policy preferences. The common prior belief is that θ is distributed according to a Beta distribution with known parameters.[5] If the policy choice is interpreted as the intensity of regulation, then θ can be interpreted as some piece of information that would affect the public's demand for regulation, such as information about a product's safety or its potential environmental impacts. Following conventions, we refer to θ as the "state of the world."

The sequence of the game is as follows. First, all players receive independent noisy signals $s_i \in \{0,1\}$ about the state of the world, where $\Pr[s_i = 1|\theta] = \theta$. The signals are private information. Second, G chooses contribution levels $c_G = (m,a)$ to the candidates, where $m \geq 0$ is the contribution to the moderate and $a \geq 0$ is the contribution to the ally. The probability of the moderate candidate winning the election is $V(m,a)$ where $\frac{\partial V(m,a)}{\partial m} > 0$ and $\frac{\partial V(m,a)}{\partial a} < 0$ for all pairs of contributions. Finally, the winner of the election chooses a policy $x \in X$.

The players are policy-motivated. The interest group's preferences are independent of the state of the world: G prefers less regulation to more regulation for any θ. Its preferences are, therefore, represented by the utility function

$$u_G(x) = -x^2. \quad (1)$$

The candidates' preferences should satisfy three properties. First, the candidates should prefer more regulation when they believe that θ is larger. Second, A's preferences should be more aligned with G's than are M's preferences. Finally, A should be less sensitive to information about θ than M. For instance, if both candidates receive information increasing the belief that G's industry could cause environmental harm, both would increase their preferred level of regulation but M's shift would be greater than A's.

The three properties described above are represented in a stylized manner with the following

[5] The Beta distribution is extremely flexible and convenient for modeling dichotomous signals since it is conjugate to the binomial distribution. However, the proof only uses the fact that $\mathbb{E}[\theta|s_G + s_i = 1]^2 \geq \mathbb{E}[\theta|s_G + s_i = 0]\mathbb{E}[\theta|s_G + s_i = 1]$, which holds for every continuous prior on $[0,1]$ that we have found.

utility functions:

$$u_M(x,\theta) = -(x-\theta)^2 \tag{2}$$

$$u_A(x,\theta) = -(bx-\theta)^2 \tag{3}$$

where $b > 1$ represents the difference in how the candidates wish to relate policy to the state of the world. One intuitive property of the candidates' policy preferences is that they are relatively similar when θ is believed to be small and diverge as θ increases. For instance, if both candidates believe that a particular pesticide poses no threat to public safety ($\theta = 0$), then they would both agree to zero regulation. Only if they learned of potential harm from the pesticide would candidate preferences diverge, perhaps because they would trade off (known) economic and public-safety benefits at different rates.

The analysis focuses on pure strategy perfect Bayesian equilibria that satisfy the Intuitive Criterion (Cho and Kreps, 1987). A strategy for G maps both possible signals into contribution decisions, and a strategy for each candidate maps contribution strategies and signals into policies. A perfect Bayesian equilibrium (PBE) is a profile of strategies and beliefs such that all players make optimal choices given their beliefs and the strategies of the other players, and beliefs are consistent with Bayes' rule on the equilibrium path. The Intuitive Criterion also eliminates pooling equilibria based on undesirable beliefs off the path of play. A formal description of this refinement is in Appendix A. Finally, we focus on equilibria in which G contributes only to one of the candidates at any information set. We show in Appendix B.1 that only this type of equilibrium is robust to the inclusion of an arbitrarily small cost of contributions. We will refer to profiles that meet all of these requirements simply as "equilibria."

3 Equilibrium analysis

The equilibrium analysis will show that, under certain conditions, there exists an equilibrium in which interest groups give some positive amount to M when $s_G = 0$ ("good types") and give only to A if $s_G = 1$ ("bad types"). Thus, the candidates interpret contributions to M as good news about the group's preferred policy and, therefore, adjust policy to be more favorable to G. Such an equilibrium only occurs when contributions to M are sufficiently electorally costly to deter the bad types of interest groups from making them. Unlike in standard signaling games, this separating equilibrium is not driven by ex ante differences in the costs of contributions. Instead, the result is driven by how the information provided by the signal s_G affects strategic incentives in the game. If an interest group receives a signal of $s_G = 1$, representing bad news about its preferred policy, then it expects the candidates are more likely to also receive bad news about the policy. Therefore, this bad type of interest group expects a greater divergence between the policy M would choose and that which A would choose. For this reason, the bad type of interest group is more sensitive than the good type to changes in the probability of a Moderate being elected. In contrast, the good type of interest group (i.e., that which receives a signal of $s_G = 0$), expects the policies chosen by M and A to be more similar; it is, thus, willing to make contributions that increase the probability of electing M to levels that would be intolerable to the bad type.

3.1 Policy choices

We begin our analysis by characterizing the candidate's policy choices as a function of their beliefs.

Lemma 1. *M sets policy to $x_M = \mathbb{E}[\theta|s_M, c_G]$ if elected. A sets policy to $x_A = \frac{\mathbb{E}[\theta|s_M, c_G]}{b}$ if elected.*

Lemma 1 has several immediate implications. First, information that increases the expected value of θ for both candidates will increase the difference between their optimal policies. Second, the difference between the optimal policies of M and A grows as b increases. As b approaches its lower bound of 1, there is no difference between M and A. As b increases to infinity, A's optimal policy for any beliefs goes to zero, so A's preferences approach those of G. Finally, Lemma 1 allows us to fully describe policy strategies in pooling and separating equilibria. In a pooling equilibrium, contribution decisions can be ignored and the candidates choose policy only on the basis of their own signals: $x_M = \mathbb{E}[\theta|s_M]$ and $x_A = \mathbb{E}[\theta|s_A]/b$. In a separating equilibrium, we can replace the c_G in the conditional expectations in Lemma 1 with the value of G's signal: $x_M = \mathbb{E}[\theta|s_M, s_G]$ and $x_A = \mathbb{E}[\theta|s_A, s_G]/b$. This tells us that in a pooling equilibrium, each candidate will pursue one of only two distinct policy choices: one for each value of their signal. Conversely, in a separating equilibrium, the candidates change their policy choices based on both sets of signals. Though there are four combinations of relevant signals, the signals' exchangeability means that the candidates respond to the sum of the two signals and, therefore, have only three distinct policy choices.

3.2 Contributions

3.2.1 Motivations for contributions

Contribution decisions turn on how G trades off the costs of increasing the chances of electing M with the costs of an unfavorable policy through informational effects. The electoral cost of contributing $c_G = (m,a)$ rather than $c'_G = (m',a')$ is

$$K_E((m,a),(m',a')) = \frac{(b-1)V(m,a)+1}{(b-1)V(m',a')+1}.$$

The electoral cost of contributing (m,a) relative to (m',a') is equal to one if both contribution schedules lead to the same probability of the moderate's election, and increases as $V(m,a)$ increases relative to $V(m',a')$. Furthermore, if $V(m,a) > V(m',a')$, then K_E increases as b increases. Thus, the electoral cost associated with making a contribution more favorable to M is larger if campaign contributions more effectively affect electoral outcomes or the level of preference divergence between the two candidates is high. Importantly, K_E depends on the contribution amounts but not on G's type.

The persuasion cost faced by G can be operationalized as the expected policy of M when she is convinced that $s_G = 1$ relative to her expected policy when convinced that $s_G = 0$. Because s_G informs G about M's most likely signal, this cost also depends on the actual value of G's signal. If $s_G = 0$, then G expects that lower values of θ are more likely. Since the candidates' signals also depend on θ, this tells G that the elected candidate is more likely to have received a signal of $s_i = 0$ as well. Similarly, if $s_G = 1$ then G believes $s_i = 1$ to be more likely from either candidate. Specifically, we have

$$\Pr[s_M = 1|s_G] = \Pr[s_A = 1|s_G] = \mathbb{E}[\theta|s_G]$$

and $\mathbb{E}[\theta|s_G = 1] > \mathbb{E}[\theta|s_G = 0]$. Therefore, G's expectation about M's policy choice when M believes that $s_G = 0$ is

$$\mu^0(s_G) = \mathbb{E}[\theta|s_G]\mathbb{E}[\theta|s_M \neq s_G] + (1 - \mathbb{E}[\theta|s_G])\,\mathbb{E}[\theta|s_M = s_G = 0].$$

That is, G believes that $s_M = 1$ with probability $\mathbb{E}[\theta|s_G]$. In that case, given M's belief that $s_G = 0$, she sets policy equal to $x = \mathbb{E}[\theta|s_M \neq s_G]$. With probability $(1 - \mathbb{E}[\theta|s_G])$ M's signal will instead be $s_M = 0$. Since M believes that both signals are zero, she sets policy to $x = \mathbb{E}[\theta|s_M = s_G = 0]$. Similarly, G's expectation about M's policy choice when M believes that $s_G = 1$ is

$$\mu^1(s_G) = \mathbb{E}[\theta|s_G]\mathbb{E}[\theta|s_M = s_G = 1] + (1 - \mathbb{E}[\theta|s_G])\,\mathbb{E}[\theta|s_M \neq s_G].$$

The persuasion cost faced by G is

$$K_P(s_G) = \frac{\mu^1(s_G)}{\mu^0(s_G)},$$

, which represents G's policy loss when it convinces M of an unfavorable signal $(s_G = 1)$, rather than a favorable one $(s_G = 0)$. K_P does not depend directly on the contribution amounts: that is, any pair of contributions that induce the same posterior beliefs from the candidates carry the same persuasion cost. However, unlike electoral costs, persuasion costs are experienced differently by different types of G. Lemma 2 establishes the direction of this dependence: persuasion costs are greater for the good type than for the bad type.

Lemma 2. *Persuasion costs are greater when G has received favorable information:* $K_P(0) > K_P(1)$.

In a separating strategy profile, the candidates' beliefs are that $s_G = 0$ when G makes a contribution that is sufficiently favorable to M, and $s_G = 1$ otherwise. Thus, there is a trade-off between the two motivations for contributions: contributions more favorable to M decrease persuasion cost but increase electoral cost. The interest group's contribution decisions boil down to a comparison between the electoral and persuasion costs. Lemma 3 states the result.

Lemma 3. *If $c_G = (m,a)$ induces the belief that $s_G = 0$ and $c'_G = (m',a')$ induces the belief that $s_G = 1$, then G weakly prefers to contribute c_G over c'_G if $K_P(s_G) \geq K_E((m,a),(m',a'))$, and the preference is strict if the inequality is strict.*

Lemma 3 clarifies when an interest group would be willing to choose one contribution schedule over another in order to convince the candidates that $s_G = 0$: G would make a contribution for the purpose of persuasion if the electoral costs created thereby are lower than the persuasion costs of sending another contribution and convincing the candidates that $s_G = 1$.

As we note in Corollary 1, Lemmas 2 and 3 together imply a sorting condition that lays the groundwork for persuasion through contributions in this game. Specifically, if the bad type would weakly prefer to make a given contribution to persuade the candidates it is a good type, then the good type would strictly prefer to make that same contribution.

Corollary 1. *If $K_P(1) \geq K_E((m,a),(m',a'))$ then $K_P(0) \geq K_E((m,a),(m',a'))$.*

Following Corollary 1, a separating equilibrium exists as long as there is some contribution (m^*,a^*) making the bad type indifferent between giving everything to A, thus revealing itself as a bad type, and giving (m^*,a^*) to imitate a good type. That is, the electoral costs $K_E((m,a),(0,1))$ must be sufficiently large to deter imitation by the bad types given the value of their persuasion costs $K_P(1)$. Our typology of equilibria relies on this comparison.

3.2.2 Persuasion through restraint

If the candidates' preferences are very divergent from one another and the electoral effect of contributions is very large, then electoral costs are at their highest. In this case, the reward for persuading the candidates may not be high enough to convince the bad types of interest groups to reduce their contributions to A. Thus, the good types of interest groups can reveal their type by simply reducing their contribution amounts to A. We call this "persuasion through restraint."

Proposition 1 gives the conditions under which there is an equilibrium involving persuasion through restraint. The key question is as follows: would the bad type of interest group be willing to reduce its contributions to zero if doing so would convince the candidates it was a good type? If the answer is no, then there cannot be persuasion through restraint equilibrium, since the bad type would not be deterred from imitation by restraint alone. Conversely, if the answer is yes, then since the group's utility function is continuous, there must be some restrained level of contributions to A that makes the bad type indifferent, implying there is a persuasion through restraint equilibrium.

Proposition 1. *If $K_P(1) \leq K_E((0,0),(0,1))$ then there is an equilibrium with persuasion through restraint. In this case, the unique equilibrium has the bad type contributing $(0,1)$ and the good type contributing $(0,a^*)$, where a^* is chosen to set $K_P(1) = K_E((0,a^*),(0,1))$*

Uniqueness of the persuasion by restraint equilibrium in Proposition 1 is the result of applying the Intuitive Criterion. This rules out two types of equilibria. First, the pooling equilibrium is ruled out. Second, though there is a continuum of perfect Bayesian equilibria to the game (any contribution where the electoral cost is between $K_P(1)$ and $K_P(0)$ is a separating equilibrium), the equilibrium that makes the bad type indifferent is the only one that survives the Intuitive Criterion. The details of these arguments are set out in Appendix A.

3.2.3 Persuasion through switching sides

In some cases, simply reducing contributions to A is insufficient to credibly reveal G's signal, but this information can be revealed by contributing to M. This may occur when candidates are less polarized or the electoral effect of contributions is at a moderate level. In this type of equilibrium, which we call "persuasion through switching sides," the bad type of G continues to contribute the maximum amount only to A, while the good type separates by contributing some amount to M. The arguments for existence and uniqueness are similar to those for Proposition 1.

Proposition 2. *If* $K_P(1) \leq K_E((1,0),(0,1))$ *then there is an equilibrium with persuasion through switching sides. In this case, the unique equilibrium has the bad type contributing* $(0,1)$ *and the good type contributing* $(m^*,0)$*, where* m^* *is chosen to set* $K_P(1) = K_E((m^*,0),(0,1))$

Proposition 2 provides a rationale for why some interest groups might contribute to their least preferred candidate in an election. These contributions are meant to convey that the group's private information suggests more closely aligned interests with those of M than might otherwise be expected. To credibly convey that message, the group must choose a contribution level that they would not be incentivized to give in the event of less favorable information. Thus, credibility may sometimes only be acquired by contributing to the group's least preferred candidate.

3.2.4 Pure electoral motivation

If the candidates are not very polarized or the electoral race is not so close that contributions will likely to affect the outcome, it may not be possible to demand sufficiently high electoral costs for contributions to credibly reveal information. In these cases, contributions have no persuasive power and the group's only motivation for providing them is to support its most preferred candidate. Thus, in this scenario, we predict a pooling equilibrium in which both types of G give only to A and do not perceive any value in restraint or switching sides.

Proposition 3. *If* $K_P(1) > K_E((1,0),(0,1))$ *then no equilibria involve persuasion and contributions are purely electorally motivated (i.e., both types of groups give the maximum amount to A).*

The main take-away from Proposition 3 is that contributions cannot be effective tools for persuasion if the maximum feasible level of electoral costs is insufficient to deter the bad type of interest group . The additional prediction that both types give the maximum amount to A is highly dependent on the assumption that campaign contributions carry only negligible financial costs. If we relax this assumption then, since the electoral motivation for giving is also quite low, we might expect both types to instead give nothing to either candidate. However, the more important insight that contributions are not persuasive would remain true as long as the financial costs of contributions do not depend on s_G.

4 Discussion

4.1 Campaign contributions and welfare

In this section, we discuss the welfare effects of campaign contributions by evaluating equilibrium social welfare compared to a situation in which campaign contributions are not allowed. The most interesting case is that in which G's preferences conflict with those of the public, so we consider a situation in which the public is aligned with M (i.e., $W(x,\theta) = -(x-\theta)^2$). The evaluation of citizen welfare, much like that of G's decision-making, turns on two factors: the direct electoral effects of contributions and the indirect informational effects. Contributions to A tend to harm the moderate citizen by increasing the probability that the biased candidate takes office. Conversely, contributions to M benefit the moderate citizen by increasing the probability that M takes office. Finally, the information provided to candidates in a separating equilibrium benefits the citizen by increasing both candidates' effectiveness in matching policy to the state of the world. This effect is most pronounced when M is likely to take office. In a pooling equilibrium, the moderate citizen would clearly benefit from eliminating the possibility of political contributions: in such an equilibrium, as all contributions go to A, the positive informational effects of contributions are non-existent. As we will show below, the welfare effects of contributions are less clear in a separating equilibrium, and positive and negative effects are both possible for different parameterizations of the model.

In a separating equilibrium, contributions provide some benefit to the citizen by giving politicians better information on which to base policy decisions. The effects of contributions on election probabilities are mixed: in persuasion by switching sides, G contributes to A when $s_G = 1$ and to M when $s_G = 0$. Thus, the citizen's welfare calculation depends on the balance of these electoral distortions and their magnitude relative to the informational benefits of contributions. Example 1 in Appendix B.2.1 shows that, when θ is uniformly distributed and V is a linear probability function, the welfare effect of informative contributions compared to no contributions is sensitive to the model's parameters. In that example, either scenario may be favorable to the voter, depending on the level of preference divergence between candidates and on the marginal effect of campaign contributions on electoral outcomes.

4.2 Multiple groups

We have focused on the case of one interest group and two candidates to make our argument as parsimonious as possible. One concern with the one-group model is that persuasion through restraint or switching sides only occurs if the effects of contributions on electoral outcomes are sufficiently substantial to generate an electoral cost deterring bad types of G from imitation. However, with a large number of interest groups, the effect of any one group's contribution on the electoral outcome is minimal. Therefore, a many-group model may not provide interesting predictions. This argument has merit but overlooks that the persuasive effects of contributions diminish as the number of groups grows large. Since electoral and persuasion costs each decrease as the number of groups increases, we may still support interesting equilibria as the number of interest groups grows large.

Example 2 in Appendix B.2.2 uses a numerical example to demonstrate that separating equilibria may still exist as the number of interest groups increases. However, this feature of Example 2 is not universal. The argument depends on the values of the model parameters and on the specification of how V changes shape as the number of groups increases. The key issue is how quickly persuasion costs converge on one (i.e., no relative costs) relative to electoral costs. If electoral costs diminish very quickly relative to persuasion costs – that is, if the electoral effect of contributions diminishes very quickly but the persuasion effect of an extra signal does not – then separating equilibria will diminish more quickly as the number of groups becomes larger[6]

[6]The substantive import of the many-group example also depends on the empirical context. In a Presidential election, most Senate elections, or those in highly visible Congressional districts, we see hundreds of groups vying for influence or trying to influence the election outcome. In other elections, such as municipal, state legislative, judicial, or even those in certain Congressional districts, the support of one or two key groups or trade associations may have a large effect on the outcome.

Equilibrium (type)	Contribution	Predicted Effect
Pooling (any type)	Allies	No effect
Restraint (bad type)	Allies	Wrong sign
Restraint (good type)	Allies	Correct sign
Switching sides (bad type)	Allies	Wrong sign
Switching sides (good type)	Opponents (Moderate)	Correct sign

Table 1: Predicted causal effect of contributions on a candidate's policy choice for each equilibrium and type of interest group.

4.3 Some empirical implications

Though citizens and commentators widely suspect that legislators' policy choices are influenced by campaign contributions, social scientists have not found much evidence that contributions affect votes on policy. For instance, Ansolabehere, de Figueiredo and Snyder (2003) reviewed the literature and concluded that, in three out of four cases, contributions either had no significant effects or the effects were in the wrong direction (114). Though our model predicts that contributions can influence politicians' policy choices, that influence depends on two factors that researchers may not observe: the game's equilibrium and the type of G.

Table 1 summarizes the possibilities. In a pooling equilibrium, contributions should have no effect on policy since they convey no information to the candidates. In a persuasion through restraint equilibrium, contributions go to allies of G and may have opposite effects depending on their size: "restrained" contributions in smaller amounts have a positive effect on policy choices from the group's perspective. Thus, a regression of policy choices on contribution amounts would find effects running in the opposite direction to that desired. In a persuasion through switching sides equilibrium, only bad types contribute to allies and these contributions have the "wrong sign" (i.e., contributions would appear to be associated with policy choices unfavorable to the group). Contributions to opponents, which signal that G is a good type, have the usual expected effect on policy choice. Thus, if researchers are missing critical information about the model parameters and do not consider what information the interest groups may possess, it is easy to understand why even studies with otherwise sound research designs would not find consistent evidence of policy influence.

To compound matters, the effects of contributions on policy choices in our model apply to both candidates, not just the contributions recipient. In fact, all effects of contributions in our model are more pronounced when M wins the election, regardless of which candidate receives the contributions. Thus, we would expect empirical designs to find little or no effects of contributions in cross-sectional comparisons between legislators who receive contributions and those who do not.

Though some of the above empirical implications are peculiar to our (very stylized) model, the discussion reveals some insights applicable generally to informational models and that are not incorporated into current research. First, if the mechanism for policy influence is informational, then the effect of contributions may not always be positive. Some contribution amounts must reveal negative policy information and some others must reveal positive policy information, so that the average effect of contributions may be near zero. Second, the informational effects of contributions should apply not just to the contributions recipient but also to anyone who observes those contributions.

5 Conclusions

In this paper, we studied how an interest group might use campaign contributions to either persuade policymakers to choose policies in line with the group's interests or influence an election outcome. Our formal model highlights a trade-off between these two forms of influence, stemming from the fact the most persuasive contributions are those running counter to the donor's electoral interests. In fact, persuasion is only possible because of this trade-off: if an interest group cannot make contributions sufficiently harmful to its most preferred candidate's electoral prospects, then contributions are not credible tools for persuasion.

In addition to highlighting the trade-off between persuasion and electoral influence, the model provides novel predictions on the influence of contributions on politicians' choices. First, contributions are only persuasive when their electoral effects are sufficiently large (e.g., in close elections) and when the candidates are sufficiently polarized. Second, even when these conditions are met and contributions are persuasive, their effects will be heterogeneous: some (electorally motivated) contributions will cause politicians to shift *away* from the group's preferred policy, while those that conflict with the donor's electoral interests will cause politicians to choose more favorable policies. Finally, contributions will affect the choices of all politicians who observe them, rather than just the recipients. Thus, analyses making cross-sectional comparisons between politicians who receive contributions from the group and those who do not are unlikely to identify persuasive effects of contributions.

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A Supplemental information: proofs of results

We prove our results for a more general model than the one in the text. Rather than assuming θ is distributed beta, we assume θ follows some arbitrary continuous distribution F, with density f and support on $[0,1]$. In addition, we make the following assumption about the conditional expectations of θ following different combinations of signals:

Assumption 1. For $j \in \{M, A\}$, we have $\mathbb{E}[\theta | s_j \neq s_G]^2 > \mathbb{E}[\theta | s_j = s_G = 0]\mathbb{E}[\theta | s_j = s_G = 1]$.

Assumption 1 can be interpreted to mean that the posterior expectations are log-concave with respect to the number of positive signals. It is easily verified that Assumption 1 holds if F is a Beta distribution with parameters α and β. In that case, it is well-known that the posterior is a beta distribution with parameters $\alpha + s_i + s_G$ and $\beta + 2 - s_i - s_G$. Therefore, the posterior expectation is $\frac{\alpha+s_i+s_G}{\alpha+\beta+2}$. It is straightforward to check that

$$\left(\frac{\alpha+1}{\alpha+\beta+2}\right)^2 > \frac{\alpha}{\alpha+\beta+2}\frac{\alpha+2}{\alpha+\beta+2}.$$

In fact, the authors have looked for examples of continuous distributions on $[0,1]$ for which Assumption 1 does *not* hold given signals such that $\Pr[s = 1|\theta] = \theta$, finding no such examples.

The conditional expectations of θ given a general prior are:

$$\begin{aligned}
\mathbb{E}[\theta|0] &= \int_0^1 \frac{f(\theta)(1-\theta)\theta}{\int_0^1 f(\hat{\theta})(1-\hat{\theta})d\hat{\theta}}d\theta = \frac{1}{1-\mathbb{E}[\theta]}\int_0^1 f(\theta)(1-\theta)\theta d\theta = \frac{\mathbb{E}[\theta]-\mathbb{E}[\theta^2]}{1-\mathbb{E}[\theta]} \\
\mathbb{E}[\theta|1] &= \int_0^1 \frac{f(\theta)\theta^2}{\int_0^1 f(\hat{\theta})\hat{\theta}d\hat{\theta}}d\theta = \frac{1}{\mathbb{E}[\theta]}\int_0^1 f(\theta)\theta^2 d\theta = \frac{\mathbb{E}[\theta^2]}{\mathbb{E}[\theta]} \\
\mathbb{E}[\theta|0,1] &= \int_0^1 \frac{f(\theta)(1-\theta)\theta^2}{\int_0^1 f(\hat{\theta}(1-\hat{\theta})\hat{\theta}d\hat{\theta}}d\theta = \frac{1}{\mathbb{E}[\theta(1-\theta)]}\int_0^1 f(\theta)\theta^2(1-\theta)d\theta = \frac{\mathbb{E}[\theta^2]-\mathbb{E}[\theta^3]}{\mathbb{E}[\theta]-\mathbb{E}[\theta^2]} \\
\mathbb{E}[\theta|0,0] &= \int_0^1 \frac{f(\theta)(1-\theta)^2\theta}{\int_0^1 f(\hat{\theta}(1-\hat{\theta})^2 d\hat{\theta}}d\theta = \frac{1}{\mathbb{E}[(1-\hat{\theta})^2]}\int_0^1 f(\theta)(1-\theta)^2\theta d\theta = \frac{\mathbb{E}[\theta^3]-2\mathbb{E}[\theta^2]+\mathbb{E}[\theta]}{\mathbb{E}[\theta^2]-2\mathbb{E}[\theta]+1} \\
\mathbb{E}[\theta|1,1] &= \int_0^1 \frac{f(\theta)\theta^3}{\int_0^1 f(\hat{\theta})\hat{\theta}^2 d\hat{\theta}}d\theta = \frac{1}{\mathbb{E}[\theta^2]}\int_0^1 f(\theta)\theta^3 d\theta = \frac{\mathbb{E}[\theta^3]}{\mathbb{E}[\theta^2]}.
\end{aligned}$$

Proof of Lemma 1. We first prove the result for A. A's expected utility is $-b^2x_A^2+2bx_A\mathbb{E}[\theta|s_M,c_G]-\mathbb{E}[\theta^2|s_M,c_G]$. This is concave and the first order condition with respect to x_A is $2b(\mathbb{E}[\theta|s_M,c_G]-bx_A)=0$, which gives $x_A=\mathbb{E}[\theta|s_M,c_G]/b$. Setting $b=1$ yields the result for M. ■

Proof of Lemma 2. Note that

$$\frac{\mu^1(0)}{\mu^0(0)}-\frac{\mu^1(1)}{\mu^0(1)}=\frac{\mu^1(0)\mu^0(1)-\mu^0(0)\mu^1(1)}{\mu^0(0)\mu^0(1)}.$$

We must have $\mu^0(0)\mu^0(1)>0$ since both expectations are positive. Therefore, the Lemma holds if

$$\mu^1(0)\mu^0(1)-\mu^0(0)\mu^1(1)>0.$$

Substituting the definitions of μ into these expressions yields

$$\begin{aligned}\mu^1(0)\mu^0(1)-\mu^0(0)\mu^1(1)=&\Big[(\mathbb{E}[\theta|0]\mathbb{E}[\theta|1,1]+(1-\mathbb{E}[\theta|0])\mathbb{E}[\theta|0,1])\\&\times(\mathbb{E}[\theta|1]\mathbb{E}[\theta|0,1]+(1-\mathbb{E}[\theta|1])\mathbb{E}[\theta|0,0])\Big]-\\&\Big[(\mathbb{E}[\theta|0]\mathbb{E}[\theta|0,1]+(1-\mathbb{E}[\theta|0])\mathbb{E}[\theta|0,0])\\&\times(\mathbb{E}[\theta|1]\mathbb{E}[\theta|1,1]+(1-\mathbb{E}[\theta|1])\mathbb{E}[\theta|0,1])\Big]\\=&\mathbb{E}[\theta|0,1]^2\mathbb{E}[\theta|1]-\mathbb{E}[\theta|1,1]\mathbb{E}[\theta|0,0]\mathbb{E}[\theta|1]-\\&\mathbb{E}[\theta|0,1]^2\mathbb{E}[\theta|0]+\mathbb{E}[\theta|1,1]\mathbb{E}[\theta|0,0]\mathbb{E}[\theta|0]\\=&(\mathbb{E}[\theta|1]-\mathbb{E}[\theta|0])(\mathbb{E}[\theta|0,1]^2-\mathbb{E}[\theta|1,1]\mathbb{E}[\theta|0,0]).\end{aligned}$$

Since $\mathbb{E}[\theta|1]-\mathbb{E}[\theta|0]>0$, the difference is positive,

$$\mathbb{E}[\theta|0,1]^2>\mathbb{E}[\theta|1,1]\mathbb{E}[\theta|0,0]). \tag{4}$$

This is precisely Assumption 1. ■

Proof of Lemma 3. Given these expectations, G weakly prefers to contribute c_G rather than c'_G when $-V(m,a)\mu^0(s_G)-(1-V(m,a))\frac{\mu^0(s_G)}{b} \geq -V(m',a')\mu^1(s_G)-(1-V(m',a'))\frac{\mu^1(s_G)}{b}$, which reduces to $\frac{\mu^1(s_G)}{\mu^0(s_G)} \geq \frac{(b-1)V(m,a)+1}{(b-1)V(m',a')+1}$, which is equivalent to $K_P(s_G) \geq K_E((m,a),(m',a'))$, as claimed. By a similar argument, a strict inequality implies strict preference. ■

Proof of Proposition 1. In any separating equilibrium, the bad type makes the contribution that maximizes its electoral benefit, which is to contribute $(0,1)$. By continuity of V, $\frac{\mu^1(s_G)}{\mu^0(s_G)} - \frac{(b-1)V(m,a)+1}{(b-1)V(0,1)+1}$ is continuous in (m,a). Clearly $\frac{\mu^1(s_G)}{\mu^0(s_G)} > \frac{(b-1)V(0,1)+1}{(b-1)V(0,1)+1} = 1$. Thus, if $\frac{\mu^1(s_G)}{\mu^0(s_G)} \leq \frac{(b-1)V(0,0)+1}{(b-1)V(0,1)+1} = 1$, then, by continuity, there exists $a^* \in [0,1)$, such that $\frac{\mu^1(s_G)}{\mu^0(s_G)} = \frac{(b-1)V(0,a^*)+1}{(b-1)V(0,1)+1}$. By Lemma 2, the good type strictly prefers to give $(0,a^*)$ in this profile, so this is an equilibrium. (The argument for uniqueness is nearly identical to that in the proof of Proposition 2 below.) ■

Proof of Proposition 2. By continuity of V, $\frac{\mu^1(s_G)}{\mu^0(s_G)} - \frac{(b-1)V(m,a)+1}{(b-1)V(0,1)+1}$ is continuous in (m,a). Clearly, $\frac{\mu^1(s_G)}{\mu^0(s_G)} > \frac{(b-1)V(0,1)+1}{(b-1)V(0,1)+1} = 1$. Thus, if $\frac{\mu^1(s_G)}{\mu^0(s_G)} \leq \frac{(b-1)V(1,0)+1}{(b-1)V(0,1)+1} = 1$, then, by continuity, there exists m^*, such that $\frac{\mu^1(s_G)}{\mu^0(s_G)} = \frac{(b-1)V(m^*,0)+1}{(b-1)V(0,1)+1}$. By Lemma 2, the good type strictly prefers to give $(m^*,0)$ in this profile, so this is an equilibrium.

To show uniqueness, we must demonstrate that no other equilibrium survives the Intuitive Criterion. First, a pooling equilibrium does not survive the Intuitive Criterion: clearly, $(m^*,0)$ is equilibrium dominated for the bad type, since the bad type gets better policy in the pooling equilibrium than in a separating equilibrium, and contributing $(m^*,0)$ would only make the bad type indifferent. Furthermore, by Lemma 2, the good type would deviate from the pooling equilibrium to $(m^*,0)$ if it persuaded the candidates that $s_G = 0$. Finally no higher contribution $m' > m^*$ survives the Intuitive Criterion. Note that, by definition of m^*, any $m > m^*$ is equilibrium dominated for the bad type. Furthermore, relative to a separating equilibrium in which the good type contributes $(m',0)$, the good type would strictly prefer to contribute $m < m'$. Thus, any PBE with $m' > m^*$ fails the Intuitive Criterion. ■

Proof of Proposition 3. If $K_P(1) > K_E((1,0),(0,1))$, then, since $K_E((1,0),(0,1)) \geq K_E((m,a),(m',a'))$ for all other $(m,a) \in [0,1]^2$ and $(m',a') \in [0,1]^2$ (by the assumption that V is increasing in m and decreasing in a), there is no contribution schedule that would prevent the bad type of G from pooling. Thus, the unique equilibrium is for both types to send the contributions that maximize their electoral benefit, which is to give $(0,1)$ (everything to A). ■

APPENDIX B INTENDED FOR ONLINE PUBLICATION

B Online supplemental information

B.1 Giving to multiple candidates

In the main text we ignore the possibility of equilibria in which groups give to multiple candidates in some information sets. In this appendix we justify this decision by showing that only equilibria with contributions to one candidate at a time are robust to the inclusion of small financial costs to contributions. We start by noting that any equilibrium involving contributions to multiple candidates must have higher total contributions. Our starting point is the following observation:

Lemma 4. *If* $m > 0$ *and* $a > 0$ *and* $K_E((m,a),(0,1)) = K_E((m^*,0),(0,1))$*, then* $m + a > m^*$*. Similarly, if* $K_E((m,a),(0,1) = K_E((0,a^*),(0,1))$ *then* $m + a > a^*$*.*

Proof. If $K_E((m,a),(0,1)) = K_E((m^*,0),(0,1))$ then we have

$$K_E((m,0),(0,1)) > K_E((m,a),(0,1)) = K_E((m^*,0),(0,1))$$

where the inequality is implied by the fact that $V(m,a)$ is decreasing in a. The above implies that $m > m^*$. Furthermore, if $K_E((m,a),(0,1) = K_E((0,a^*),(0,1))$ then we have

$$K_E((0,a),(0,1) < K_E((m,a),(0,1) = K_E((0,a^*),(0,1))$$

which is implied by the fact that $V(m,a)$ is increasing in m. This also implies that $a > a^*$. ■

Lemma 4 implies that, if two profiles meet the equilibrium conditions from Lemma 3 but only one has the good type contributing to both candidates, the total amount of contributions must be greater in the profile involving contributions to both candidates. This in turn implies that only equilibria with contributions to one candidate at a time survive application of the Intuitive Criterion once we include some financial costs of contributions.

Proposition 4. *Consider a game like that described in the text except with G's payoff defined as $u_G(x,m,a) = -x^2 - \varepsilon(m,a)$ for $\varepsilon > 0$. Then there exists some $\overline{\varepsilon} > 0$ such that for all $\varepsilon < \overline{\varepsilon}$ any perfect Bayesian equilibrium that survives the Intuitive Criterion involves contributions to only one candidate at a time.*

Proof. For $\varepsilon < \min_{a\in[0,1]} V'(0,a)$ the optimal choice from a purely electoral perspective remains to contribute $(0,1)$. In a pooling equilibrium, this implies that both types of G contribute only to A. Furthermore, Lemma 4 implies that, among all separating PBE, the PBE in which the good type contributes to only one candidate or the other is the one that minimizes contribution costs. Therefore, given a separating PBE with $m > 0$ and $a > 0$ for the good type, there is some other contribution schedule that is (a) equilibrium dominated for the bad type (following the logic laid out in the proof of Proposition 2), and (b) preferred by the good type as long as it convinces the candidates that G is a good type. Therefore, PBE with contributions to both candidates fail to survive application of the Intuitive Criterion. ■

B.2 Illustrative examples

Example 1 shows how the welfare effects of contributions depend on the parameters of the model. Example 2 shows that separating equilibria may be robust to the inclusion of a large number of interest groups. In both examples, we focus on the implications of persuasion by switching sides, though similar analyses would apply to persuasion by restraint. Both examples are discussed briefly in the text and explained in greater detail below. In both cases, since the examples are simply for illustration, we do not show extensive calculations. Instead, a supplementary Mathematica file is included in the Supplemental Information to verify all work.

B.2.1 Welfare effects of contributions

Example 1. Suppose that θ is distributed uniformly on $[0,1]$ and assume that $V(m,a)$ is a linear probability function

$$V(m,a) = \frac{1}{2} + \gamma(m-a)$$

where $\gamma \in \left(0, \frac{1}{2}\right)$ represents the marginal effect of contributions on electoral outcomes.

The conditional expectations of any signal or pair of signals is computed by performing the usual Beta-Binomial updating, noting that the uniform is equivalent to a Beta(1, 1) distribution. The expectation of θ following only s_G is

$$\frac{1+s_G}{3}$$

and the expectation of θ following a pair of signals (s_G, s_j) for $j \in \{M, A\}$ is

$$\frac{1+s_G+s_j}{4}.$$

Thus, the expected policy choice from M for a group with signal s_G who sends a contribution that induces the belief that $s_G = 0$ is

$$m^0(s_G) = \frac{1+s_G}{3}\frac{1}{2} + \left(1 - \frac{1+s_G}{3}\right)\frac{1}{4}.$$

Similarly for a contribution inducing the belief that $s_G = 1$:

$$m^0(s_G) = \frac{1+s_G}{3}\frac{3}{4} + \left(1 - \frac{1+s_G}{3}\right)\frac{1}{2}.$$

Therefore, we have:

$$\begin{aligned} m^0(0) &= \frac{1}{3} \\ m^0(1) &= \frac{5}{12} \\ m^1(0) &= \frac{7}{12} \\ m^1(1) &= \frac{2}{3}. \end{aligned}$$

Thus, our equilibrium tells us there exists a separating equilibrium if

$$\frac{8}{5} \leq \frac{(b-1)\left(\gamma+\frac{1}{2}\right)+1}{(b-1)\left(\frac{1}{2}-\gamma\right)+1}$$

which holds if $b > \frac{8}{5}$ and $\frac{3b+3}{26b-26} \leq \gamma$. Under these conditions, the equilibrium contribution to M by the good type (found by setting persuasion costs equal to electoral costs for the bad type and solving for m) is

$$m^* = \frac{b(3-16\gamma)+16\gamma+3}{10(b-1)\gamma}$$

which results in the following probabiity of electing M given a good type of G

$$V(m^*, 0) = \frac{8b\gamma - 4b - 8\gamma + 1}{5-5b}.$$

We can now write the citizen's ex ante welfare as a function of the parameters:

$$W(\theta, b, \gamma) = \left(-(1-\theta)\left(\left(\frac{1}{45}(72\gamma-39)+1\right)\left((1-\theta)\left(\frac{1}{40}-\theta\right)^2+\left(\frac{1}{20}-\theta\right)^2\theta\right)+\frac{1}{45}(39-72\gamma)\left((1-\theta)\left(\frac{1}{4}-\theta\right)^2+\left(\frac{1}{2}-\theta\right)^2\theta\right)\right)-\theta\left(\left(\gamma+\frac{1}{2}\right)\left((1-\theta)\left(\frac{1}{20}-\theta\right)^2+\left(\frac{3}{40}-\theta\right)^2\theta\right)+\left(\frac{1}{2}-\gamma\right)\left((1-\theta)\left(\frac{1}{2}-\theta\right)^2+\left(\frac{3}{4}-\theta\right)^2\theta\right)\right)\right)$$

Since θ is unknown, we calculate the citizen's ex ante expected welfare (noting that the uniform density is a constant function $f(\theta) = 1$ as

$$\int_0^1 W(\theta, b, \gamma) d\theta = -\frac{b^2(158\gamma+81)-4b(79\gamma+35)+79(2\gamma+1)}{480b^2}.$$

If contributions are banned, both candidates will win with probability $V(0,0) = \frac{1}{2}$ and update their beliefs based only on their own signals. Therefore, voter welfare is
$\int_0^1 \left[\frac{1}{2}\left(-(1-\theta)\left(\frac{1}{3b}-\theta\right)^2-\theta\left(\frac{2}{3b}-\theta\right)^2\right)+\frac{1}{2}\left(-(1-\theta)\left(\frac{1}{3}-\theta\right)^2-\left(\frac{2}{3}-\theta\right)^2\theta\right)\right]d\theta = -\frac{7b^2-10b+5}{36b^2}$
Thus, there exists a separating equilibrium that is strictly preferred to banning contributions when

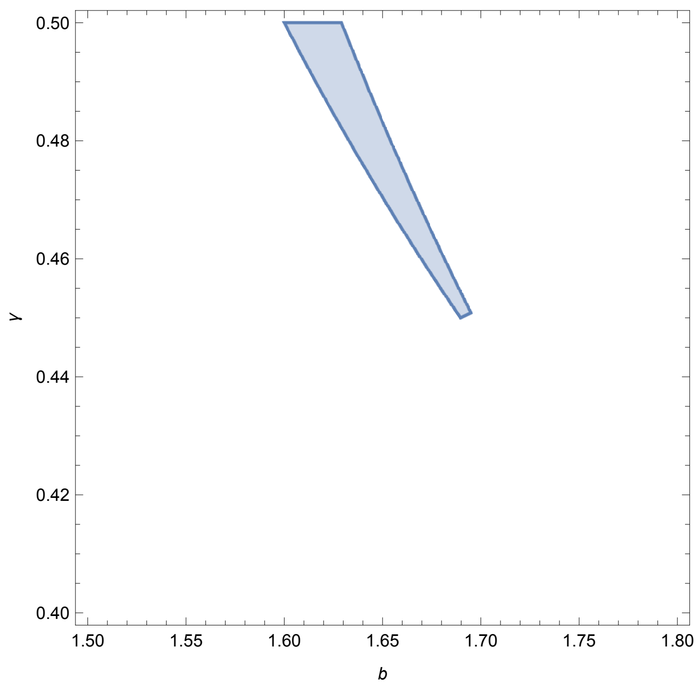

Figure 1: The blue region represents the set of parameters under which there exists a separating equilibrium that is preferred to banning contributions.

the equilibrium conditions are met and also

$$-\frac{b^2(158\gamma+81)-4b(79\gamma+35)+79(2\gamma+1)}{480b^2} > -\frac{7b^2-10b+5}{36b^2}.$$

This occurs when, in addition to the requirements that $b > \frac{8}{5}$ and $\frac{3b+3}{26b-26} \leq \gamma$, we have $\gamma < \gamma^*(b) \equiv \frac{37b^2+20b-37}{474b^2-948b+474}$. The region of the parameter space for which there exists a separating equilibrium that dominates a ban on contribution is displayed in Figure 1. In this particular example, a ban seems to dominate the separating equilibrium over most of the parameter space. However, the example was chosen to be illustrative rather than realistic and other examples may support the opposite conclusion. Our main take-way is that full knowledge of the model parameters is often necessary in order to make clear statements about whether a ban on contributions would increase or decrease citizen welfare. Therefore, in most applications, the welfare prediction is ambiguous.

B.2.2 Multiple groups

Example 2. Consider an n-group example of the model. Suppose θ is uniform on $[0,1]$ and let $b = 10$. Now suppose there are n identical groups which each receive conditionally independent signals and simultaneously choose contribution levels. Letting T_m and T_a denote the total amounts of contributions to m and a respectively, the probability that M is elected is

$$V(T_m, T_a, n) = \log\left(\frac{1+e}{2} + \frac{e-1}{2n}(T_m - T_a)\right)$$

where the letter e here represents the exponential constant and the log has base e. V is therefore log-linear and the intercept and slope are chosen to ensure that all probabilities fall between zero and one. We will show that there is a symmetric separating equilibrium even for large n. A separating equilibrium profile to this game involves each group choosing $(m,a) = (0,1)$ when it is a bad type and $(m,a) = (m^*, 0)$ for some $m^* > 0$ when it is a good type. The winning candidate, in turn, updates her beliefs assuming all contributions with $m > m^*$ and $a = 0$ indicate signals of 0 and any contribution with $a \geq 0$ or $m < m^*$ indicate signals of 1. Since the uniform is a Beta(1, 1) distributon, this means that the posterior distribution of θ for candidate j following a set of n contributions and her own signal, letting S denote the candidate's belief about the total number of high signals, is distributed $Beta(1+S+s_j, 1+n-S-s_j)$, and policy is chosen accordingly (equal to the expectation of θ for moderate candidates and $1/b$ times that expectation for allies). using this information, we can compute each type of G's expected utility for choosing each signal on the path of play. The expected utility for type s of sending $(m^*, 0)$ is

$$U_{m^*}(s_g, m^*, n) = -\mathbb{E}\left[\frac{(S+1)(1-V(m(n-S)+m, S, n))}{b(n+2+1)} + \frac{(S+1)V(m(n-S)+m, S, n)}{n+2+1}\right]$$

where the expectation is taken with respect to S, which is distributed Beta-Binomial with parameters $\alpha = 1+s$, $\beta = 2-s$. and $n = n$ (the first two parameters are the updated beliefs about θ from the signal s and the sample size n reflects the number of signals – all other groups plus one candidate). Similarly, the expected utility from sending $(0,1)$ is

$$U_0(s_g, m^*, n) - \mathbb{E}\left[\frac{(S+1+1)(1-V(m(n-S), S+1, n))}{b(n+2+1)} + \frac{(S+1+1)V(m(n-S), S+1, n)}{n+2+1}\right]$$

where S is distributed in the same way as above. For this example we compute these expectations numerically and omit the analytical details of the calculations.

Notice that, unlike in the 1 group model, the expected policy and the probability of electing the moderate fora given contribution both depend on the players' types since they also affect expectations over other players' contributions. Nevertheless, our sorting condition still holds. The next plot verifies that the good type has a stronger incentive to choose $(m^*, 0)$ over $(0,1)$ than does the bad type. This holds if

$$\Delta(m^*, n) = (U_{m^*}(1, m^*, n) - U_0(1, m^*, n)) - (U_{m^*}(1, m^*, n) - U_0(1, m^*, n))$$

is negative for a given n and all $m^* \in (0,1)$. Figure 2 verifies that this holds for several values of n.

The sorting condition implies that if there is a contribution to the moderate $m^* > 0$ that would make the bad type indifferent between sending $(m^*, 0)$ and $(0,1)$ given the proposed strategy profile, the good type woudl strictly benefit from separating and sending $(m^*, 0)$. We must now verify that some contribution would make the bad type indifferent. As in the one group model, we do so by showing that the bad type would not send the maximum amount to the Moderate. Then, by appealing to continuity, we know that some contribution makes the bad type indifferent. Figure 3 shows that this is true even for very large numbers of interest groups. In this figure, the number of interest groups is on the x axis and the y axis represents the bad type's utility gain from imitating by sending $(1,0)$. We note that this utility gain is negative for all of the examined values of n, which shows that the bad type can be deterred from imitating and therefore there is a symmetric separating equilibrium. Note that this example does not show that separating equilibria are *always* robust to increasing the number of groups. In fact, for smaller values of b the separating equilibrium is

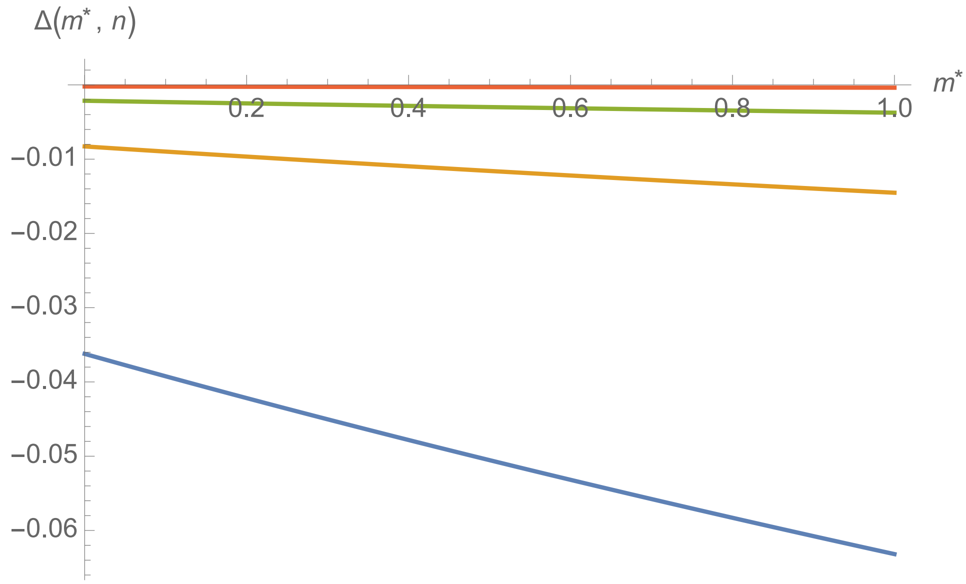

Figure 2: The lines show values of $\Delta(m^*, n)$ for each possible value of m^* and various values of n. Values below 0 verify our sorting condition: bad types of G have less of an incentive to contribute to the Moderate in order to be viewed as a good type. Note also that the lines are decreasing in m^*, since naturally this difference in incentives widens as we increase the required contribution and therefore increase the electoral disincentive to do so. However, the slope of the lines are lower for higher values of n since the importance of any one contribution diminishes as n increases.

only sustainable for relatively small numbers of groups. As we have noted, the answer depends on how quickly the electoral and persuasion components of the effects of contributions go to zero as n gets large: if the electoral effects converge to zero more slowly, as they do in this example, then the separating equilibrium is sustained for high values of n.

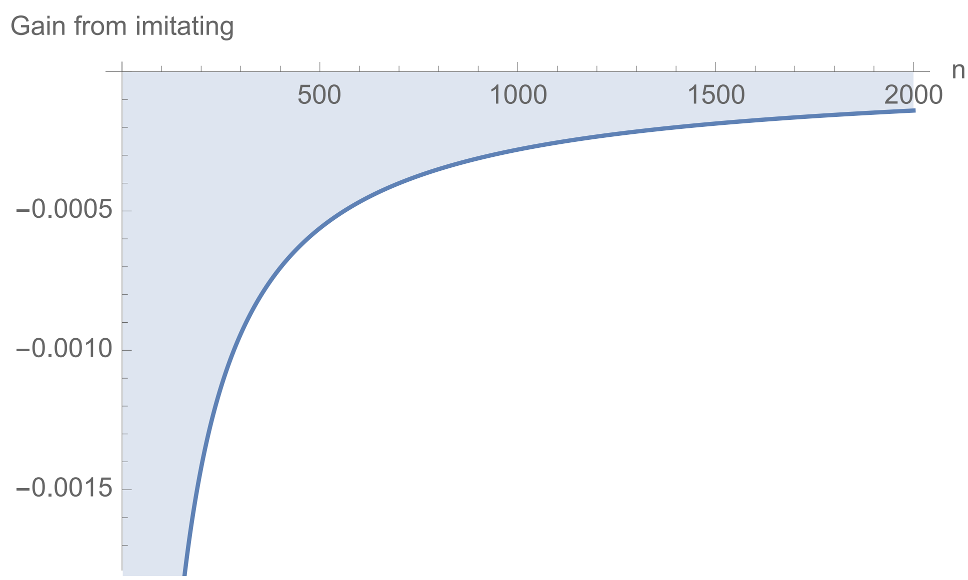

Figure 3: This plot shows the bad type of G's net utility from deviating from the separating equilibrium by giving the maximum amount to M, for each value of n. Negative values indicate that the bad type would not deviate, which means that we can support a symmetric separating equilibrium for that value of n.