The Iceberg Theory of Campaign Contributions: Political Threats and Interest Group Behavior

March 2007

Abstract

This paper presents a model of campaign contributions where a special interest group can condition its contributions not only on the receiving candidate's support but also on that of her opponent. This allows the interest group to obtain support both from contributions as well as from the implicit threat of contributing to the opponent. These out-of-equilibrium contributions can help explain the "missing money" puzzle in the empirical literature. Our framework contradicts standard models in predicting that interest groups do not give to both sides of a same race. It also predicts that stronger candidates get more money from special interest groups primarily because more contributors give to lop-sided winners, not because more money is given per contribution. Both of these predictions are strongly supported in FEC data for U.S. House Elections from 1984-2004. Our theory also predicts that special interest groups will mainly target lop-sided winners whereas general (partisan) interest groups will contribute mainly to candidates in close races. This is also verified empirically. Finally, our framework implies that stricter campaign finance rules will always lower special interest influence but may lead to an increase in equilibrium contributions, making the latter a poor measure of effectiveness.

JEL Codes: D72, P16

Keywords: Campaign contributions; multilateral contracting; lobbying; U.S. elections.

1 Introduction

Growing concerns about the increasing role of money in politics and the influence of interest groups on policy are voiced with unerring regularity in popular and policy debates. Much of those concerns have not found support in the empirical literature on campaign contributions. While there is a widespread popular perception that there is too much money in politics, researchers, beginning with Tullock (1972), have struggled to rationalize why there is actually so little money considering the value of the favors campaign contributions allegedly buy. The sugar industry provides an excellent illustration of this point. The sugar program provides subsidies and huge tariff and non-tariff protection to U.S. producers. The General Accounting Office estimates that the sugar program led to a net gain of over one billion dollars to the sugar industry in 1998. However, the sugar industry's total campaign contributions in the two years of that election cycle were a mere \$2.8 million (1.5 thousandths of the net gain from the sugar program). Ansolabehere et al. (2003) discuss a number of other similar examples. A particularly interesting illustration is provided by Milyo et al. (2000), which shows that industries reputed to wield vast political influence, such as the military contracting industry, spend several times more on philanthropy than on campaign contributions.

The empirical literature has had mixed success in finding systematic evidence of an effect of contributions on policy outcomes. Much of that literature, reviewed in detail in Ansolabehere et al. (2003), has focused on the effect of contributions on roll-call voting behavior. Several studies do not indicate a statistically significant effect. Goldberg and Maggi (1999) estimate a structural model that captures the effect of industry contributions on their nontariff barriers coverage ratio based on the canonical Grossman and Helpman (1994) framework. They estimate that policy-makers would be willing to forsake 98 dollars of contributions even if they were to imply only a one-dollar loss of social welfare. The lack of systematic evidence of an effect of contributions on policy has led some to conclude that contributions are small precisely because they do not affect the political process much (see for example, Ansolabehere et al. 2003 and Milyo et al. 2000).

In this paper, we present a framework that reconciles the existing empirical literature with the popular view that there is too much influence of special interests in politics. Campaign contributions have traditionally been thought of as a transaction involving only the contributor and the receiving candidate or political party. Such a perspective largely ignores how the possibility of contributing to an opponent could also affect the patterns of contributions and support. Unlike the previous literature, we allow interest groups to announce schedules of contributions which are contingent not only on the platform of the candidate receiving the offer (bilateral contacting) but also on the platform of the opposing candidate (multilateral contracting). As a result, a candidate may support a special interest not only in order to receive a contribution but also in order to discourage that special interest from making a contribution to his or her opponent. This leverages the power of special interests, whose influence may be driven, or at least leveraged, by implicit out-of-equilibrium contributions, generating a disconnect between their influence and the actual contributions we observe. This approach also explains a number of empirical patterns documented in this paper which standard models cannot.

Our model of electoral competition builds on the frameworks of Grossman and Helpman (1996) and Baron (1994). Two candidates compete for office. Voters base their choice on the candidates' platforms and an "impression" component that is influenced by campaign expenditures. We consider two types of interest groups: special interest groups and general interest groups. Special interest groups care only about a particular policy, and do not care inherently about which candidate wins the election as long as their special interest policy is supported by the winner. As in Baron (1994), campaign contributions can "buy" some of the impressionable component of the vote, but catering to special interests will cost the candidates votes amongst the informed component of the vote. General interest groups, on the other hand, care about a policy dimension over which voters are divided and over which politicians are precommitted., so they do care about which candidate gets elected. They contribute mainly in close elections in order to increase the odds that a candidate they prefer gets elected.

In our multilateral contracting framework, a special interest group's threat of contributing one dollar to the opponent can induce the same level of support to the special interest policy as an actual one dollar contribution to each candidate would in a bilateral contracting setting. Even when equilibrium contributions are made, they are still being leveraged by an implicit out-of-equilibrium threat. For example, suppose a special interest group contributes \$2,000 to the stronger candidate in exchange of its support, while threatening to contribute \$10,000 to her opponent if that support is denied. This \$2,000 equilibrium contribution in our multilateral contracting framework can induce the same level of support from that candidate that a \$12,000 would in a traditional bilateral contracting setting (\$2,000 for the actual contribution and \$10,000 for the out-of-equilibrium one). Similarly, the weaker candidate will provide a level of support to the special interest policy similar to that obtained by an \$8,000 contribution in a bilateral contracting setting (the difference between the \$10,000 the special interest can threaten to contribute to the opponent and the \$2,000 it actually does). Thus, the \$2,000 equilibrium contributions are just the tip of the iceberg, with out-of-equilibrium contributions 9 times as large helping to "buy" support to the special interest without money actually being spent. Even if we considered only the contributions to the stronger candidate in this example, the special interest would still have leveraged its equilibrium contribution with out-of-equilibrium contributions 5 times as large. As equilibrium contributions get smaller, that leverage gets larger because more money is left in reserves for threats. For example, if the special interest contributes only \$1,000 then out-of-equilibrium contributions to that candidate would be 10 times larger than equilibrium contributions, and for a \$500 equilibrium contribution that ratio would be 20. We show through a simple back-of-the-envelope calculation that under reasonable assumptions on the number of contributors and the size of the legislature, our framework is capable of explaining very large rates of return (as large as those enjoyed by the sugar industry). This framework also has interesting and counter-intuitive implications for campaign finance reform. Stricter limits on campaign contributions make out-of-equilibrium threats less effective, raising the marginal return to equilibrium contributions. As a result, stricter limits can actually lead to an increase in equilibrium contributions, but will always lower interest group influence.

Baron (1994), chapter 3 of Persson and Tabellini (2000), Dal Bo (2007) and chapter 10 of Grossman and Helpman (2001) are the closest models to our own in that they allow out-of-equilibrium contributions to drive support for a policy favorable to an interest group. Our model differs from these models first in that all three achieve a collapse in contributions through the existence of ex-post discretionary contributions (i.e. after policy platforms have been announced) whereas we achieve it through ex-ante multilateral contracts. More importantly, our model is the first to show that an interest group may make both equilibrium and out-of-equilibrium contributions simultaneously and that the degree to which each is used will depend on the candidate's electoral strength. That is, we allow for the possibility of out-of-equilibrium contributions without leading to a collapse in equilibrium contributions, providing an explanation for the "missing money" puzzle while still explaining why contributions actually take place. As such, we can make a plausible empirical case for an explanation of the missing money puzzle. In addition, our model also predicts that interest groups never give to both sides of a race, since the same level of support from each candidate can be achieved with less contributions when they are "one-sided" (for example, the support stemming from a $2,000 contribution to the stronger candidate and a $1,000 contribution to the weaker one could be achieved by just contributing $1,000 to the former). This prediction is strongly supported in the data.

The model's empirical predictions are tested using data from U.S. House elections in 1984-2004. We use itemized contributions data from the Federal Election Commission (FEC) to classify Political Action Committees (PACs) as partisan or non-partisan based on whether their contributions fall within a 75-25% split between the two major parties. The partisan contributors are analogous to the general interest groups in our model, while non-partisan ones are analogous to the special interest groups. The data indicates that while it is common for a special interest group to contribute to candidates from both parties, they very rarely contribute to opposing candidates in the same race, consistently with our model (and contradicting standard models which typically predict "two-sided" contributions). The predicted pattern whereby special interest groups contribute mainly to lop-sided winners whereas general interest groups contribute mainly to close election candidates is also verified in the data. Finally, most of the variation in the total amount of contributions to a candidate are driven by variations in the number of contributing interest groups, not by variations on the size of the average contribution. This pattern is compatible with our model, which can explain variation in the extensive margin (whether or not a contribution occurs) but contradicts the predictions of standard models where variation is driven by the intensive margin (changes in the amount contributed, e.g. Snyder 1990 and Grossman and Helpman 1996).

The remainder of this paper is organized as follows: Section 2 presents a model of electoral competition with interest group influence. Section 3 characterizes campaign contribution patterns. Section 4 presents empirical evidence confirming the predictions of the model. Finally, Section 5 concludes.

2 The Model

Our basic setting builds on the framework of Grossman and Helpman (1996). We assume that there are three strategic actors in the game: 2 candidates competing in a legislative race and one interest group. We separately consider two types of interest groups: general (or partisan) interest groups and special (or non-partisan) interest groups. There are two stages of the model. First, the interest group moves, offering payments in exchange for policy commitments by candidates. Unlike previous models, we allow special interest groups to condition payments to a given candidate not only on her platform but also on that of her opponent. In the second stage, the two candidates simultaneously choose their levels of support for the interest group policy, contributions are made, and payoffs are received. We assume that candidates have ideological preferences over certain general interest policy issues. These preference are commonly known and despite what candidates may say during a campaign, they will vote according to their fixed preferences once elected. However, we assume they can commit their position on a "pliable" special interest policy.[1]

2.1 Voters

For expositional purposes, we first present a model of electoral competition without interest groups. Following Baron (1994) and Grossman and Helpman (1996), each voter makes her decision based not only upon what policies candidates will implement but also on her "impression" which is influenced by the amount of money spent on campaigns. We consider a median-voter type model where voters have single-peaked preferences over the candidate's fixed policy and over the pliable policies. The "informed" component of the vote is based on the voter's preference for one candidate's platform over the other. That preference is determined by the differences in the candidates' positions on the fixed policy plus the difference in the candidates' positions on the pliable policies.

We denote voter j's relative preference for candidate A by V_j. The value of V for the median voter is given by $b + \varepsilon$, where b is the average ideological bias of the population in favor of candidate A and ε is the realization of a mean zero shock to median ideology. The realization of ϵ is distributed with a symmetric, single-

[1] As in Grossman and Helpman (2001), p. 69.

peaked distribution of unbounded support. Thus, in the absence of pliable policies or campaign expenditures, the probability that the median voter prefers candidate A (and therefore the probability that candidate A wins the election) is given by $P(b+\epsilon>0)=P(\epsilon>-b)=1-F(-b)$. However, voters also care about pliable policies. Their utility function is given by $V_j+W_j(\tau^*)$ where τ^* is the pliable policy of the winning candidate. Special interest pliable policies are assumed to be uniformly disliked by all voters:

$$\frac{\partial W(\tau_{SIG})}{\partial \tau_{SIG}}<0 \tag{1}$$

Also, for convenience of mathematical notation, we assume that $W(0)=0$.

Finally, the popularity of the candidates is also altered by campaign spending. Any given voter is more likely to support candidate A over B the higher the difference between the expenditures by A and B . We denote campaign expenditures by candidate k as M_k. The median voter casts a ballot for candidate A when:

$$b+\varepsilon+W(\tau_A)-W(\tau_B)+M_A-M_B>0$$

The probability that the median voter casts her ballot for candidate A (and therefore candidate A wins the election) is given by:[2]

$$\begin{aligned}\int_{-[b+W(\tau_A)-W(\tau_B)+M_A-M_B]}^{\infty} f(\epsilon)d\epsilon &= \frac{1}{2}+\int_{-[b+W(\tau_A)-W(\tau_B)+M_A-M_B]}^{b} f(\epsilon)d\epsilon \\ &= 1-F\left[-b-(W(\tau_A)-W(\tau_B)+M_A-M_B)\right]\end{aligned}$$

[2] As is standard, we denote by f the probability density function of ϵ and by F the cumulative distribution. Note that if the bias b towards candidate A is zero, and both candidates announce the same pliable policies and have the same level of expenditures the probability of candidate A winning the election is exactly $1/2$.

2.2 Candidates

The expected utility of candidate k is equal to the probability of winning :

$$U_k = P(k)$$

Our results are robust to the introduction of other components in the candidate's utility, such as an added utility over pliable policies or from money balances which are not spent on the campaign (which could have an option value for future elections or be used in the campaigns of other candidates in the same party if the model was extended to incorporate such features).

2.3 Interest groups

Finally, we turn to interest groups. We consider two types: special (or non-partisan) interest groups and general (or partisan) interest groups. Special interest groups (SIGs) care only about a special interest policy τ_{SIG} and money. These groups are non-partisan in the sense that they do not care about the ideology or party affiliation of the winner, just about the resulting policy τ^*_{SIG}. Examples would include the sugar industry and other industry-specific lobbies, lobbies for government procurement such as specific military contractors, and trade policy lobbies. General interest groups (GIGs) care about policies that candidates are unable to commit not to support (or not support) once in office. These groups will be partisan in the sense that they will prefer the winning candidate to be the one with similar fixed preferences. Examples of GIGs would include tax policy interest groups, labor groups, the gun lobby, pro-choice and pro-life groups, among others. We first analyze electoral competition with one GIG and then turn to a setting with one SIG. We do not analyze a setting with both SIGs and GIGs though that could be an interesting extension. The utility function associated with the an interest group is:

$$U_{IG} = P(k)W_{IG}(\tau_{IG}) + [1 - P(k)]\, W_{IG}(\tau_{IG}) + M_{IG} - M_k - M_{-k}$$

where $P(k)$ is the probability that candidate k wins, $W_{IG}(\tau_{IG})$ is the utility of the interest group over the policy implemented by the candidate, M_{IG} the funds held by the interest group, and M_k and M_{-k} are the contributions made to the two candidates. We assume that contributions must be non-negative and bounded by the interest group's cash holdings and that special interest policies are non-negative:

$$\begin{aligned} M_A, M_B &\in [0, M_{IG}] \\ \tau_A, \tau_B &\in [0, \infty) \end{aligned}$$

The utility function for the SIG is thus defined as:

$$U_{SIG} = P(k)W_{SIG}(\tau_k) + [1 - P(k)]\, W_{SIG}(\tau_{-k}) + M_{SIG} - M_k - M_{-k}$$

In the particular case of the GIG, politicians policy positions are fixed. Normalizing the utility of the GIG over the policy implemented by their preferred candidate to one and the utility to the opponent candidate to zero, we can rewrite the objective function of the GIG as:

$$U_{GIG} = P(k) + M_{GIG} - M_k - M_{-k}$$

We define $\theta(\tau_{SIG})$ to be the ratio of the marginal utility to the SIG to the marginal disutility caused to voters of an increase in the special interest policy:

$$\frac{\partial W_{SIG}\left(\tau_{SIG}\right)}{\partial \tau_{SIG}} = -\theta\left(\tau_{SIG}\right) \frac{\partial W\left(\tau_{SIG}\right)}{\partial \tau_{SIG}} \tag{2}$$

We assume that at higher levels of special interest policy, voters care weakly more on the margin about the policy relative to interest groups:

$$\frac{\partial \theta\left(\tau_{SIG}\right)}{\partial \tau_{SIG}} \leq 0$$

To ensure that it is always worthwhile for SIGs to contribute at least some funds to at least one candidate, independent of vote share, we assume that the ratio of the marginal value of the policy of the interest group relative to the voters is sufficiently high:

Condition 1

$$\theta(\tau_{SIG}) \geq 2\left(1 + f\left(0\right)\right) \tag{3}$$

Our model is very much in the style of Grossman and Helpman (1996). So far, the main difference is that we allow for two types of interest groups, GIGs and SIGs, one of which has a pure electoral motive for contribution and the second of which has an influence motive. This distinction will have implications for differences in the patterns of campaign contributions between different types of interest groups (SIGs and GIGs in our setting).

3 Interest Group Influence

This section presents the main insights of this paper, starting with an analysis of general interest group politics.

3.1 General Interest Group

In this section we look at the patterns of contributions that arise when there is one general interest group. Without loss of generality, we assume that the general interest group is ideologically aligned with candidate A. Therefore, it tries to maximize a weighted sum of the probability of candidate A's victory and the amount of money left over. We write the formal maximization problem as:

$$\max_{\{M_A, M_B\}} 1 - F\left[-b - M_A + M_B\right] + M_{GIG} - M_A - M_B$$

$$\text{s.t.} \quad :$$

$$M_A \geq 0, \; M_B \geq 0, M_A + M_B \leq M_{GIG}$$

An equilibrium of the game is given by a vector of functions specifying contribution schedules for the interest groups and reaction functions of the schedules for the candidates such that the above problem is maximized:

$$[M_A^*, M_B^*]$$

Grossman and Helpman (1996) make a useful distinction between two types of motives for contributions: an influence motive, whereby contributions seek to influence the candidate's platforms, and an electoral motive, whereby contributions seek to influence the outcome of the election taking the platforms as given. The GIG will never contribute to the ideologically opposing candidate because the candidate cannot credibly commit to change her ideology. In lop-sided elections, the GIG will not contribute any money to the race. In close elections, there is an electoral motive for giving to the candidate with which the GIG is aligned.

Proposition 1 *GIG's never give money to ideologically opposing candidates and give to aligned candidates only in sufficiently close elections, i.e.* $\exists \underline{P}$ *and* $\overline{P}$ *such that* $\forall P(A) \in \left(\underline{P}, \overline{P}\right)$, $M_K^* > 0$, $M_{-K}^* = 0$ *and* $\forall P(A) \notin \left[\underline{P}, \overline{P}\right]$, $M_A^* = 0 = M_B^*$

Proof. See appendix. ■

The intuition of this result is quite simple. For close elections, the interest group spends money on improving candidate A's victory prospects. The interest group is willing to spend money as long as the value of doing so is greater than the opportunity cost of alternative usage of the funds. When the distribution of voter preferences is single peaked and symmetric, marginal shifts in probability of victory per dollar spent will be highest (and thus contributions will occur) in close races. This is encapsulated in the following formula for the Kuhn-Tucker-Lagrange (KTL) multiplier on non-negativity of contributions to party A (λ_A):

$$-\lambda_A = f(-b + M_A - M_B) - 1 + \lambda_{GIG}$$

where λ_{GIG} is the KTL for the GIG's budget constraint. Since the KTL multiplier on non-negativity of contributions to candidate A is the value of relaxing the constraint on not reducing contributions by a dollar below zero, the negative of $-\lambda_A$ can roughly be interpreted as the marginal value of donating. This is then equal to the marginal gain in probability of electoral victory for the candidate preferred by the interest group less the marginal value of the dollar. Moreover, the marginal value of contribution may be even higher when the budget constraint of the interest group is binding.

3.2 Special Interest Group

Whereas general interest groups mainly contribute to candidates in close elections in order to affect the outcome of the election, this sub-section shows that special interest groups contribute to lop-sided winners in order to influence the policies which the likely winner implements; in close races, special interest groups rely more heavily on out of equilibrium threats. Since special interest groups are trying to influence candidates in areas where candidates can make commitments, they can condition their payments on what the candidates announce. In fact, they can condition the payments to each candidate on what policies both candidates announce. Special interest groups maximize:

$$\max_{\left\{M_A\left(\tau^A_{SIG},\tau^B_{SIG}\right),M_B\left(\tau^A_{SIG},\tau^B_{SIG}\right)\right\}} (1 - F\left[-b - \left(W\left(\tau^*_A\right) - W\left(\tau^*_B\right) + M_A - M_B\right)\right]) W_{SIG}\left(\tau^*_A\right) +$$

$$F\left[-b - \left(W\left(\tau^*_A\right) - W\left(\tau^*_B\right) + M_A - M_B\right)\right] W_{SIG}\left(\tau^*_B\right) + M_{SIG} - M_A - M_B \tag{4}$$

$$\begin{aligned}
&s.t.: \\
&\tau^*_A\left(M_A, M_B\right) = \arg\max_{\tau^A} 1 - F\left[-b - \left(W\left(\tau_A\right) - W\left(\tau^*_B\right) + M^*_A - M^*_B\right)\right] \\
&\tau^*_B\left(M_A, M_B\right) = \arg\max_{\tau_B} F\left[-b - \left(W\left(\tau^*_A\right) - W\left(\tau_B\right) + M^*_A - M^*_B\right)\right] \\
&M_A, M_B \geq 0,\ M_A + M_B \leq M_{SIG}
\end{aligned}$$

An equilibrium of the game is given by a vector of functions specifying contribution schedules for the interest groups and reaction functions of the schedules for the candidates such that the above problem is maximized:

$$[M^*_A(\tau_A,\tau_B), M^*_B(\tau_A,\tau_B), \tau^*_A\left(M_A(\tau_A,\tau_B), M_B(\tau_A,\tau_B)\right), \tau^*_B\left(M_A(\tau_A,\tau_B), M_B(\tau_A,\tau_B)\right)] \tag{5}$$

The special interest group's maximization problem stated as a game theory problem (henceforth referred to as the 'game theory problem') is difficult to solve directly; we therefore rephrase the problem as a principal-agent contract theory problem (henceforth referred to as the 'contract theory problem'). Since the actions of the agents are contractible and observable, there is no incentive compatibility constraint. So, the SIG maximizes its utility subject to the constraint that each of the candidates achieve a utility greater than or equal to their outside options. In contrast to the bilateral contracting environment standardly considered, we do not require that a candidate receive the same amount of money in the other candidate's inside and outside options respectively. The interest group can create a flexible schedule where the equilibrium level of contributions from the SIG to a candidate differs depending upon the opposing candidate's level of support. Moreover, because the SIG can commit to a schedule in advance and because the amount of money it gives to a candidate in the other candidate's outside option does not actually get paid in equilibrium (as opposed to in the bilateral contracting problem), there is no cost to the SIG of threatening to give all of its money to a candidate in the other candidate's outside option. The individual rationality constraint for candidate A is:

$$U_A\left[\tau_A^*, \tau_B^*, M_A^*, M_B^*\right] \geq U_A\left[0, \tau_B^*, 0, M_{SIG}\right]$$

Formulated as a contract theory problem, the only difference between bilateral and multilateral contracting reduce to whether or not the amount of money given to the opponent in the inside option of the individual rationality constraint equals the amount given in the outside option. We are now ready to rewrite the SIG's problem as the maximization of its utility, choosing compensation levels and support levels for each candidate subject to each candidate receiving at least their outside option in utility terms:

$$\begin{gathered}\max_{\tau_A, \tau_B, M_A, M_B} U_{SIG}\left[\tau_A, \tau_B, M_A, M_B\right] \qquad (6)\\ \text{s.t. } U_A\left[\tau_A, \tau_B, M_A, M_B\right] \geq U_A\left[0, \tau_B, 0, M_{SIG}\right]\\ \text{s.t. } U_B\left[\tau_A, \tau_B, M_A, M_B\right] \geq U_B\left[\tau_A, 0, M_{SIG}, 0\right]\\ M_A, M_B \geq 0,\ M_A + M_B \leq M_{SIG}\end{gathered}$$

It remains to check that our specification of the outside option to the multilateral contracting problem gives us an equivalence between solutions of the game theory problem and solutions of the contract theory problem:

Lemma 1 *A solution to the contract theory problem* (6) *gives the equilibrium levels*

$[\tau_A, \tau_B, M_A, M_B]$ to a solution of the game theory problem (4)*, and the levels to a solution of the game theory problem* (4) *give a solution to the contract theory problem* (6)

Proof. See appendix ■

The equivalence between the game theory problem and the multilateral contract theory problem allow us to derive an expression which characterizes when interest groups contribute.

The first implication of our multilateral contracting framework is that the SIG will never contribute to both sides of the same race. The intuition behind our result is simple. Suppose that the when the SIG gives (M_A, M_B) to candidates A and B it achieves support levels (τ_A, τ_B). With bilateral offers, a reduction in monetary contributions to either candidate means a reduction in support from that candidate . However, with multilateral offers, the SIG can take away the M dollars from candidate A and compensate her by taking away M dollars from candidate B. Similarly, the dollars taken away from candidate B are fully compensated by the dollars taken from candidate A. Assuming without loss of generality that $M_A > M_B$, the SIG could offer $(M_A - M_B, 0)$ while still maintaining support levels (τ_A, τ_B) and keeping $2M_B$ extra dollars. Therefore, the SIG will never give positive amounts to both candidates. One-sidedness of contributions is one of the key distinguishing predictions of our model when compared with standard models in the literature, which typically predict two-sided contributions (e.g. Snyder 1990 or Grossman and Helpman 1996).

Proposition 2 *SIGs never give to both sides in the same race: $M_A^* > 0 \Rightarrow M_B^* = 0$ and $M_B^* > 0 \Rightarrow M_A^* = 0$.*

Proof. See Appendix. ■

For notational simplicity, let $\Delta = -b - (W(\tau_A^*) - W(\tau_B^*) + M_A - M_B)$. In the appendix, we derive the following characterization of the KTL multipliers λ_A and λ_B associated with the non-negativity of contributions to A and B respectively:

Lemma 2 *Contributions levels are characterized by:*

$$\begin{aligned}\lambda_A &= 1 + F(\Delta)\,\theta(\tau) - [1 - F(\Delta)]\,\theta(\tau) \\ \lambda_B &= 1 + [1 - F(\Delta)]\,\theta(\tau) - F(\Delta)\theta(\tau)\end{aligned}$$

if non-negativity constraints on contributions are binding for both parties, where $\tau_A = \tau_B = \tau = W^{-1}(M_{SIG})$

Proof. See appendix. ■

The intuition is relatively simple, although the proof involves some tedious algebra. The gross marginal benefit of contributing to A is the benefit the SIG obtains from additional support from candidate A: $(1 - F(\Delta))\,\theta(\tau)$. The gross marginal cost of contributing to A is equal to the loss in the SIG's ability to threaten candidate B, given by $F(\Delta)\,\theta(\tau)$, plus the direct marginal disutility of contributing money (equal to 1). That gross marginal benefit outweights the gross marginal cost only if A is sufficiently strong. We can now state our characterization of giving patterns for the Special Interest Group. The SIG contributes only to sufficiently strong candidates and does not contribute (but still gets support) in close races:

Proposition 3 *The SIG always receives equilibrium support from candidates ($\tau_A^* > 0$, $\tau_B^* > 0$ or both) but contributes only in sufficiently lop-sided races: $P(A) \in \left[\frac{1}{2} - \frac{1}{2\theta(\tau)}, \frac{1}{2} + \frac{1}{2\theta(\tau)}\right] \Rightarrow M_A^* = M_B^* = 0$, $P(A) < \frac{1}{2} - \frac{1}{2\theta(\tau)} \Rightarrow M_A^* > 0$ and $P(A) > \frac{1}{2} - \frac{1}{2\theta(\tau)} \Rightarrow M_B^* > 0$.*

Proof. See appendix ■

Out-of-equilibrium threats lead to a collapse in contributions when both λ_A and λ_B are positive (so the constraints on the non-negativity of contributions bind). The range of $F(\Delta)$ for which that is the case is $\left[\frac{1}{2} - \frac{1}{2\theta(\tau)}, \frac{1}{2} + \frac{1}{2\theta(\tau)}\right]$, which becomes arbitrarily small as $\theta(\tau) \to \infty$.

The interest group has two possible schedules of offers to make: distributed and concentrated threats. Either the interest group can use a prisoner's dilemma type game to get an equal amount of support from each of the candidate or it can concentrate the threats on one candidate, making the schedule only a function of what that candidate announces. In the concentrated threats schedule, for low levels of support, the SIG threatens to contribute to the opposition and for high levels of support, the SIG makes direct contributions to the candidate in question. The relative benefits of making equilibrium contributions (the concentrated threats offer) will be high when the difference in the probability of winning is sufficiently high that even with the loss in direct utility from holding money by the SIG, the SIG still prefers to concentrate threats rather than spread them around.

Our results can be illustrated with a simple example. Suppose that $\theta(\tau) = 5$ for all levels of τ and assume that candidate A will win with 55% probability. Then, the SIG gains (55%-45%)·5 or .5 in expectation from moving a dollar from reserves to contribution to A. This utility gain is less than the marginal disutility which the SIG experiences due to the loss of its dollar; so, contributions are not made. However, suppose that the probability of A's victory is 60%. Then, the SIG gains (60%-20%)·5=$2 from donating the dollar to A, which is greater than the disutility the SIG will undergo from having less money in reserves. [3]

One implication of assuming a constant theta is that the interest group will either contribute nothing or all of its money. Without loss of generality, suppose A is the stronger candidate. In the appendix, we derive the following characterization of the KTL multiplier λ_{SIG} associated with the SIG's budget constraint:

Corollary 1 *When $\theta(\tau)$ is constant: $\theta(\tau) = \overline{\theta}$, if the SIG contributes, it contributes all of its money: $\lambda_A > 0 \Leftrightarrow \lambda_{SIG} = 0$.*

Proof. See appendix ■

This stark "all or nothing" result is not robust, and disappears when $\theta(\tau)$ is a sufficiently decreasing function (which allows for an internal solution). But SIG con-

[3] The assumed marginal utility of money can be seen as a proxy for the value of money used to threaten in other races. In a model with multiple races, money is endogenously valuable because of its use in other races (for threats as well as for direct contributions).

tributions remain lumpy, in the sense that small differences in a candidate's strength can lead to discrete changes in the amount contributed. This lumpiness suggests that differences in contributions received by lop-sided winners and close election candidates can be driven by the extensive margin. This pattern contrasts to that in Snyder (1990) and Grossman and Helpman (1996) where the variation occurs in the intensive margin. The next section provides strong empirical support for this prediction of our model.

Whether or not the interest group uses distributed or concentrated threats, it will be able to get more than a dollar of benefit for a dollar of expenditure. In some cases, the interest group can even get an infinite average rate of return. In a bilateral contracting environment, the SIG would be able to obtain $\overline{\theta}M_{SIG}$ worth of support by spending M_{SIG}. In our multilateral contracting setting, if the SIG spends M_{SIG} it is able to obtain $2\overline{\theta}M_{SIG}$ worth of support ($\overline{\theta}M_{SIG}$ for the actual contribution and $\overline{\theta}M_{SIG}$ for the threat of contributing to the opponent). In this case, the average rate of return is $2\overline{\theta}$. In the opposite extreme where the SIG spends no money, it gets $\overline{\theta}M_{SIG}$ worth of support from each candidate. In this case, it gets an infinite rate of return (although the value of the support obtained is bounded and the optimal strategy for the interest group is not necessarily the one that maximizes that rate of return):

Proposition 4 *When $\theta(\tau)$ is constant, the average rate of return to money contributed by the SIG ranges from $2\overline{\theta}$ to ∞.*

Proof. See appendix ■

The leverage provided by out-of-equilibrium threats in our model immediately suggests an explanation for the missing money puzzle. We do a back of the envelope calculation of the potential strength of this leverage, using the sugar industry as an illustration. We show that our model can indeed provide a quantitatively relevant explanation for the missing money puzzle. The General Accounting Office estimated the benefits to the sugar industry generated by the sugar program to be $1 billion in

1998 (at a cost of $2 billion to U.S. consumers, GAO 2000). In the 1998 electoral cycle, the sugar industry contributed $2.8 million (which correspond to 1.5 thousandths of the favors received during that time, since each electoral cycle covers two years). The sugar industry contributed $2 million to Congressional candidates (most of the remaining $800 thousand were likely soft money contributions), with $1.4 million going to House races, with a 52-48 percent split favoring Democrats (making it a "textbook" example of an SIG). There were 17 sugar-related Political Action Committees (PACs), which together contributed $1.6 million to congressional races, with $1.2 million going to House candidates.[4] These 17 PACs retained $800 thousand on reserves. If the entirety of the reserves could be used as an out-of-equilibrium threat to the stronger candidate in each of the 435 House races, out-of-equilibrium contributions would correspond to $348 million ($375 million if we also considered the 34 Senate races). If we also consider out-of-equilibrium contributions to losing candidates, these figures would roughly double[5], making them comparable to the benefits received by the sugar industry. In practice, the magnitude of out-of-equilibrium contributions is limited by campaign finance rules, which impose a $10,000 cap (unless they are made through independent expenditures or issue ads, in which case there would not be a limit). Out of the 17 PACs, 11 had at least $10,000 on reserves. If each of these 11 threatened to contribute the maximum of $10,000 or the amount available on reserves to the opponent of a candidate that did not support the sugar special interest, then each House election winner would have faced $125 thousand in out-of-equilibrium contributions, which would add-up to $54 million in the 435 House races. This corresponds to 45 times the amount of equilibrium contributions made by those PACs in House races. Thus, the ratio of favors allegedly bought to total contributions declines from about one thousand to about ten if we consider both in and out-of-equilibrium contributions, despite restrictions on the size of contributions.

[4] The campaign contribution figures reported in this section are based on data for the sugar industry available at www.opensecrets.org

[5] They would not exactly double since there are uncontested races.

That ratio can be further lowered if the number of potential contributors increases. For example, presumably the 6 PACs with less than \$10,000 on reserves could have raised more money if sufficiently inclined to do so, and there is likely a number of individuals with a sufficiently large stake in the sugar program that would be willing to make a large contribution against a candidate opposing the program.[6]

Our framework suggests that organized industries with low levels of contributions may be compensating with greater use of out-of-equilibrium threats, since observed contributions may not be strongly correlated with policy outcomes (e.g. Goldberg and Maggi (1999)). This could explain the disconnect between contributions and influence observed in the empirical literature. Unorganized industries, on the other hand, may not be able to influence policy.

In our GIG theorem, we have already shown that GIGs never make contributions to members of the opposing party. Therefore, we have established that interest groups generally make at most one-sided contributions within a race.

Finally, our model has interesting implications for campaign finance reform. Suppose campaign finance rules can cap contributions (i.e. they impose the additional constraint $M_k \leq \overline{M}$). Contributions will obviously decrease if the new cap is below the amount the SIG would have contributed in the absence of that limit. However, if the SIG's equilibrium contributions in the absence of the new cap are below that limit, it is possible that the amount spent by the SIG will actually increase as a result of that restriction. The decrease in the cap lowers the SIG's ability to make out-of-equilibrium threats. The resulting loss in leverage raises the marginal benefit from contributing, which can lead to an increase in equilibrium contributions even though support for the SIG policy declines. To illustrate this counter-intuitive result, we provide necessary and sufficient conditions for SIG contributions to go from zero

[6] The example above focused on a situation where any candidate opposing the sugar special interest could be threatened to the fullest extent possible. But if enough candidates chose to challenge that special interest, the sugar SIG's budget constraint would eventually bind (making it easier for other candidates to challenge it as well). It is beyond the scope of this paper to model such coordination game, but this is an interesting area for future research.

to a positive amount as a result of a tightening of the cap in campaign contributions from an amount $\overline{M}_{OLD}$ to an amount $\overline{M}_{NEW} > \overline{M}_{OLD}$:

Proposition 5 *If θ is strictly decreasing in τ : $\frac{\partial\theta}{\partial\tau_A}, \frac{\partial\theta}{\partial\tau_B} < 0$, then contributions from an SIG are zero for a sufficiently high cap on contributions (M_{OLD}) and positive for a lower (stricter) cap on contributions (M_{NEW}) if and only if $M_{OLD} \geq \theta^{-1}\left(min\left[\frac{1}{1-2F(b)}, \frac{1}{2F(b)-1}\right]\right) > M_{NEW}$*

Proof. See appendix ■

4 Empirical Evidence

The multilateral contracting approach presented in this paper makes many predictions. First, it implies that interest groups, including those with influence motives for donating, will not give to both sides of the same race. Second, it implies that a candidate will receive more SIG money the more likely she is to win an election. Third, it implies that GIGs will give more to candidates engaged in close elections. In this section, these prediction are all verified using itemized contribution data from the Federal Elections Commission (FEC). Additionally, we show that the amount given per SIG contribution varies much less with respect to the candidate's vote share than the number of SIGs contributing to the candidate. Thus, stronger candidates receive more SIG money mainly because they receive contributions from more SIGs (as opposed to larger contributions from each SIG). This variation in the number of contributors is consistent with our theory but not with other standard models (e.g. Grossman and Helpman (1996) and Snyder (1990)).

4.1 Data

All individual contributions of $200 or more as well as contributions made by a committee are required to be reported to the Federal Election Commission (FEC). Data files itemizing those contributions are available through the FEC website, which also provides information on election results. Committees which raise and spend money to elect and defeat candidates are referred to as Political Action Committees, or PACs. The term is most commonly used to refer to committees that are not affiliated with a political party. Most PACs represent industries, labor or ideological interests. They are formed, among other reasons, in order to comply with election law which prohibits entities such as corporations or unions from making contributions to candidates directly out of their treasury funds. Corporations, unions and associations, however, can form a PAC in order to pool contributions from employees or members (or any individual that chooses to contribute to that PAC). Following most of the literature on campaign contributions, we focus our analysis on U.S. House general election races and on contributions by PACs which are not connected to a party.[7] Their contribution pattern is more varied than that of party committees and individuals, and seems more relevant for interest group considerations.[8]

We use data from the House elections in 1984-2004. For comparison purposes, contributions data is deflated to 2004 prices using the CPI. We also consider a measure of contributions that is based on relative terms to the average contributions in each election cycle[9].

We construct a measure of partisanship for each PAC in each election-cycle based on the share of its contributions to Democrat and Republican House candidates (we ignore independent or third-party candidates). PACs which give more than 25% but less than 75% of their contributions to both major parties are classified as SIGs. PACs which give 75% or more of their contributions to one party are classified as

[7] We consider the committees classified by the FEC as "Delegate," "House," "Presidential," "Senate," "Non-Qualified Party" and "Qualified Party" to be party committees. Our analysis uses the remaining classifications: "Communication," "Independent," "Non-party non-qaualified" and "Qualified non-party."

[8] A previous version of this paper also considered contributions by party committees and by individuals. Their behavior matched the pattern of contributions of GIGs, as one would expect.

[9] Due to the rise of soft money as well as independent expenditures in the 1990s, we also considered a restricted sample including data only up to 1990. Our findings in that restricted sample are similar to the ones presented.

GIGs.[10] We drop independent expenditures, which by law must be made without consultation, coordination or cooperation with the supported candidate or party, and therefore may have limited use as part of the multilateral contracting menu. These expenditures are relatively small, and their inclusion does not change the qualitative results presented.[11] The PAC contributions considered account for about 35% of the total contributions received by the candidates (with the remaining coming from either individuals or party committees). SIGs account for 50.4% of the contributions in our sample, with GIGs accounting for the remaining 49.6%.

Under the election laws that were applicable during our sample, in each cycle PACs were allowed to contribute at most $5,000 per candidate per election (primary and general elections count as separate elections), $5,000 per PAC and $15,000 per national party committee, and did not face any limits on total contributions.[12] In practice, there were a number of ways through which an interest group could contribute beyond those limits, notably through "soft money" contributions which in theory were meant to be raised by party organizations for non-federal election purposes (eliminated after the 2002 election cycle). Since soft money contributions cannot be traced to a specific giver-candidate pairing, they are not used in our analysis.[13] Interest groups could also circumvent these limits through issue advertisements attacking or praising a candidate (the FEC did not require the activities, sponsoring groups or

[10] We experimented with a variety of different cutoff levels for the definitions of SIG and GIG, ranging from very strict (e.g. SIGs contributting at most 60% to one party) to very lax (e.g. SIGs contributting at most 90% to one party). Since SIGs target mainly stronger candidates, they tend to give more to the majority party (which is the one with more lopsided winners on average with the exception of the 1994 election). We also experimented with SIG definitions based on whether its share of contributions to a party were inside a 25% band around that party's share of the House in that year. The results are qualitatively similar across all these different rules.

[11] Independent expenditures against a candidate are negligible, corresponding to only 0.7% of the PAC contributions in our sample. Independent expenditures in support of a candidate are larger, corresponding to 3.5% of the contributions, 73% of which were made by GIGs.

[12] Figures refer to multi-candidate committees. Those committees have more than 50 contributors, have been registered for at least six months, and (with the exception of state party committees) have made contributions to five or more federal candidates. If a PAC failed to meet these conditions the limits were $1,000, $5,000 and $20,000 respectively.

[13] The FEC data only identifies soft money contributions beginning with the 1992 cycle, when they accounted for 16% of all contributions. In the 2000 cycle that figure had risen to 40%.

sources of funds to be reported), and in the last election cycle notably through "527 organizations."

4.2 Results

The first prediction of our multilateral contracting approach is the "one-sidedness" of contributions. If an SIG were to contribute \$2,000 to a Democrat House candidate and \$1,000 to her Republican opponent, the SIG would have been able to achieve a similar level of support by contributing only \$1,000 to the Democrat and nothing to the Republican. Hence \$2,000 worth of contributions in the former scenario would be "redundant." In more formal terms, if giver g contributes M_{g,D_j} to the Democrat candidate in race j and M_{g,R_j} to the Republican one in that race, then:

$$\text{Redundancy}_{g,j} = 2 \cdot \min(M_{g,D_j}, M_{g,R_j})$$

Table 1 confirms our prediction that redundant contributions do not often occur; they amount to less than half a percent of total SIG contributions. Thus, while it is very common for PACs to contribute to both Democrat and Republican House candidates (as indicated by size of SIGs in our sample), it is extremely rare for them to give to directly opposing candidates. Table 1 also shows the share of redundant contributions in close races. Standard campaign contribution models predict that SIGs should contribute 50-50 in very close races, implying a 100% redundancy of their contributions according to our classification. However, even in the closest of races (e.g. winner has 51% or less of the two-party vote), the redundant contributions remain only 7.5% of total SIG contributions. This low level of redundancy may result from changes over time in the perceived ex ante strength of the candidates and second order considerations not captured by the model. Table 1 also reports the average share of SIGs contributing to both candidates relative to the total number of contributing SIGs in a race. That figure is also very small (only 5.7% in the races where the winner has 51% or less of the two-party vote). This finding stands in sharp contrast to the predictions of standard models, such as Grossman and Helpman (1996) and Snyder (1990).

Table 2 shows the average amount of SIG and GIG contributions to candidates by different ranges of vote share. As expected, SIGs contribute more to lop-sided winners while GIGs contribute more to candidates in close elections. The table also reports a relative measure of contributions, based on the average SIG or GIG contribution made in each election-cycle. This measure improves comparability over time, since campaign contributions have risen substantially faster than inflation. SIG contributions to lop-sided winners with 60% or more of the two-party vote were 1.66 times the mean, while that to candidates in close races (in the 40-60%) range were only 1.19. The reverse is true for GIGs, with lop-sided winners receiving only 1.20 times the average while close election candidates received 1.72 (and over twice the average in very close races).[14] Previous studies have documented that even though PACs contribute relatively large amounts to winning candidates in lopsided races, they contribute even more to ones involved in close races (e.g. Levitt (1998)). The decomposition of PACs between SIGs and GIGs helps to explain that pattern, with SIGs targeting predominantly lopsided winners, GIGs target mainly close election candidates and their combination yielding on net more contributions in close elections.

Table 2 also shows the average number of contributions and the size of the average contribution (conditional on a contribution being made). The number of SIG contributions follows a similar pattern to that of total contributions, but the size of the average contribution varies much less with the candidate's vote share. This implies that changes in total SIG contributions are driven mainly by changes in the number of SIGs contributing, as opposed to larger or smaller sized contributions from each SIG. For example, the average SIG contribution to a lopsided winner with 60% or

[14] The threshold for the vote shares used to classify a race as "close" or "lop-sided" is arbitrary. For illustration purposes, 55-45% is roughly the margin by which Kerry won California in 2004, and 60-40% the margin by which Bush won Mississipi.

more of the vote share is actually moderately smaller than that to a close election candidate with 45-55% of the vote share. However, those lopsided winners received on average contributions from 100 SIGs whereas close election candidates received from only 65, which explains why the former received 40% more SIG contributions despite receiving on average less per contribution. The difference is even more stark when we compare lopsided winners to lopsided losers. Table 3 provides a more detailed comparison for candidates in the 40-60% range of the vote share, where most of the variation in contributions occurs. It shows the total contributions, number of contributors and average size of contributions for candidates in the 40-45%, 45-50%, 50-55% and 55-60% range of the vote share. Between each of these ranges, the change in the number of contributing SIGs is much larger than the change in the size of their average contributions. We compute the change in total contributions that is due to changes in the number of contributing SIGs. This decomposition is also reported in Table 3. Changes in the number of contributing SIGs account for over 90% of the variation in total contributions. While our model can explain variations in the number of contributors, standard models in the literature cannot as discussed below. In the case of GIGs, the picture is more mixed. While changes in the number of contributors still account for most of the variation, the change in the average GIG contribution is also important across two of the ranges considered.

The stylized facts documented in Tables 2 and 3 are also confirmed in semi-parametric regressions of campaign contributions on the vote shares. The use of semi-parametric estimation is appropriate given the highly non-linear relationships predicted by the model. We start with the model:

$$Contributions_{i,p,t} = f(votes_{i,p,t}) + \sum_{p} \sum_{t} \delta_{p,t} D_{p,t} + \varepsilon_{i,p,t} \tag{7}$$

where $Contributions_{i,p,t}$ are the contributions made to candidate i from party p in election-cycle t, $votes_{i,j,t}$ is the two-party vote share (henceforth vote share) of that candidate, $f()$ is a non-parametric function, and $D_{p,t}$ are $party * election - cycle$ dummies. We estimate the parametric terms $\widehat{\delta}_{p,t}$ using the differencing method described in Yatchew (1999). We initially order the candidates in increasing order of their two-party vote share. Under the assumption that $f(votes_{i,p,t}) - f(votes_{i-1,p(i-1),t(i-1)}) \approx 0$, we can difference (7) in order to eliminate the non-parametric term and estimate:

$$Contributions_{i,p,t} - Contributions_{i-1,p(i-1),t(i-1)} = \sum_p \sum_t \delta_{p,t}(D_{p(i),t(i)} - D_{p(i-1),t(i-1)}) + \upsilon_{i,p,t}$$

Once $\widehat{\delta}_{p,t}$ has been estimated, we obtain the non-parametric term:

$$f(votes_{i,p,t}) = Contributions_{i,p,t} - \sum_p \sum_t \widehat{\delta}_{p,t} D_{p,t}$$

We estimate $f()$ using Fan's (1992) locally weighted regression, with quartic kernel weights. Our estimates at a point with vote-share v_1 are based on a linear regression that weights an observation with vote-share v_2 by:

$$w_{v_1}(v_2) = \begin{cases} \frac{15}{16}\left(1 - abs\left(\frac{v_1 - v_2}{\lambda}\right)^2\right)^2 & \text{if } v_1 - v_2 < \lambda \\ 0 \text{ otherwise} \end{cases},$$

where λ is the bandwidth parameter. In our estimates, we use a bandwidth of 0.05.[15]

Figure 1 presents a scatter plot of contributions and vote shares, as well as the estimated relationship between those two variables and a bootstrapped confidence interval. SIG contributions (Figure 1A) are virtually zero for lop-sided losers. SIG contributions begin a gradual and steep increase around a vote share of 35%, leveling-off around a vote share of 60% and remain high for lop-sided winners (the relationship is very noisy around the 80-100% vote share due to relatively few observations in that

[15] The results are similar when different bandwidths are used. A smaller bandwidth makes the resutls noisier in regions where there are fewer observations. A larger bandwidth makes the results smoother, but that smoothness can dampen the rapid changes that occur around a vote share of 50%, which is the main region of interest.

range). GIG contributions (Figure 1B) are also virtually zero for lop-sided losers. GIG contributions begin increasing around a vote share of 35% and peak at close races. Contributions then decline with the vote share, but remain high for lopsided-winners (at about half the level for close races). The peak in close races suggests that electoral motive considerations drive most GIG contributions, although the level of contributions to lop-sided winners suggests that an influence motive also plays an important role.

Figure 1C plots the slope of SIG contributions as a function of the vote share. Statistical significance at every point can be easily identified by whether the confidence interval includes a slope of zero. The slope is not statistically significant for lop-sided losers. It becomes statistically significant and increasing around a vote share of 35%, with its steepness peaking around 50% (indicating an inflection point) before declining and becoming no longer statistically significant around a vote share of 60% (and remaining so with the exception of small ranges of the vote share). Figure 1D plots the slope of GIG contributions as a function of the vote share. The GIG slope fluctuates and is usually not statistically significant for lop-sided losers, becomes positive, statistically significant and increasing around a vote share of 35%, peaks around 50% before rapidly declining and becoming negative at around 52.5%. Afterwards, the slope remains negative but its magnitude becomes smaller as the vote share increases. Beginning around a vote share of 70%, it is usually not statistically significant. Figure 1C confirms an S-shaped relationship for SIG contributions as a function of the vote share, and a bell-shaped relationship for GIG contributions.

Close election losers receive more SIG contributions than our model predicts. This could be the result of uncertainty on the ex-ante electoral strength of the candidates. For example, candidates that end up being close losers may have been perceived as relatively strong ex ante by some SIGs. Substantial contributions to close election winners are consistent with our model, provided they are "one-sided" (which is indeed the case as shown in Table 1) and that θ is a sufficiently steep function of τ_{SIG}. At first, it may seem that one can explain the observed pattern of contributions with a much simpler story than our multilateral contracting framework. For example, Snyder (1990) presents and tests a model showing that "economic" PACs[16] target their contributions to candidates that are more likely to win. If candidates are willing to offer similar favors to a PAC, its contributions will be proportional to the candidate's probability of victory (a similar prediction is made by Grossman and Helpman 1996). This simple story would be able to explain the observed pattern of contributions, provided that the ex ante probability of victory is extremely non-linear with respect to the ex post vote share, and that, in addition, we observe individual SIGs contributing on average twice as much to lopsided winners as they do in very close elections. The latter is not true, as documented in Table 3. The reason why lopsided winners receive more than close election candidates is because they receive contributions from more SIGs, not because they receive more from each contributing SIG.

We estimate similar semi-parametric relationships for the number and average size of SIG and GIG contributions as a function of the vote share. Figure 2 presents the results. The curve for the number of SIG contributions (Figure 2A) is similar to the one from Figure 1A based on the total contributions received. Figures 2C and 2D show the estimated relationship between the average size of SIG and GIG contributions and the vote share. The curve for SIG contributions (Figure 2C) is fairly flat, particularly if we ignore lop-sided losers (who account for a very small share of total SIG contributions). The curve for GIG contributions (Figure 2D) does show more variation, with close election candidates receiving significantly more on average per contribution than lop-sided winners or losers. It is useful to compare the variation in the number of contributors to that in the size of the average contribution. For that illustration purpose, we rescale those two variables so that they are measured relative to their respective value for a candidate with 50% of the vote share. That is, for each value of our estimates for the number of contributions and average size of contribution,

[16] Defined as PAC contributions from corporations; labor unions; trade, membership, and health organizations; and cooperatives, excluding independent expenditures.

we divide it by the value at a vote share of 50%. Figure 2E plots those rescaled estimates for SIG contributions, confirming a much stronger variation in the number of contributors than in the average size of contributions. Figure 2F plots the rescaled series for GIGs, where the variation in the number of contributors is still stronger but the variation in the size of the average contribution is also substantial, particularly in some ranges of the vote share. This pattern, whereby differences in total SIG contributions are largely driven by increases in the number of SIGs contributing to the candidate as its strength increases supports our multilateral contracting approach relative to standard models in the literature which are not able to explain variation in the number of contributors.

5 Conclusion

In the continuing and unresolved debate on the role of money in politics, the low levels of contributions by special interests have led some to believe that special interests do not play a large role in the political process. This paper shows how interest groups can sometimes gain support without spending any money, and even the money they do spend only reflects the tip of the iceberg of their influence. In addition to providing an explanation for the "missing money puzzle", our framework also generates a number of stylized facts which are empirically verified. First, contrary to the conventional wisdom (and contrary to many popular models of campaign contributions) we empirically establish that while interest groups often give to both parties, they rarely give to both sides of a same race. Second, we distinguish between special and general interest groups and we predict that general interest groups give to candidates involved in close elections whereas special interest groups target lop-sided winners. Finally, in contrast to Snyder (1990) and Grossman and Helpman (1996), lop-sided winners receive more special interest money primarily because they receive more contributions not because the size of the average contribution is larger. These predictions are all verified in the data.

We have limited ourselves to models with a single interest group. Prat and Rustichini (2002) look at models with multiple principals and multiple agents, though without multilateral contracting. Extending the current model to a context with multiple principals would be theoretically interesting as well as potentially insightful for the understanding of special interest group behavior.

In this paper we have modeled interest group behavior in a single race. The existence of multiple simultaneous races should increase the prevalence of out-of-equilibrium threats. In particular, the value of a dollar held in reserves could potentially be extremely high (and actual contributions very low) if a dollar in reserves is used in threatening many races simultaneously, as we assumed in our back-of-the-envelope calculation of the impact of spending by the sugar industry. Campaign finance rules constrain the amounts that contributors can give to a candidate and disallow contributors from coordinating their actions so as to circumvent those limits. This suggests that the stronger special interests will be those where several decentralized contributors punish (reward) candidates that challenge (support) the special interest. An important question for future research is why some special interests self-organize this way while others do not. Our framework suggests this feature can be a far more important determinant of influence than money by itself.

Certainly our theory suggests that the connection between money spent and the effect of money in politics is not a simple one. Empirical work focusing merely on contributions may miss the icebergs underneath the surface of the water and underestimate the influence of interest groups. This needs to be kept in mind when analyzing campaign finance rules. Stricter limits on contributions can reduce the effectiveness of out-of-equilibrium threats and cause an increase in equilibrium contributions while limiting the influence of special interests. As shown in this paper, observed contributions can be a very poor guide for the importance of money and the influence of special interests in the political process.

A Appendix

Proposition 1 *GIG's never give money to ideologically opposing candidates and give to aligned candidates only in sufficiently close elections, i.e.* $\exists \underline{P}$ *and* $\overline{P}$ *such that* $\forall P \in \left(\underline{P}, \overline{P}\right)$, $M_K^* > 0$, $M_{-K}^* = 0$ *and* $\forall P \notin \left[\underline{P}, \overline{P}\right]$, $M_A^* = 0 = M_B^*$

Proof. The GIG's maximization problem as

$$\max_{M_A, M_B} 1 - F\left[-b - M_A + M_B\right] + M_{GIG} - M_A - M_B$$

s.t. :

$$\begin{aligned} (1.) &: \quad M_A, M_B \geq 0, \text{ and} \\ (2.) &: \quad M_A + M_B \leq M_{GIG} \end{aligned}$$

The FOC for M_A is given by:

$$f\left(-b - M_A + M_B\right) - 1 + \lambda_A - \lambda_{GIG} = 0$$

where λ_A is the KTL associated with the non-negativity constraint on contributions to A and λ_{GIG} the one associated with the GIG's budget constraint. Rearranging, we obtain:

$$\max\left[1 - f\left(-b - M_A + M_B\right) + \lambda_{GIG}, 0\right] = \lambda_A$$

From single peakedness, we get that $M_A^* > 0 \Leftrightarrow \lambda_A < 0 \Leftrightarrow f\left(-b - M_A + M_B\right) > 1 \Leftrightarrow \exists k > 0$ such that $-b + M_A - M_B \in (-k, k) \leftrightarrow P \in \left(\frac{1}{2} - \overline{P}, \frac{1}{2} + \overline{P}\right)$ for some $\overline{P}$. ■

Lemma 1 *A solution to the contract theory problem* (6) *gives the equilibrium levels* $[\tau_A, \tau_B, M_A, M_B]$ *to a solution of the game theory problem* (4), *and the levels to a* *solution of the game theory problem* (4) *give a solution to the contract theory problem* (6)

Proof. Assume a multilateral contracting problem in game theory form. We will show that any solution of the game theory problem is representable as a solution to the contract theory problem and vice versa. Lets define the game theory problem as:

$$\begin{aligned}
&\max_{M_A\left(\tau_A^*,\tau_B^*\right),M_B\left(\tau_A^*,\tau_B^*\right)} U_{SIG}\left[\tau_A^*\left(M_A^*,M_B^*\right),\tau_B^*\left(\tau_A^*,\tau_B^*\right),M_A\left(\tau_A^*,\tau_B^*\right),M_B\left(\tau_A^*,\tau_B^*\right)\right] \quad (8)\\
&\text{s.t. } \tau_A^*\left(M_A^*,M_B^*\right) = \arg\max_{\tau_A\left(M_A^*,M_B^*\right)} U_A\left[\tau_A,M_A\left(\tau_A,\tau_B^*\right),M_B\left(\tau_A,\tau_B^*\right)\right]\\
&\text{s.t. } \tau_B^*\left(M_A^*,M_B^*\right) = \arg\max_{\tau_B\left(M_A^*,M_B^*\right)} U_B\left[\tau_B,M_A\left(\tau_A^*,\tau_B\right),M_B\left(\tau_A^*,\tau_B\right)\right]
\end{aligned}$$

The above is a very complicated game theory problem with a solution using optimal control theory. We will show that the compensation levels and levels of support of any solution can be obtained by solving a simpler contract theory problem where the principal (the SIG) chooses the compensation and support levels subject to the constraint that each agent (candidates) gets an outside option which would obtain if the agent didn't support the SIG at all, received no compensation and her opponent received the maximum contribution M_{SIG}. That is, the solution can be obtained from:

$$\begin{aligned}
&\max_{\tau_A,\tau_B,M_A,M_B} U_{SIG}\left[\tau_A,\tau_B,M_A,M_B\right] \quad (9)\\
&\text{s.t. } U_A\left[\tau_A,\tau_B,M_A,M_B\right] \geq U_A\left[0,\tau_B,0,M_{SIG}\right]\\
&\text{s.t. } U_B\left[\tau_A,\tau_B,M_A,M_B\right] \geq U_B\left[\tau_A,0,M_{SIG},0\right]
\end{aligned}$$

We now show that the constraint set for the equilibrium values of the game theory problem, $G\prime$, contains the constraint set, C, for the contract theory problem. Suppose that $[\tau_A^*,\tau_B^*,M_A^*,M_B^*]$ is a solution of the contracting problem. The SIG can create a function which obtains its maximum at $[0,\tau_B^*,0,M_{SIG}]$ and $[\tau_A^*,\tau_B^*,M_A^*,M_B^*]$ for candidate A and $[\tau_A^*, 0, M_{SIG}, 0]$ and $[\tau_A^*, \tau_B^*, M_A^*, M_B^*]$ for candidate B. Consider differentiable payment function $M_k(\tau_k, \tau_{-k}) = W(\tau_k) - R(\tau_k)$, where $R(\tau_k)$ is a differentiable function over the positive real numbers with the following properties: (1.) $R(0) = 0$, (2.) $R(\tau_k^*) = 0$ and (3.) $W(\tau_k) > R(\tau_k) > 0 \forall \tau_k \neq 0, \tau_k^*$. Thus, $[\tau_A^*, \tau_B^*, M_A^*, M_B^*]$ is in the constraint set for the equilibrium values of the game theory problem: $G\prime \supset C$.

Now we show that the constraint set of the contract theory problem contains the equilibrium values for the constraint set of the game theory problem: $C \supset G\prime$. Suppose that the vector $[\tau_A^*, \tau_B^*, M_A^*, M_B^*]$ contains the equilibrium values of an element of the constraint set to the game theory problem. In any subgame where the interest group chooses a policy $M_k(\tau_k, \tau_{-k})$, $M_k \geq 0 \Rightarrow U_k[\tau_k, \tau_{-k}, M_k, M_{-k}] \geq$ (since the politician can reject the offer and the interest group can condition the payment to the other politician on rejection with a maximum of contributing M_{SIG}) $U_k[0, \tau_{-k}, 0, M_{SIG}] \Rightarrow U_k[\tau_k^*, \tau_{-k}, M_k^*(\tau_k^*, \tau_{-k}), M_{-k}] \geq U_k[0, \tau_{-k}, 0, M_{SIG}] \Rightarrow$ the vector of equilibrium-path values $[\tau_A^*, \tau_B^*, M_A^*, M_B^*]$ is feasible in (9) : $C \supset G\prime$. Thus $C = G'$.

Since the constraint sets for the two problems are the same and the objective functions are the same, the set of solutions must be the same. Thus, $[\tau_A^*, \tau_B^*, M_A^*, M_B^*]$ is a solution of (9) if and only if

$$[\tau_A^*(M_A^*(\tau_A^*, \tau_B^*), M_B^*(\tau_A^*, \tau_B^*)), \tau_B^*(M_A^*(\tau_A^*, \tau_B^*), M_B^*(\tau_A^*, \tau_B^*)), M_A^*(\tau_A^*, \tau_B^*), M_B^*(\tau_A^*, \tau_B^*)]$$

is a solution of (8) . ■

Proposition 2 *SIGs never give to both sides in the same race:* $M_A^* > 0 \Rightarrow M_B^* = 0$ *and* $M_B^* > 0 \Rightarrow M_A^* = 0$.

Proof. For notational simplicity, let $\Delta = -b - (W(\tau_A^*) - W(\tau_B^*) + M_A - M_B)$.

We write the SIG maximization problem as:

$$\max_{M_A,M_B,\tau_A,\tau_B} \left[1-F\left(\Delta\right)\right]W_{SIG}\left(\tau_A\right)+F\left(\Delta\right)W_{SIG}\left(\tau_B\right)+M_{SIG}-M_A-M_B+$$

$$\lambda_A M_A+\lambda_B M_B+\lambda_{SIG}\left[M_{SIG}-M_A-M_B\right]+$$

$$\mu_A\left[1-F\left(\Delta\right)-1+F\left(-b+M_{SIG}+W\left(\tau_B\right)\right)\right]+\mu_B\left[F\left(\Delta\right)-F\left(-b-M_{SIG}-W\left(\tau_A\right)\right)\right]$$

Taking first order conditions with respect to M_A and M_B, we obtain:

$$\frac{\partial U_{SIG}}{\partial M_A}=f(\Delta)\left[W_{SIG}\left(\tau_A\right)-W_{SIG}\left(\tau_B\right)\right]-1+\lambda_A-\lambda_{SIG}+f(\Delta)\left(\mu_A-\mu_B\right)=0 \quad (10)$$

$$\frac{\partial U_{SIG}}{\partial M_B}=f(\Delta)\left[W_{SIG}\left(\tau_B\right)-W_{SIG}\left(\tau_A\right)\right]-1+\lambda_B-\lambda_{SIG}+f(\Delta)\left(\mu_B-\mu_A\right)=0 \quad (11)$$

Taking first order conditions with respect to τ_A and τ_B and dividing by $\frac{\partial W_k}{\partial \tau_k}$, we obtain:

$$\begin{aligned}\frac{\partial U_{SIG}}{\partial \tau_A} &= 0=f(\Delta)\left[W_{SIG}\left(\tau_A\right)-W_{SIG}\left(\tau_B\right)+\mu_A-\mu_B\right]+ \qquad (12)\\ &\quad \mu_B f\left(-b-M_{SIG}-W\left(\tau_A\right)\right)-\left[1-F(\Delta)\right]\theta\left(\tau_A\right)\end{aligned}$$

$$\begin{aligned}\frac{\partial U_{SIG}}{\partial \tau_B} &= 0=f(\Delta)\left[W_{SIG}\left(\tau_B\right)-W_{SIG}\left(\tau_A\right)+\mu_B-\mu_A\right]+ \qquad (13)\\ &\quad \mu_A f\left(-b+M_{SIG}+W\left(\tau_B\right)\right)-F(\Delta)\theta\left(\tau_B\right)\end{aligned}$$

Adding (12) and (13), we obtain:

$$\mu_A f\left(-b+M_{SIG}+W\left(\tau_B\right)\right)+\mu_B f\left(-b-M_{SIG}-W\left(\tau_A\right)\right)=\left[1-F(\Delta)\right]\theta\left(\tau_A\right)+F(\Delta)\theta\left(\tau_B\right) \quad (14)$$

Combining (14) with (10) and (11), we obtain:

$$\begin{aligned}\lambda_A &= \max\left[1+\lambda_{SIG}+\mu_B f\left(-b-M_{SIG}-W\left(\tau_A\right)\right)-\left[1-F(\Delta)\right]\theta\left(\tau_A\right),0\right] \quad (15)\\ \lambda_B &= \max\left[1+\lambda_{SIG}+\mu_A f\left(-b+M_{SIG}+W\left(\tau_B\right)\right)-F(\Delta)\theta\left(\tau_B\right),0\right]\end{aligned}$$

Adding $\lambda_A+\lambda_B$, we get obtain:

$$\begin{aligned}\lambda_A+\lambda_B &\geq 2+2\lambda_{SIG}+\mu_A f\left(-b+M_{SIG}+W\left(\tau_B\right)\right)+\\ &\quad \mu_B f\left(-b-M_{SIG}-W\left(\tau_A\right)\right)-\left[1-F(\Delta)\right]\theta\left(\tau_A\right)-F(\Delta)\theta\left(\tau_B\right)\end{aligned}$$

now using (14), we obtain:

$$\lambda_A+\lambda_B \geq 2+2\lambda_{SIG}>0$$

This means that at least one of λ_A and λ_B must be positive and therefore that at least one of M_A and M_B must be zero. In other words, the SIG will never give to both sides of the same race. ■

Lemma 2 *Contributions levels are characterized by:*

$$\begin{aligned}\lambda_A &= 1+F\left(\Delta\right)\theta(\tau)-\left[1-F(\Delta)\right]\theta(\tau)\\ \lambda_B &= 1+\left[1-F(\Delta)\right]\theta(\tau)-F(\Delta)\theta(\tau)\end{aligned}$$

if non-negativity constraints on contributions are binding for both parties, where $\tau_A=\tau_B=\tau=W^{-1}(M_{SIG})$.

Proof. We prove this characterization in three steps.

Part I: Outside Options are binding:

We prove by contradiction. In subpart (1.) we show that if a candidate's outside option is non-binding, then she will get no money. In (2.) we show that it is never optimal for the SIG to allow the outside options of both candidates to be non-binding. Finally, in (3.) we show that B's outside option binding implies A must get strictly more money than B, which means that A must get a positive amount, contradicting (1.).

(1.) $\mu_A = 0 \Rightarrow M_A^* = 0$: Without loss of generality, assume that the outside option for A is non-binding. Then, $\mu_A = 0 \Rightarrow \mu_B f\left(-b - M_{SIG} - W\left(\tau_A\right)\right) = \left[1 - F(\Delta)\right]\theta\left(\tau_A\right) + F(\Delta)\theta\left(\tau_B\right)$ (from equation (15)) $\Rightarrow \lambda_A = 1 + \lambda_{SIG} + F\left(\Delta\right)\theta\left(\tau_A\right) > 0 \Rightarrow M_A^* = 0$. So, if the outside option for A is non-binding, then A must be getting no money.

(2.) Either $\mu_A > 0$ or $\mu_B > 0$: If both were non-binding, then $\mu_A = \mu_B = 0$. But then equation (14) can not be satisfied. Therefore, at least one outside option must bind.

(3.) $\mu_A > 0$ and $\mu_B > 0$: Without loss of generality, suppose that the outside option for candidate A is non-binding. This implies that B's outside option binds: $-W(\tau_A) + W(\tau_B) - M_A + M_B = -W(\tau_A) - M_{SIG}$. Since A's outside option is non-binding, we also have $-W(\tau_A) + W(\tau_B) - M_A + M_B < W(\tau_B) + M_{SIG}$. Thus: $-W(\tau_A) - M_A + M_B < M_{SIG} = -W(\tau_A) + M_A - M_B$. This, however, means that A must get strictly more money than B ($M_B < M_A$) which contradicts that A must get zero (1.) and $M_B \geq 0$.

Part II: $\tau_A = \tau_B \Leftrightarrow M_A = M_B = 0$:

(1.) $M_A = M_B = 0 \Rightarrow \tau_A = \tau_B$:

$M_A = M_B = 0 \Rightarrow -b - W\left(\tau_A\right) + W\left(\tau_B\right) - M_A + M_B = -b - W\left(\tau_A\right) + W\left(\tau_B\right)$ (using the fact that IR constraints bind) $= -b - M_{SIG} - W\left(\tau_A\right) \Rightarrow W\left(\tau_B\right) = M_{SIG}$ and similarly, $W\left(\tau_A\right) = M_{SIG} \Rightarrow W\left(\tau_A\right) = W\left(\tau_B\right) \Rightarrow \tau_A = \tau_B$.

(2.) $\tau_A = \tau_B \Rightarrow M_A = M_B = 0$:

$\tau_A = \tau_B \Rightarrow -b - W\left(\tau_A\right) + W\left(\tau_B\right) - M_A + M_B = -b - M_A + M_B$ (using the fact that IR constraints bind) $= -b - M_{SIG} - W\left(\tau_A\right)$ and $-b - M_A + M_B = -b + M_{SIG} + W\left(\tau_B\right)$.

Adding the latter two equations, we obtain: $-2b - W(\tau_A) + W(\tau_B) = -2b - 2M_A + 2M_B$ (given that $\tau_A = \tau_B$ and cancelling the $-2b$) $\Rightarrow M_A = M_B$.

Part III: Characterizing contribution levels

From the fact that the IR constraints are binding: $f(-b - M_{SIG} - W(\tau_A)) = f(\Delta) = f - b + M_{SIG} + W(\tau_A))$; thus, we can reduce equation (12) to:

$$0 = f(\Delta)\left[W_{SIG}(\tau_A) - W_{SIG}(\tau_B) + \mu_A\right] - \left[1 - F(\Delta)\right]\theta(\tau_A)$$

solving this under the assumption that $\tau_A = \tau_B$, we obtain:

$$\mu_A f(\Delta) = \left[1 - F(\Delta)\right]\theta(\tau_A) \tag{16}$$

Similarly, we can derive:

$$\mu_B f(\Delta) = F(\Delta)\theta(\tau_B) \tag{17}$$

Combining (16) and (17) with (15) and dropping λ_{SIG} because when no money is spent, the aggregate budget constraint for the SIG is not binding, we get (where, since $M_A = M_B \Rightarrow \tau_A = \tau_B$, we define $\theta = \theta(\tau_A) = \theta(\tau_B) = \theta(\tau)$ such that $\tau = W^{-1}(M_{SIG})$):

$$\begin{aligned} \lambda_A &= 1 + F(\Delta)\theta(\tau) - \left[1 - F(\Delta)\right]\theta(\tau) \\ \lambda_B &= 1 + \left[1 - F(\Delta)\right]\theta(\tau) - F(\Delta)\theta(\tau) \end{aligned} \tag{18}$$

■

Proposition 3 *When $\theta = \theta(\tau)$, the SIG always receives equilibrium support ($\tau_A^* > 0$, $\tau_B^* > 0$ or both) but contributes only in sufficiently lop-sided races: $P(A) \in$*

$\left[\frac{1}{2}-\frac{1}{2\theta(\tau)},\frac{1}{2}+\frac{1}{2\theta(\tau)}\right] \Rightarrow M_A^*=M_B^*=0,\ P(A)<\frac{1}{2}-\frac{1}{2\theta(\tau)} \Rightarrow M_A^*>0\ and\ P(A)>\frac{1}{2}-\frac{1}{2\theta(\tau)} \Rightarrow M_B^*>0.$

Proof. We prove this proposition in two parts. First, we show that the SIG always obtains equilibrium support (even when it does not contribute). Then, we show that the SIG only contributes in lop-sided races.

Part I. First we show that if equilibrium contributions are zero, then support must still be positive. Suppose $\tau_A^*=\tau_B^*=0$ but $M_A^*+M_B^*<M_{SIG}$. Since $max\left[P(A)\frac{\partial W_{SIG}(0)}{\partial \tau_A},[1-P(A)]\frac{\partial W_{SIG}(0)}{\partial \tau_A}\right] \geq \frac{\frac{\partial W_{SIG}(0)}{\partial \tau_A}}{2} > -(1+f(0))\frac{\partial W_k(0)}{\partial \tau_k}$ and $-(1+f(0))\frac{\partial W_k(0)}{\partial \tau_k} \geq -(1+f)\frac{\partial W_k(0)}{\partial \tau_k}$ by (3) $\Rightarrow$ the marginal benefit to the SIG of contributing is greater than the marginal cost of announcing some amounts of the SIG policy for the ex-ante winning candidate $\Rightarrow$either $\tau_A^*>0, \tau_B^*>0$ or both. Alternatively, $M_A^*+M_B^*=M_{SIG}$ and $\tau_A^*=\tau_B^*=0$ the SIG can reduce contributions and be better off. Thus, $\tau_A^*>0$, $\tau_B^*>0$ or both.

Part II Now we show that no monetary contributions implies $F(\Delta)\in\left[\frac{1}{2}-\frac{1}{2\theta(\tau)},\frac{1}{2}+\frac{1}{2\theta(\tau)}\right]$ and positive monetary contributions to at least one party implies $F(\Delta)\notin\left[\frac{1}{2}-\frac{1}{2\theta(\tau)},\frac{1}{2}+\frac{1}{2\theta(\tau)}\right]$ $\left(P(A)<\frac{1}{2}-\frac{1}{2\theta(\tau)} \Rightarrow M_A^*>0 \text{ and } P(A)>\frac{1}{2}-\frac{1}{2\theta} \Rightarrow M_B^*>0\right):$

We break this part into two subparts. In (1.), we show that when the SIG is not contributing in equilibrium, the races are close (or in other words, when the races are not close, the SIG must be giving money). In (2.), we show that when the SIG is contributing in equilibrium the races are lop-sided (or in other words, when the races are not lop-sided, the SIG does not contribute).

(1.)$M_A=M_B=0 \Rightarrow \tau_A=\tau_B$. This implies that

$$\min\left[F(\Delta)\theta(\tau)-[1-F(\Delta)]\theta(\tau),\ 1-F(\Delta)\theta(\tau)-F(\Delta)\theta(\tau)\right]\geq -1$$

This implies that $F(\Delta)\in\left[\frac{1}{2}-\frac{1}{2\theta(\tau)},\frac{1}{2}+\frac{1}{2\theta(\tau)}\right]$

(2.) Without loss of generality, suppose $M_A>0$. Since, $\mu_B f(-b-M_{SIG}-W(\tau_A))=$

$\mu_B f(\Delta)$, from (12), we have $\mu_A f(-b + M_{SIG} + W(\tau_B)) = \mu_A f(\Delta) = [1 - F(\Delta)]\,\theta(\tau) - f(\Delta)[W_{SIG}(\tau_A) - W_{SIG}(\tau_B)] < [1 - F(\Delta)]\,\theta(\tau)$. This implies that $\mu_B f(-b - M_{SIG} - W(\tau_A))$ is strictly greater than $F(\Delta)\theta(\tau)$ as a consequence of (14). This means that $\lambda_A < 0$ when $F(\Delta)\,\theta(\tau) - [1 - F(\Delta)]\,\theta(\tau) < -1 \Rightarrow F(\Delta) < \frac{1}{2} - \frac{1}{2\theta(\tau)}$. Similarly, $\lambda_B < 0$ when $1 - F(\Delta)\,\theta(\tau) - F(\Delta)\theta(\tau) < -1 \Rightarrow F(\Delta) > \frac{1}{2} + \frac{1}{2\theta(\tau)}$.

Combining (1.) and (2.), we get that $P(A) \in \left[\frac{1}{2} - \frac{1}{2\theta(\tau)}, \frac{1}{2} + \frac{1}{2\theta(\tau)}\right] \Rightarrow M_A^* = M_B^* = 0$, $P(A) < \frac{1}{2} - \frac{1}{2\theta(\tau)} \Rightarrow M_A^* > 0$ and $P(A) > \frac{1}{2} - \frac{1}{2\theta(\tau)} \Rightarrow M_B^* > 0$. ■

Corollary 2 *When $\theta(\tau)$ is constant: $\theta(\tau) = \overline{\theta}$, if the SIG contributes, it contributes all of its money: $\lambda_A > 0 \Leftrightarrow \lambda_{SIG} = 0$.*

Proof. $M_A > 0 \Leftrightarrow \lambda_A = 0 \Leftrightarrow 1 + F(\Delta)\,\overline{\theta} - [1 - F(\Delta)]\,\overline{\theta} \leq 0 \Leftrightarrow [2F(\Delta) - 1]\,\overline{\theta} \leq -1$

Given one-sidedness of contributions, $M_A = M_{SIG} \Leftrightarrow \lambda_{SIG} = \lambda_A - 1 + [1 - F(\Delta)]\,\overline{\theta} - F(\Delta)\,\overline{\theta} > 0 \Leftrightarrow -1 > [2F(\Delta) - 1]\,\overline{\theta} + \lambda_A \Leftrightarrow -1 > [2F(\Delta) - 1]\,\overline{\theta}$

So, $\lambda_{SIG} > 0 \Leftrightarrow \lambda_A = 0$. In other words, when the interest group spends anything, it spends everything. ■

Proposition 4 *When θ is constant, the average rate of return to money contributed by the SIG ranges from $2\overline{\theta}$ to ∞.*

Proof. $W_{SIG}(\tau_A) + W_{SIG}(\tau_B) = -\overline{\theta}\,[W(\tau_A) + W(\tau_B)]$. From outside options being binding, we know that $-b - M_{SIG} - W(\tau_A) = -b - M_A + M_B - W(\tau_A) + W(\tau_B)$ $= -b + M_{SIG} + W(\tau_B) \Rightarrow M_{SIG} = M_B - M_A - W(\tau_A)$ and $M_{SIG} = M_A - M_B - W(\tau_B)$. Adding these two equations, we obtain: $2M_{SIG} = -[W(\tau_A) + W(\tau_B)]$. This implies that

$$W_{SIG}(\tau_A) + W_{SIG}(\tau_B) = 2\overline{\theta}M_{SIG}$$

The average rate of return to money spent is just benefits over expenditures. Without loss of generality, we assume that $M_A \geq 0 = M_B$. Thus the average rate of return is given by:

$$\frac{2\overline{\theta} M_{SIG}}{M_A}$$

which ranges from $2\overline{\theta}$ when $M_A = M_{SIG}$ to ∞ when $M_A = 0$. ■

Proposition 5 *If $\theta(\tau)$ is strictly decreasing in τ : $\frac{\partial \theta}{\partial \tau_A}, \frac{\partial \theta}{\partial \tau_B} < 0$, then contributions from an SIG are zero for a sufficiently high cap on contributions (M_{OLD}) and positive for a lower (stricter) cap on contributions (M_{NEW}) if and only if $M_{OLD} \geq \theta^{-1}\left(min\left[\frac{1}{1-2F(b)}, \frac{1}{2F(b)-1}\right]\right) > M_{NEW}$*

Proof. Main Claim We know that our SIG maximization problem now has two extra constraints. However, we just want to characterize conditions under which $M_A = M_B = 0$ at the old limits $(M_A, M_B \leq \overline{M}_{OLD})$ and where either $M_A > 0$ or $M_B > 0$ at the new limits $(M_A, M_B \leq \overline{M}_{NEW} < \overline{M}_{OLD})$. Since we know that our new maximization problem is the same as the old when the constraints on non-negativity of contribution are binding and since we know that the constraints on non-negativity of contributions are binding if and only if the following equations lead to positive numbers for both λ_A and λ_B, then we just have to find conditions under which the following equations lead to positive solutions for λ_A, λ_B under the old cap and not under the new cap:

$$\begin{aligned} \lambda_A &= 1 + F(b)\,\theta(\tau) - [1 - F(b)]\,\theta(\tau) \\ \lambda_B &= 1 + [1 - F(b)]\,\theta(\tau) - F(b)\theta(\tau) \end{aligned}$$

where $F(b)$ is the cumulative distribution function giving the probability that candidate B wins if there are no expenditures ($M_A = M_B = 0$) and equal support for the SIG policy ($W(\tau_A) = W(\tau_B)$).

Now we define θ_{OLD} as the cutoff level of $\theta(\tau)$ (for $W(\tau) = -M_{SIG}$)such that all higher levels of $\theta(\tau)$ will lead to equilibrium contributions given the old campaign contribution limits. From $\lambda_A \geq 0$, we get $1 \geq [1-2F(b)]\,\theta_{OLD}$ or $\frac{1}{1-2F(b)} \geq \theta_{OLD}$. Similarly, from $\lambda_B \geq 0$, we can derive $\frac{1}{2F(b)-1} \geq \theta_{OLD}$. Combining these two inequalities, we get $min\left[\frac{1}{1-2F(b)}, \frac{1}{2F(b)-1}\right] \geq \theta_{OLD}$. Inverting θ (see subclaim below for a proof that θ^{-1} depends negatively on M_{SIG}), we get $\overline{M}_{OLD} \geq \theta^{-1}\left(min\left[\frac{1}{1-2F(b)}, \frac{1}{2F(b)-1}\right]\right)$. In order for $\overline{M}_{NEW}$ to not satisfy the above relations, we must have $\theta^{-1}\left(min\left[\frac{1}{1-2F(b)}, \frac{1}{2F(b)-1}\right]\right) > \overline{M}_{NEW}$. Thus:

$$\overline{M}_{OLD} \geq \theta^{-1}\left(min\left[\frac{1}{1-2F(b)}, \frac{1}{2F(b)-1}\right]\right) > \overline{M}_{NEW}$$

Subclaim To complete the proof, we need to show that $\frac{\partial\theta^{-1}(\overline{M})}{\partial\tau_A^*} < 0$ (where $\overline{M}$ is the statutory limit on campaign contributions). From outside options being binding, we have: $-b - W(\tau_A) + W(\tau_B) - M_A + M_B = -b - \overline{M} - W(\tau_A)$ but $M_A = M_B = 0 \Rightarrow \tau_A = \tau_B \Rightarrow -W(\tau_A) + W(\tau_B) = 0$. This implies that $-b = -b - \overline{M} - W(\tau_A) \Rightarrow \tau_A^* = -W^{-1}\left(\overline{M}\right) \Rightarrow \frac{\partial\tau_A^*}{\partial\overline{M}} = -\frac{\partial W^{-1}(\overline{M})}{\partial\overline{M}} > 0 \Rightarrow \frac{\partial\theta\left(\tau_A^*(\overline{M})\right)}{\partial\overline{M}} < 0 \Rightarrow \frac{\partial\theta^{-1}(\overline{M})}{\partial\tau_A^*} < 0$ ■

References

[1] Ansolabehere, Stephen, Rui de Figueiredo and James Snyder Jr. (2003). "Why is There so Little Money in U.S. Politics?" Journal of Economic Perspectives 17(1): 105-130.

[2] Baron, David (1994). "Electoral Competition with Informed and Uninformed Voters." American Political Science Review 88: pp.33-47.

[3] Bernheim, B. Douglas and Michael Whinston (1986). "Common Agency." Econometrica 54:4, pp. 923-942.

[4] Besley, Tim and Stephen Coate (2001). "Lobbying and Welfare in a Representative Democracy." Review of Economic Studies 68, pp. 67-81.

[5] Blundell, Richard and James Powell (2000). "Endogeneity in Nonparametric and Semiparametric Regression Models", Invited Lecture in the Econometric Society World Meeting, Seattle.

[6] Center for Responsive Politics, http://www.opensecrets.org.

[7] Dalbo, Ernesto (2007), "Bribing Voters", American Political Science Review (forthcoming).

[8] Dixit, Avinash, Gene Grossman and Elhanan Helpman (1997). "Common Agency and Coordination: General Theory and Application to Policy Making." Journal of Political Economy 105:4 , pp. 752-769.

[9] Fan, Jianqing (1992). "Design adaptive non-parametric regression." Journal of the American Statistical Association 87: 998-1004.

[10] Federal Elections Commission. Campaign Finance Reports and Data, detailed files for 1986-2004 election cycles available at http://www.fec.gov.

[11] Goldberg, Pinelopi and Giovanni Maggi (1999). "Protection for Sale: An Empirical Investigation." American Economic Review 89:5, pp. 1135-1155.

[12] Grossman, Gene and Elhanan Helpman (1996). "Electoral Competition and Special Interest Politics." Review of Economic Studies 63: 256-286.

[13] Grossman, Gene and Elhanan Helpman (2001). Special Interest Politics, MIT Press, Cambridge.

[14] Helpman, Elhanan and Torsten Persson (2001). "Lobbying and Legislative Bargaining." Advances in Economic Analysis & Policy, 1(1).

[15] King, Gary; Bradley Palmquist; Greg Adams; Micah Altman; Kenneth Benoit; Claudine Gay; Jeffrey B. Lewis; Russ Mayer; and Eric Reinhardt. 1997. "The Record of American Democracy, 1984-1990," Harvard University, Cambridge, MA [producer], Ann Arbor, MI: ICPSR [distributor].

[16] Levitt, Steven (1998). "Who are PACs trying to Influence with Contributions: Politicians or Voters?", Economics and Politics 10(1): 19-36.

[17] Milyo, Jeffrey, David Primo and Timothy Groseclose (2000). "Corporate PAC Campaign Contributions in Persepctive." Business and Politics. 2:1, pp.75-88.

[18] Olson, Mancur (1971). The Logic of Collective Action, Harvard University Press, Cambridge.

[19] Persson, Torsten and Guido Tabellini (2000). Political Economics: Explaining Economic Policy, MIT Press, Cambridge.

[20] Prat, Andrea and Aldo Rustichini (2003), "Games Played Through Agents", Econometrica Vol. 71(4), (July, 2003): 989–1026.

[21] Segal, Ilya (1999). "Contracting with Externalities." Quarterly Journal of Economics: Vol. 114, pp. 337-388.

[22] Snyder, James Jr (1990). "Campaign Contributions as Investments: The House of Representatives, 1980-1986." Journal of Political Economy 98:6, pp. 1198-227.

[23] Strattman, Thomas (1991). "What Do Campaign Contributions Buy? Deciphering Casual Effects of Money and Votes." Southern Economic Journal, 57:4, pp. 606-20.

[24] Tullock, Gordon (1972). "The Purchase of Politicians." Western Economic Journal 10: 354-55.

[25] U.S. General Accounting Office (2000). "Sugar Program: Supporting Sugar Prices Has Increased Users' Costs While Benefiting Producers." GAO/RCED-00-126.

[26] Yatchew, Adonis (1999). An Elementary Nonparametric Differencing Test of Equality of Regression Functions. Economic Letters, Vol 62(3), pp. 271-278.

Table 1: SIG Contributions and Share of "Redundant" Two-Sided Contributions in Race By Range of Two-Party Vote Share

	Lopsided Races (Winner has 60% or more)	Close Races		
		[40-60%]	[45-55%]	[49- 51%]
Average SIG contributions	183,253	251,284	254,952	259,138
(2004 dollars)	(133,800)	(158,241)	(152,222)	(160,316)
Share of "redundant"	0.4%	4.4%	5.5%	7.5%
two-sided contributions	(2.3%)	(6.6%)	(6.6%)	(8.0%)
Average number of SIGs	100.6	122	123.7	123.9
Contributing	(57.9)	(58.4)	(58.7)	(58.7)
Share of SIGs contributing to	0.4%	3.5%	4.4%	5.7%
both candidates	(1.5%)	(4.5%)	(4.3%)	(5.2%)
Number of Races	3492	1177	564	105

Notes: Standard deviations reported in parenthesis. Redundancy in the contributions of an SIG in a given race is defined as 2*min(contributions to Democrat, contributions to Republican). Shares of redundant contributions reported correspond to the average weighted by the total contributions in each race in the respective range. Unweighted averages yield similar results (on average lower), with redundancy being highest at. 7.7% for races in the [49-51%] range. Similarly, the share of SIGs contributing to both candidates is weighted by the number of contributions in each race in the respective range. Unweighted averages are also very similar to the ones reported (on average lower), with the share being highest at 5.4% for races in the [49-51%] range.

Table 2: SIG and GIG Contributions By Candidate Two-Party Vote Share

	Lopsided Losers (Below 40%)	Lopsided Winners (Above 60%)	Close Election Candidates [40-60%]	[45-55%]	[49- 51%]
SIGs					
Average contributions	2,808	180,996	125,642	127,476	129,569
(2004 dollars)	(143,04)	(133,406)	(148,773)	(143,667)	(143,929)
Average number of	1.8	99.6	63.1	64.5	65.3
contributions	(7.6)	(58)	(64.7)	(62.7)	(60)
Size of average	1,306	1,741	1,789	1,804	1,864
contribution[1]	(1,269)	(544)	(752)	(685)	(614)
Size of average	1,576	1,818	1,992	1,977	1,983
contribution (weighted) [1,2]	(871)	(497)	(529)	(498)	(492)
Average contributions	0.03	1.66	1.19	1.22	1.26
relative to average in cycle[3]	(0.13)	(1.17)	(1.36)	(1.33)	(1.32)
GIGs					
Average contributions	15,661	126,925	183,729	210,925	227,232
(2004 dollars)	(43,362)	(94,238)	(156,687)	(162,540)	(163,286)
Average number of	6.0	57.7	62.1	69.7	73.4
contributions	(12.1)	(28.5)	(42.5)	(43)	(41.1)
Size of average	1,695	2,024	2,642	2,746	2,808
contribution[1]	(1,349)	(880)	(1236)	(1,276)	(1,289)
Size of average	2,589	2,201	2,958	3,025	3,095
contribution (weighted) [1,2]	(1,285)	(838)	(1,094)	(1,108)	(1,147)
Average contributions	0.15	1.20	1.72	2.0	2.22
relative to average in cycle[3]	(0.4)	(0.87)	(1.41)	(1.46)	(1.47)
SIG + GIGs					
Contributions as share	14.4	42.5	32.9	32.9	33.4
of candidate's total receipts	(14.3)	(17.2)	(17.4)	(16.8)	(17)
Number of Observations	2807	3492	2354	1128	210

Notes: Standard deviations reported in parenthesis. There are more lopsided winners than losers due to uncontested races.

[1] Size of average contribution conditional on a contribution being made. Value reported indicates average for a candidate in that range of vote share.

[2] Average weighted by the number of contributions.

[3] Values correspond to the amount received by the candidate from SIGs (GIGs) divided by the average amount received from SIGs (GIGs) by all candidates in that election cycle.

Table 3. Amount and Average Size of Contributions by Candidate Two-Party Vote Share

	Range of Vote Share			
	[40-45]	(45-50]	(50-55]	(55-60]
SIGs				
Total contributions (2004 dollars)	29,870	80,775	174,177	217,981
Number of contributors	15.8	41.9	87.1	107.4
Size of average contribution	1,888	1,929	2,000	2,029
Change over previous range[1]				
Total contributions		50,905	93,401	43,804
(%)		170%	116%	25%
Number of contributors		26.06	45.20	20.37
(%)		165%	108%	23%
Size of average contribution		40	71	29
(%)		2%	4%	1%
Share of change in total contributions due to change in number of contributors[2]		97%	93%	93%
GIGs				
Total contributions (2004 dollars)	102,442	180,536	241,313	215,809
Number of contributors	33.1	58.5	80.9	77.3
Size of average contribution	3,097	3,085	2,982	2,793
Change over previous range[1]				
Total contributions		78,094	60,777	-25,505
(%)		76%	34%	-11%
Number of contributors		25.44	22.41	-3.65
(%)		77%	38%	-5%
Size of average contribution		-12	-103	-189
(%)		0%	-3%	-6%
Share of change in total contributions due to change in number of contributors[2]		101%	110%	40%
Number of observations	613	564	564	602

Notes: Size of average contribution based on average for each candidate in the respective range weighted by the number of contributions (so as to equal the average total contribution divided by the average number of contributors in the range).

[1] The percentage change is computed relative to the level in the previous range.

[2] Decomposition corresponds to share of the change in total contributions that could be explained by the change in the number of contributions keeping the size of average contributions constant at the minimum of its current level or that in the preceding range (so as to estimate a lower-bound for the role of changes in the number of contributions).

Figure 1. SIG and GIG Contributions By Two-Party Vote Share and Locally-Weighted Regression Estimates

Figure 1A:Total SIG Contributions

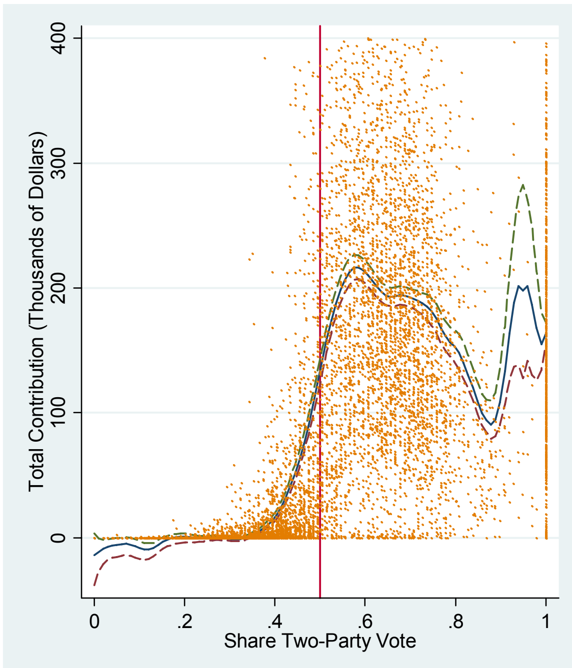


Figure 1B:Total GIG Contributions

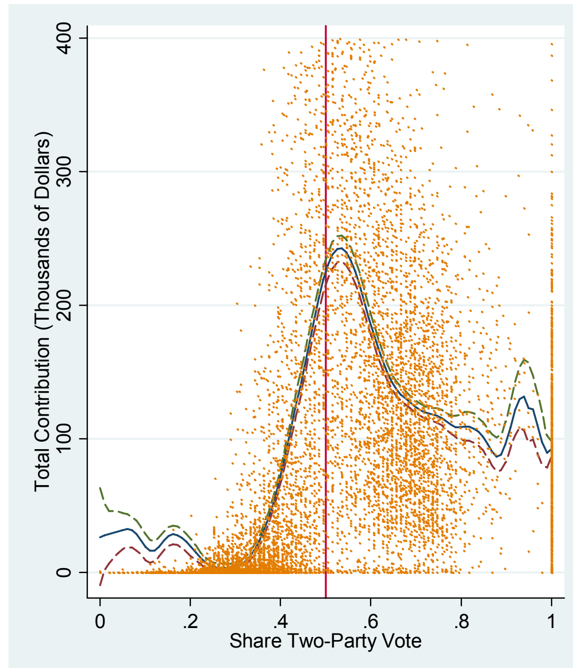


Figure 1C:Slope of SIG Contributions

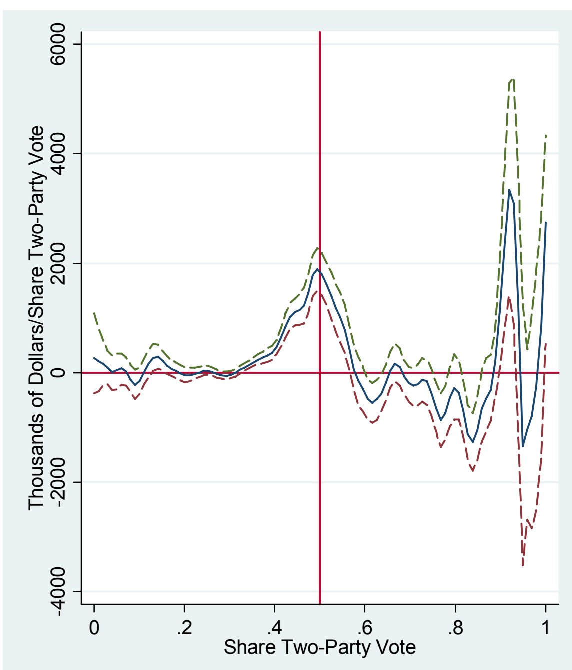
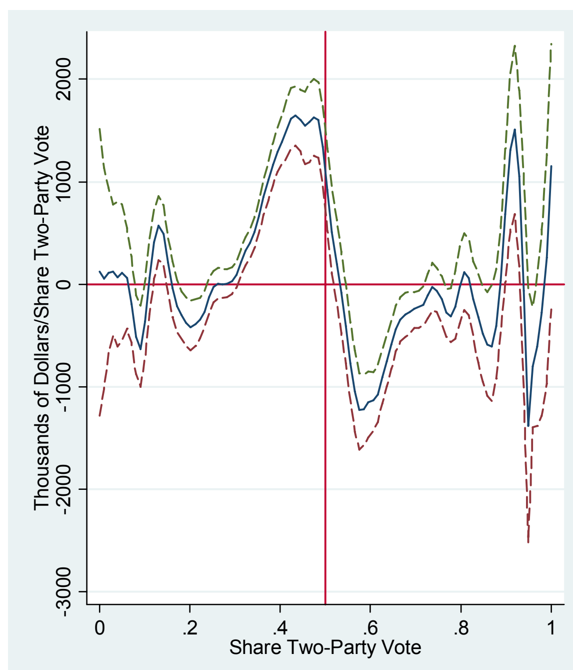


Figure 1D: Slope of GIG Contributions



Notes: Plots based on semi-parametric regression controlling for Party*Year dummies. Solid lines correspond to estimate and dotted lines to bootstrapped 95% confidence interval. Vertical lines at 50% vote share drawn for reference. Horizontal line drawn at 0 in Figures 1C and 1D for visualization of statistical significance. All contribution values deflated to 2004 Dollars.

Figure 2: Number of Contributing SIGs and GIGs and Size of Their Average Contribution by Two-Party Vote Share and Locally-Weighted Regression Estimates.

Figure 2A:Number of SIG Contributions

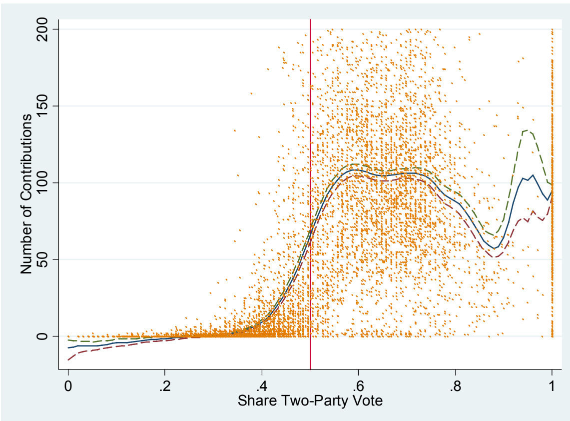


Figure 2B:Number of GIG Contributions

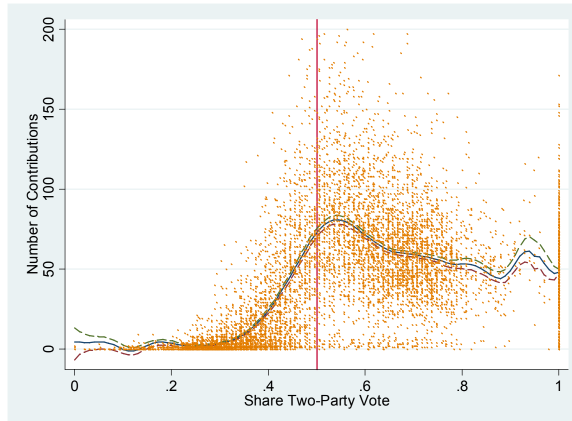


Figure 2C: Size of Average SIG Contribution

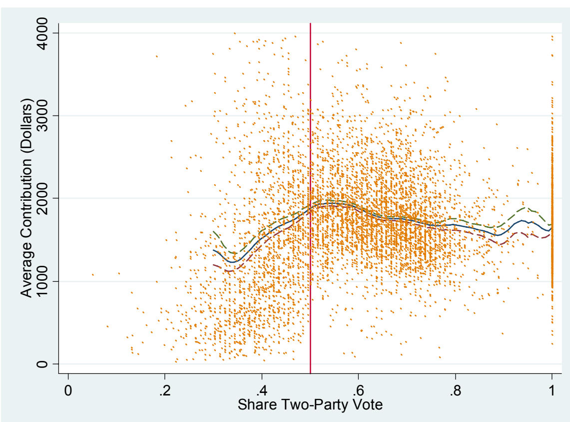


Figure 2D: Size of Average GIG Contribution

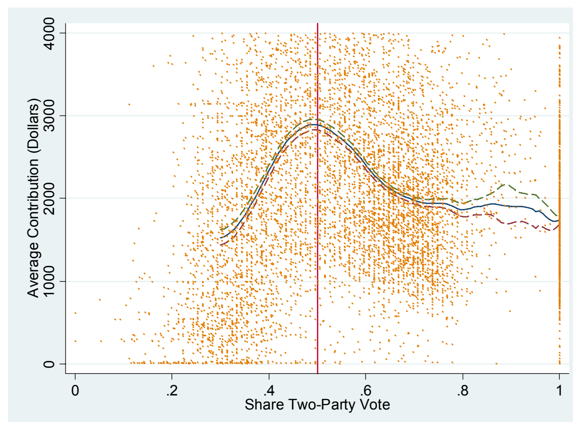


Figure 2E: Number and Size of Average SIG Contribution Relative to Values For 50% Vote Share

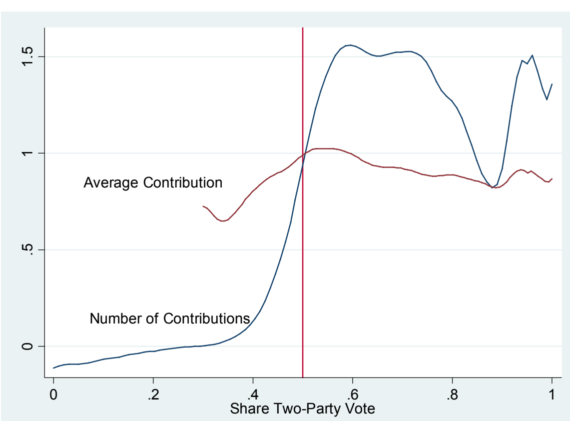
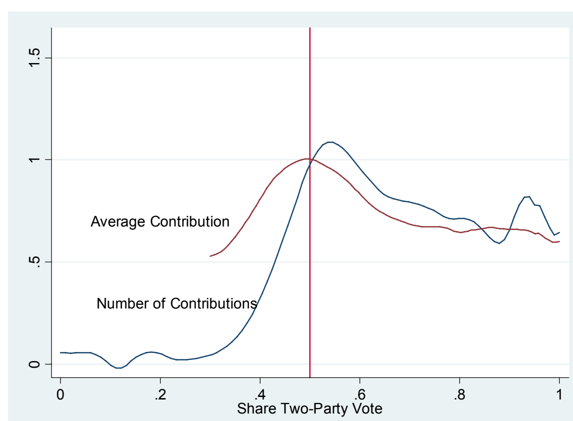


Figure 2F: Number and Size of Average GIG Contribution Relative to Value for 50% Vote Share



Notes: Plots based on semi-parametric regression controlling for Party*Year dummies. Solid lines correspond to estimate and dotted lines to bootstrapped 95% confidence interval. Vertical lines at 50% vote share drawn for reference. Figures 2E (2F) correspond to fitted values from 2A and 2C (2B and 2D) normalized by dividing each value by that corresponding to a 50% vote share. All contribution values deflated to 2004 Dollars.