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Deep Pockets, Extreme Preferences: Interest Groups and Campaign Finance Contributions*

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Abstract

In electoral competitions, interest groups will be willing to finance politicians that require funding for campaign advertising, in exchange for policy favors. Our model predicts that interest groups with more extreme preferences will devote more resources to campaign financing. This occurs because lobbies demand policy favors that are costly to candidates since they reduce voter consent. Extreme interest groups must therefore adequately reward politicians by providing higher contributions, so that candidates may recover popularity through campaign advertising. Our unique data set on U.S. House elections provides empirical evidence that is consistent with these findings.

Keywords: Campaign Finance, Interest Groups, Elections, Extreme Preferences

JEL Classification: D72, P16

1 Introduction

When considering contributions to political campaigns in the United States, one of the most consistent and significant patterns is the reliance of both the democratic and republican

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parties on the major business groups. With some exceptions, overall there appear to be more similarities than differences between the types of industries that finance the two main contenders. In the 2010 U.S. Congressional elections for instance, sixteen out of the top 20 industries contributing to each party were in fact identical.[1] Moreover, if we consider the total amount of contributions, rankings by business sector over the past 20 years appear to exhibit very little variation (Table 1). These stylized facts suggest that there may be some structural characteristic that drives interest groups to finance electoral campaigns.

Table 1: Political contributions from business sectors 1990-2010, ranked based on totals over all electoral cycles (last column).

Sector/Year	2010	2008	2006	2004	2002	2000	1998	1996	1994	1992	1990	Total
Fin./Ins./Real Est.	317.9	501.3	286.8	351.9	239.5	316.0	159.0	177.8	104.7	117.9	61.8	2634.7
Lawyers	180.3	283.2	154.7	215.3	115.2	133.1	72.4	88.8	55.6	63.5	28.8	1390.9
Health	145.6	174.6	105.3	125.9	96.5	98.4	59.7	69.6	49.9	44.1	22.2	992.0
Commun/Electr.	87.8	146.4	76.7	104.7	116.5	132.8	56.2	62.1	31.4	35.8	17.7	868.1
Energy/Nat. Res.	75.6	81.0	51.1	55.1	58.4	67.6	42.1	47.0	30.4	33.2	19.2	560.8
Construction	70.4	93.7	60.4	76.7	48.5	59.4	34.4	36.1	22.2	23.8	13.4	539.0
Agribusiness	58.5	67.7	47.4	54.4	53.3	59.3	43.0	51.4	33.8	36.6	21.2	526.6
Transportation	46.7	58.4	42.0	51.9	47.0	58.6	37.2	40.9	26.8	25.4	15.1	450.0
Defense	22.7	24.5	18.2	18.7	16.6	14.9	10.0	13.3	9.8	8.3	7.2	164.3

Numbers (in million of dollars) are based on contributions of $200 or more from PACs and individuals to federal candidates and from PACs and individual donors to political parties and outside spending groups. Source: Federal Election Commission.

We argue that the policy preferences that different special interest groups represent, play a significant role in determining the size of contributions. More specifically, the total level of contributions is related to the degree of extremism of a particular interest group.

We develop a positive theoretical model of campaign finance, and using a data set relative to U.S. House elections, we find empirical evidence that is consistent with the model. The setting we analyze is one in which two parties compete in an electoral race. Interest groups are non-ideological and finance candidates' political campaigns demanding policy favors in return for their money. Candidates in turn, require contributions to help them win the election by getting their word out to voters. Once in office, winning candidates are able

[1] Source: Center for Responsive Politics based on data released by the Federal Election Commission on Monday, April 25, 2011.

to supply the favors required by their contributors. Parties have no explicit preferences on policies and are willing to tailor them to enhance their electoral prospects.

A distinctive finding of our theoretical model is that contributions are always increasing in the extremism of each interest group's preferences. The intuition is that interest groups that are more extreme will be demanding larger favors that are costly to candidates, as these favors tend to reduce popular consent. In order to compensate politicians for these costs, lobbies will have to provide conspicuous contributions, so that candidates may increase their popularity through campaign advertising. The relative share of contributions instead, always depends on the ex-ante electoral odds of each candidate in a specific electoral race. Moreover, since interest groups are non-ideological, competition between groups does not play a role in determining the level of contributions of each group.

We test the validity of these theoretical results, by assessing the impact of interest group preferences and ex-ante electoral probabilities, on campaign contributions for the U.S. House of Representatives in three electoral cycles (i.e., 2000, 2002 and 2004). In order to evaluate the empirical implications of the model, we consider business sectors as having distinct non-ideological policy preferences, and assume that industry interest groups belonging to a certain sector share these policy preferences. We therefore construct a new data set by using information on contributions from the FEC (Federal Election Commission), as well as defining an extremism index for each business sector using the Gallup polls. The extremism index allows us to exploit voters' perceptions of the policies pursued by different business interests, to indirectly measure the relative extremism of each group's policy preferences. To keep the analysis as general as possible, together with a standard parametric analysis, we adopt two rather sophisticated estimation methods: a quantile regression method and a semi-parametric regression method. This allows us to exploit parametric and nonparametric analysis to uncover the existence of possible nonlinear effects.

Our results provide new evidence for the idea that political campaigns can be viewed as a market for policy favors in line with Snyder (1990). The results are also consistent with Ansolabehere et al. (2003) that highlight that if contributions were investments, we should observe greater spending, since the returns to campaigns appear to be comparatively higher with respect to other investment opportunities. By introducing interest group preferences in an investment based model of campaign finance, we show that lower levels of contributions are associated with interest groups that have less extreme preferences, and therefore more

modest policy "returns" from contributing.

In terms of the theoretical literature, our paper is more closely related to the positive models of policy determination in a two party setting of electoral competition. Unlike models that consider the informational role of campaign spending such as Austen-Smith (1987), Potters et al. (1997), Prat (2002), Coate (2004), Ashworth (2004), we assume that voters are impressionable and can be swayed by advertisements following Baron (1994) and Grossman and Helpman (1996).

Previous literature has devoted only limited attention to the relevance of policy preferences of interest groups in determining campaign spending. The main focus has been on determining the impact of contributions on vote share and estimating whether incumbent or challenger spending is more effective [Jacobson (1990), Levitt (1994), Gerber (1998), Stratmann (2002)]. Another major strand of literature has attempted to pin down the relationship between contributions and policy outcomes with mixed results [Djankov and Murrell (2002), Ansolabehare et al. (2003), Jayachandran (2006)]. Our analysis instead, focuses on gathering a better insight on the determinants of campaign contributions, and in particular, on the role played by the characteristics of contributors. The first contributions to this strand of literature [Pittman (1988), Zardkoohi (1988) and Grier, Munger, and Roberts (1994)], all argue that the costs and benefits of political activity vary across industries. The idea is that the benefits of political action arise mainly from an industry's inability to solve problems of collective action or ameliorate market conditions, without government intervention. In some respect, our measure of policy extremism may reflect both of these aspects. Other recent contributions in this direction include Bombardini and Trebbi (2011), that analyze the relationship between interest group size and contributions, and Chamon and Kaplan (2012), that distinguish between the behavior of ideological versus non-ideological groups.

Bombardini and Trebbi (2011) show that larger interest groups contribute less funds, because they can alternatively offer candidates considerable direct support in the form of votes. This implies that contributions from a given industry vary across electoral districts based on the share of employees in that industry, in a given district. Our work is complementary to this paper, in that we seek to assess how business specific preferences can explain variations in campaign contributions.

Chamon and Kaplan (2012) find that ideological lobbies finance their like-minded partisan candidate when elections are close, and therefore campaigns may affect the electoral

outcome. Non-ideological groups instead, contribute when elections are lopsided in the intent of "buying" policy favors from the advantaged candidate. Unlike our analysis, Chamon and Kaplan (2012) focus on the contributions of single Political Action Committee's (PACs), while we consider contributions at the industry level, aggregating over individuals and PACs in order to investigate industry specific effects.

The paper is organized as follows. In section 2 we introduce the model and in Section 3 we analyze the political equilibrium. In Section 4 we illustrate the empirical implications of the model and in Section 5 we present the empirical analysis. Section 6 concludes.

2 The Model

The model considers an electoral race with three classes of agents: voters, political candidates and an interest group. More specifically, a finite number of voters indexed with $i \in I$ are called on to elect one of two candidates indexed with $j \in \{1, 2\}$. The possibility of abstention is not considered.

Each voter has a preferred pliable policy $p_i \in \Re$ which is weakly increasing in i, where m is the policy preferred by the median voter. Let $e \in \{1, 2\}$ denote the candidate who wins the election, where $p_j \in \Re$ is the policy chosen by candidate j. We assume that voters observe the policies chosen by each candidate. We denote $Q_i \in \Re$ as the popularity differential that candidate 1 has over candidate 2, for voter i. The utility of voter i is:

$$U_i(e, Q_i, p_1, p_2) = \begin{cases} Q_i - d_v(p_i - p_1) & \text{if } e = 1 \\ -d_v(p_i - p_2) & \text{if } e = 2 \end{cases}, \tag{1}$$

where $d_v(\cdot)$ is increasing in $\mid p_i - p_e \mid$, and captures the fact that voters derive less utility from policies that are farther from their bliss point.[2]

Candidates are opportunistic and their only objective is that of winning the election. Besides the policy p_j that candidates can choose, each candidate also has certain fixed policies or characteristics for which each voter has specific preferences. We denote B_i as the proclivity of each voter i for the fixed characteristics of candidate 1 with respect to candidate

[2]The use of a non policy dimension is not new to the literature. See for instance Groseclose (2001), Aragones and Palfrey (2002), Prat (2002), and Coate (2004). The crucial assumption is that U_i is separable in popularity and policy.

2. Whenever $B_i > 0$, a given voter i has a relative preference for candidate 1 over candidate 2. Candidates do not know the exact values of the policy preferences of each voter, but they know the pliable policy preferences of the median voter m, and they know that the fixed policy preferences of the median voter B_m are drawn from a known random distribution $\Phi(B_m)$. This is like saying, for example, that candidates are informed about the tax policy preferred by the pivotal voters, but there is always some uncertainty on the bias in favor of one candidate or the other. This bias could be ideological or even determined by the charisma of the specific politician.

Candidates can run campaigns to increase their popularity amongst the electorate. However, they have no funds of their own and campaigns are entirely financed by the interest group, that may offer contributions to each candidate in return for policy favors.

Interest Groups

We consider non-ideological interest groups such as business lobbies, which as Baron (1994) has pointed out, can be viewed as groups that try to influence *particularistic policies* as opposed to *collective policies*. Particularistic policies are those whose benefits can be denied to those who do not participate in the lobbying effort, and whose costs are spread so thinly in the population, that they do not inspire other interest groups to organize in opposition, such as would be the case with collective policies. We therefore reasonably assume that there is a single interest group (IG), since each group does not face direct competition over its relevant policy dimension.[3] Indeed when interest groups are non-ideological, the single interest group setting can be seen as a reduced form of a more general multi-interest group model, that we present in the appendix.[4] The fact that the interest group is non-ideological implies that it does not have a preference for the fixed characteristics of one candidate or the other. In other words, $B_{IG} = 0$ and this is common knowledge.[5] The IG may therefore choose to

[3]Even if the particularistic policy setup does not entail direct competition, competiton may play a subtle role. Candidates may be constrained in terms of the total amount of policy favors they can award, thus increasing the cost of policy favors as the number of particularistic interest groups rises. To simplify the analysis we abstract from this effect.

[4]In the appendix we show that when interest groups are non-ideological and policies are particularistic, the set of equilibria that are not Pareto dominated in the multiple interest group model have the same properties of the single interest group equilibrium.

[5]A similar assumption is made in Prat (2002). Even if interest group members were concerned about both ideology and pliable policies for example, there may be an agency problem between group members and the leader regarding ideology. While it is reasonable to assume that policy may be contractable, ideology may difficult to measure and verify. This implies that the group leader only has incentives to act upon the

contribute to both sides in the election. As long as each candidate has a positive probability of being elected, the interest group has an incentive to try to influence the positions taken by both parties.

The interest group leader can be seen as the representative of a subset of voters regarding the policy dimension. The group leader maximizes the policy component of the utility of the median group member g. Without loss of generality, we assume that $g > m$ implying that the policy preferences of the interest group are always more extreme than those of the median voter. Contributions made to each candidate, which we denote C_1 and C_2 respectively, are assumed to be non-negative, meaning that the interest group can offer funding to politicians but cannot receive money from them. The group's payoff is assumed to be separable in contributions and policy. When candidate e is elected the payoff of the IG is:

$$U_{IG} = -d_{IG}(g - p_e) - C_1 - C_2, \tag{2}$$

as for the voters, $d_{IG}(\cdot)$ is increasing in the distance between g and p_e, and captures the fact that the interest group derives greater utility from policies closer to its bliss point. The policy preferred by the interest group, g is assumed to be publicly observable.

The interest group makes take it or leave it offers to candidates $j \in \{1, 2\}$, in the form of a pair (p_j, C_j). We assume that candidates can credibly commit to implement a given policy if they are elected. In designing its offers, the IG considers the constraints imposed by the fact that candidates need not accept a group's offer of support. As mentioned previously, candidates are opportunistic implying that they will accept offers only if these weakly increase their probability of being elected.

Campaign Advertising

The popularity differential perceived by each voter, Q_i includes preferences for the fixed characteristics of each candidate, B_i but can also be influenced by campaign advertising. We assume that the difference between contributions spent on campaign advertising has a positive impact on candidate popularity amongst voters, as defined by the publicly known advertising technology, which we denote $A(\cdot)$. We assume that $A(\cdot)$ is a non-decreasing function of $C_1 - C_2$. In other words, the candidate who outspends the other has a visibility

policy dimension.

advantage.[6] More specifically:

$$Q_i = B_i + A(C_1 - C_2). \tag{3}$$

This setup is equivalent to assuming that voters are concerned about policy but are also impressionable. More specifically, while each voter is aware of the impact that a certain policy stance (both pliable and fixed) has on her utility, campaign advertising has the potential to persuade her that the popularity of a given candidate always has a positive effect on her utility.[7]

Timing

The timing of the game is as follows. In the first stage, the interest group makes a take it or leave it offer simultaneously to each of the two candidates. In the second stage, candidates chose their policy platforms. After the platforms are chosen, campaigns are waged and the election takes place. Finally, the candidate that receives the majority of votes wins the election and implements the policy she committed to enact.

2.1 Electoral Probabilities

Voter i prefers candidate 1 if and only if:

$$B_i + A(C_1 - C_2) - d_v(p_i - p_1) + d_v(p_i - p_2) \geq 0. \tag{4}$$

If voters play undominated strategies then candidate 1 is elected if and only if:

$$B_m + A(C_1 - C_2) - d_v(m - p_1) + d_v(m - p_2) \geq 0, \tag{5}$$

[6] In this setup campaign spending cannot be seen as providing information since it does not play the role of reducing informational assymetries, but directly influences voters' perception of the popularity differential. However, this setup can be seen as a reduced form of the one proposed by Coate (2004) and Gregorini and Pavesi (2011), in which campaigns are directly informative meaning that they contain hard information on the ability of candidates. In these models, only qualified candidates run campaigns and qualification positively effects the utility of all voters.

[7] Assuming that each voter is both rational and impressionable is without loss of generality and simplifies notation. All the results would hold if we assumed that the voting population were composed of two distinct groups: one rational and the other impressionable.

where B_m and m are respectively the fixed and pliable policies preferred by the median voter. Since $\Phi(B_m)$ and m are publicly known, the probability that candidate 1 is elected, which we denote $\pi_1(C_1, C_2)$, is equal to:

$$\pi_1(C_1, C_2) = \Phi[-A(C_1 - C_2) + d_v(m - p_1) - d_v(m - p_2)], \tag{6}$$

where $\pi_2(C_1, C_2) = 1 - \pi_1(C_1, C_2)$. Thus, each candidate's probability of being elected depends on the contributions received and on the policies that both candidates commit to implement if elected.

2.2 Functional Forms

For reasons of tractability, we assume $\Phi(B_m)$ is distributed uniformly with mean $\frac{b}{\phi}$ and density ϕ, where b represents the ex-ante voter bias in favor of candidate 1. We also assume that the advertising function is linear so that $A(C_1 - C_2) = h(C_1 - C_2)$ where $h > 0$ is a parameter that reflects the productivity of campaign spending.[8] Finally we normalize the space of policy preferences by setting $m = 0$.

We therefore obtain the following expression for the probability of electing candidate 1 conditional on the policies announced and contributions received by each candidate:

$$\pi_1(C_1, C_2) = \frac{1}{2} + b + \phi\left[h(C_1 - C_2) - d_v(p_1) + d_v(p_2)\right], \tag{7}$$

$$\text{for } \left(h(C_1 - C_2) - d_v(p_1) + d_v(p_2)\right) \in \left[-\frac{1}{2\phi} + \frac{b}{\phi}, \frac{b}{\phi} + \frac{1}{2\phi}\right].$$

Expression (7) clearly illustrates that by accepting contributions from an interest group, a candidate receives a benefit in terms of popularity if she outspends the other candidate. On the other hand, by enacting policies that are distant from those of the median voter, candidates lose vote shares.

[8] It is worth noting that the empirical literature has analyzed whether the returns to advertising may be different for challengers or incumbents. Gerber (1998) finds no evidence of a significant difference between candidates, while Jacobson (1990) concludes that challengers have higher marginal returns to advertising. Since we focus on the role of preferences, we take a neutral stance and consider the advertising technology to be equally productive for each candidate in line with Gerber (1998).

We denote π_1 as the probability of electing candidate 1 in the absence of contributions:

$$\pi_1 = \phi\left[\frac{1}{2\phi} + \frac{b}{\phi}\right] = \frac{1}{2} + b. \tag{8}$$

Without loss of generality, we assume that candidate 1 has an ex-ante electoral advantage, so that $0 < b < 1/2$ and $\pi_1 \in (1/2, 1)$. It is important to notice that since $A(\cdot)$ is additively separable in its arguments, each party can make its decisions regarding contributions and policies, independently of its knowledge or beliefs about the incentives facing the other candidate. This allows us to abstract from issues related to the fact that the interest group's offers are communicated privately or publicly.

3 Political Equilibrium

A political equilibrium consists of

- a pair of policies $\{p_1^*, p_2^*\}$
- a pair of contributions $\{C_1^*, C_2^*\}$ and
- an electoral probability $\pi_1(C_1^*, C_2^*)$ (where $\pi_2(C_1^*, C_2^*) = (1 - \pi_1(C_1^*, C_2^*))$

such that interest group and candidate strategies must be mutual best responses given voter behavior, and voter behavior must be consistent with interest group and candidate strategies.[9]

As mentioned previously (see Section 2), the single interest group framework represents a suitable reduced form of a model with a multiple number of non-ideological interest groups, such as business sectors or industries. In this setting, the problem can be seen as one of direct control. In other words, the interest group chooses a pair of policies (p_1^*, p_2^*) to maximize its expected profit (or minimize its loss) provided that its contribution offers are sufficiently

[9] The assumption that voters observe the policies chosen by each candidate could be relaxed. In principle, even if policies were unobservable, as long as voters are informed about m, $\Phi(B_m)$, the preferences of the interest group, and those of candidates, they can potentially infer the equilibrium contributions and policies of each candidate.

large to be accepted by the candidates. The $IG's$ offer to each candidate can therefore be represented by the following maximization problem:

$$\underset{(p_j,C_j)_{j\in\{1,2\}}}{Max} -\pi_1(C_1,C_2)d_{IG}(g-p_1)-(1-\pi_1(C_1,C_2))d_{IG}(g-p_2)-C_1-C_2, \tag{9}$$

subject to the following constraints:

$$\begin{aligned} \pi_1(C_1,\cdot) &\geq \pi_1(0,\cdot), \\ \pi_2(\cdot,C_2) &\geq \pi_2(\cdot,0). \end{aligned} \tag{10}$$

This implies that each candidate must be weakly better off accepting than refusing the offer. If the candidate refuses the offer, she always prefers to choose the policy preferred by the median voter, m, as this maximizes her vote share in the absence of contributions.

Given this behavior, the IG must offer the candidate a level of contributions that guarantees her at least the same electoral probability that she would obtain by refusing the offer and choosing m. The participation constraints (10) for each candidate j can therefore be rewritten in the following way:

$$C_j^* \geq \frac{d_v(p_j^*)}{h}; \forall j \in \{1,2\}. \tag{11}$$

Intuitively, if a candidate chooses a policy that is different from that preferred by the median voter, this reduces her electoral odds. The interest group must therefore finance electoral campaigns in order to increase the candidate's popularity, and compensate her for the loss in voter support that comes from providing policy favors.

If contributions are exclusively *influence* motivated, the interest group provides each candidate with exactly the amount of contributions that are strictly necessary to convince each of them to adopt policies p_1^* and p_2^*, respectively. This implies that the participation constraint is binding, and the IG induces each party to behave as if it was selecting a policy that is a weighted average of the policy preferred by the interest group, and the one preferred by the median voter:

$$p_j^* = \arg\max_{p_j} \left[-(\pi_j)\, d_{IG}(g-p_j) - \left(\frac{1}{h}\right) d_v(p_j) \right]; \forall j \in \{1,2\}. \tag{12}$$

From the first order conditions of the interest group's maximization problem with respect p_j^*, we have:

$$\pi_j h = \frac{d_v^{'}(p_j^*)}{-d_{IG}^{'}(g - p_j^*)}; \forall j \in \{1, 2\}. \tag{13}$$

Given that $d_v(\cdot)$ and $d_{IG}(\cdot)$ are strictly increasing in their domain, we obtain that p_j^* is an increasing function of g and π_j. Since the IG may potentially finance campaigns also for *electoral* motives, the participation constraint (11) may not necessarily be binding. This implies that $\frac{\partial C_j^*}{p_j^*} \geq 0$, from which it follows immediately that C_j^* is always weakly increasing in g and π_j.

Proposition 1 *For each candidate $j \in \{1, 2\}$, equilibrium contributions C_j^* are weakly increasing in both interest group preferences, g, and in the ex-ante electoral probability, π_j, of candidate j.*

We therefore obtain that contributions to both candidates will be greater, the more extreme are the policy preferences of the interest group. Moreover, p_1^* and p_2^* are increasing functions of the preferred policy of the interest group and of the ex-ante probability of electing their respective candidate. It follows that whenever $\pi_1 > \pi_2$ we have that $p_1^* > p_2^*$ and $C_1^* > C_2^*$. Candidates that have an ex-ante electoral advantage will adopt policies that are closer to those of the interest group (and farther from those of the median voter) and will receive more conspicuous contributions.

In the appendix, we show that this result holds for a general class of advertising technologies. Moreover, it is important to notice that Proposition 1 applies independently of the $IG's$ motives (electoral or influence) for financing candidates. However, when only the influence motive holds, C_j^* is strictly increasing in g and π_j.

In the next section, we spell out the empirical implications of the model in order to test if our theory is consistent with the data on campaign finance. Before doing so, we briefly address the issue of split contributions.

3.1 Split Contributions

We now analyze the relationship between interest group preferences and the share of contributions allocated to each candidate (split contributions). Notice that g may affect the

allocation of contributions if IG preferences have an effect on electoral motives. Indeed, if electoral motives apply, an interest group will allocate a greater share of contributions to one candidate in order to enhance her electoral prospects. Here, we illustrate that there is no clear relation between interest group preferences and the motives for financing candidates, and therefore no clear effect of g on split contributions.

First of all, it is important to notice that the ex-ante advantaged candidate receives a greater amount of contributions and adopts a policy that is closer to the preferences of the interest group (i.e., $p_1^* > p_2^*$), independently of whether her chances of being elected increase as a result of campaign financing. This implies that the only party that may receive additional campaign support to enhance her electoral odds is the ex-ante more advantaged one.

To see this, we consider a more general advertising technology that exhibits weakly decreasing marginal returns to contributions:

$$A(C_1 - C_2) = h(C_1) - h(C_2), \tag{14}$$

where $h(\cdot)$ is a function such that $h'(\cdot) > 0$ and $h''(\cdot) \leq 0$. Candidate j will receive more contributions than those required to induce her to adopt the preferred policy of the interest group only if the expected marginal benefit from the first additional unit of contributions is greater than the marginal cost which is equal to 1. That is,

$$\phi h'(\widehat{C}_j)[d_{IG}(g - p_{-j}^*) - d_{IG}(g - p_j^*)] > 1, \tag{15}$$

where p_j^*, p_{-j}^* and $\widehat{C}_j$ are respectively the equilibrium policies of candidate j and $-j$, and the minimum contributions that the interest group must provide to obtain the equilibrium policy from candidate j. Since $p_1^* > p_2^*$, the left hand side of inequality (15) is positive only for $p_j^* = p_1^*$, implying that only the candidate with an ex-ante advantage can potentially receive contributions for electoral motives.

In practice, the interaction between the impact of an additional unit of contributions on popularity $\phi h'(\widehat{C}_1)$ and the distance between the optimal policies, $(p_1^* - p_2^*)$ determines whether the electoral motive applies or not. From Proposition 1 we know that p_1^* and p_2^* are increasing in g, and as p_1^* increases, contributions $\widehat{C}_1$ will also rise. Therefore, when the advertising technology is (weakly) concave, the marginal impact of contributions on vote

share, $\phi h^{'}(\widehat{C}_1)$ will (weakly) decline.[10] However, the effect of interest group preferences on the distance between equilibrium policies is uncertain.[11] The impact of preferences on interest groups' incentives to finance campaigns for electoral motives is therefore undetermined.

This suggests that the empirical analysis may provide some guidance in verifying the significance and magnitude of this effect. If g systematically affects electoral motives and if the resulting impact on contributions is significant, we should observe a relevant impact of g on the share of contributions awarded to each candidate.

4 Empirical Implications

In this section, we analyze how variations in the key parameters of the model, g and b may influence campaign contributions in order to obtain testable empirical implications.

For this purpose we denote S as the split contribution index, which we define in the following way:

$$S = 1 - \frac{C_1}{C_1 + C_2} \tag{16}$$

where $S \in [0, 0.5)$, and $S = 0$ denotes single contributions, while $S = 0.5$ represents the case where each candidate receives an equal amount of funding. We continue to denote candidate 1 as the candidate with an electoral advantage (i.e., $b > 0$).

The empirical implications we obtain follow directly from Proposition 1:

Result 1 *Contributions C_1 and C_2 are weakly increasing in interest group preferences, g.*

This is an immediate consequence of the fact that an interest group with more extreme policy preferences will obtain a policy that is farther from the bliss point of the median voter, but will have to pay a higher price.

[10] If we consider the multiple interest group setting presented in the appendix, the marginal impact of contributions on vote share for each candidate is very likely to be small. This is because assuming that there are K interest groups, in this case $A(\cdot) = h(\mathbf{C}_1) - h(\mathbf{C}_2)$ where $\mathbf{C}_j = \sum_k C_j^k$, and $\phi h^{'}(\mathbf{C}_j)$ depends on total contributions. Therefore, when the advertising techology is concave each $IG's$ possibility of affecting the electoral outcome is limited.

[11] More formally, the sign of $\frac{\partial[d_{IG}(g-p^*_{-j})-d_{IG}(g-p^*_j)]}{\partial g}$ depends on the specific functional forms adopted for $d_v(\cdot)$, $d_{IG}(\cdot)$ and $A(\cdot)$.

Result 2 *(i) Contributions $C_1(C_2)$ are weakly increasing (decreasing) in the electoral advantage b;*

and

(ii) The split contributions index, S is weakly decreasing is in the ex-ante electoral advantage b.

This result is consistent with the view that campaign contributions can be seen as investments. The cost of contributions is increasing in the ex-ante probability of winning of each candidate, which represents the expected return on contributions. Since b captures the ex-ante electoral advantage of one candidate over the other, an increase in b represents a decrease in the electoral uncertainty. As uncertainty falls, the gap between contributions widens generating a lower level of split contributions (S decreases).

Result 3 *In a given electoral race, contributions of each interest group do not depend on the contributions of the other interest groups.*

This is a distinctive empirical implication of our model and derives from the fact that if interest groups are non-ideological and lobby over particularistic policies, there is no direct competition between groups. Therefore, the levels of contributions of each IG should not be affected by the number and distribution of interest groups that are active in given electoral race.

These three results provide testable empirical implications of our model.

5 Empirical Analysis

In the previous sections, we developed a model in which the amount of contributions that a candidate receives from a certain interest group depends on the candidate's ex-ante probability of election and on the policy preferences of the IG. In this section, we seek to assess the empirical implications of the model. In order to do so, we make use of both a parametric and a semi-parametric analysis. The main advantage of this approach is that, given our general model, we do not impose any *aprioristic* functional form, allowing for the data to reveal the shape of our functions.

5.1 Methodology

According to our theoretical model, contributions to each candidate j from interest group s, denoted by c_{js}, depend on the policy preferences of the interest group, g_{js}, and on the candidate's probability of election, π_{js}.[12] Naturally, the ex-ante electoral probabilities are unobservable. Therefore, based on the results obtained by Levitt (1994), we use the observable variable on vote shares as a proxy for the ex-ante probability of election. In his paper, Levitt carries out a panel data analysis to measure the impact of campaign contributions on vote shares. He concludes that campaign spending has an extremely small impact on election outcomes. This is the same idea adopted by Pettersson-Lidbom (2001) and Bombardini and Trebbi (2011). In a study on the strategic use of debt under electoral campaigns, Pettersson-Lidbom proxy the probability of electoral defeat with the ex-post election outcome. Similarly, Bombardini and Trebbi inversely approximate the ex-ante electoral uncertainty with the ex-post vote margins. Finally, notice that contributions are at the industry level, however, we use an index of sectoral extremism to proxy industrial extremism. That is, we are assuming that industries' political preferences are more homogenous within sectors than among sectors.

According to Results 1 and 2, there is a positive relationship between our explanatory variables and c_{js}. To detect the nature of this relationship, we first estimate a simple log-linear model.[13] That is, we estimate the following specification:

$$\log c_{js} = \alpha + \beta \log g_{js} + \gamma \log \pi_{js} + \varepsilon_{js}. \tag{17}$$

Here, α represents a constant term, whereas β and γ are the elasticity coefficients of contributions with respect to the extremism index and the vote share, respectively.

On the basis of the Hausman test and the Breusch-Pagan Lagrangian multiplier test, we estimate a simple pooled regression model.[14]

In order to see whether competition among interest groups affects contribution levels,

[12] The suffix s denotes the industry, as the equation is estimated considering the contribution of each interest group belonging to a certain industry. Since vote shares are the same for every interest group, for each race and each candidate we have s repetitions of variable π_j.

[13] Logarithms allow us to mitigate problems of scaling due to the fact that contributions are of a greater magnitude with respect to the vote share variable.

[14] The p-values for the Hausman and the Breusch-Pagan test are 0.30 and 1.00, respectively.

we consider the number of industries represented in each district. Considering Result 3, we expect this variable to have no significant effect on contribution levels, meaning that each industry's contributions should be independent of those of the other industries that finance campaigns in a given district. This also represents a good test to evaluate whether an analysis at the industry level is consistent with our theoretical model.

As a robustness check, we control for two important sectoral characteristics: the share of workers employed and value-added. These two variables can potentially affect how voters perceive the extremism of an interest group, and therefore either reduce or increase the amount of resources that an interest group must devote to campaign financing. For instance, one can argue that, at the district level, workers might consider the sector in which they are employed to be less extreme than others simply because their opinion is biased.[15] In this case, our extremism index would fail to capture the sectoral extremism as perceived in a specific district. At the same time, voters can consider high-value added sectors as better employment opportunities reducing their perception of the sector's degree of extremism, thus reducing the amount of contributions that an interest group must pay to obtain voters' support. Obviously, other possible channels can explain why the effects of these two control variables on contribution levels, could go in the opposite direction. For example, high value added sectors may offer more generous contributions simply because they have a greater amount of disposable funds.

After having estimated Equation (17), we extend our analysis by considering a quantile regression technique, where each coefficient captures the impact of the regressor on the τ-th conditional quantile of the response variable. Formally, we estimate the following equation:

$$Q_{\log c_{js}}(\tau|g_{js}, \pi_{js}) = \alpha(\tau) + \beta(\tau) \log g_{js} + \gamma(\tau) \log \pi_{js} + \varepsilon_{js}. \tag{18}$$

In this way, we can detect the existence of nonlinear effects of our explanatory variables on contributions to each candidate j, from group s.[16] One advantage of using this technique is that regressions will be more robust in response to large outliers. Therefore, we obtain

[15] Workers should favorably view the lobbying effort of their corresponding interest groups, if their interests are aligned.

[16] We used a variant of the Barrodale and Roberts (1974) simplex algorithm described in Koenker and d'Orey (1987). This algorithm is quite efficient for problems up to several thousand observations. Following Koenker (1994), confidence intervals are obtained by inverting a rank test.

a more comprehensive parametric analysis. It may be useful to recall that the quantile regression intercept is a prediction of the τ-th quantile of contributions for candidates with mean values of the covariates.

Finally, given our results on $\gamma(\tau)$, we also run a semiparametric regression in which the ex-ante probability of election enters the nonparametric part of the equation. That is, we estimate the following Generalized Additive Model (GAM):

$$\log c_{js} = \alpha + \beta \log g_{js} + \log f(\pi_{js}) + \varepsilon_{js} \tag{19}$$

or

$$\log c_{js} = \alpha + \beta \log g_{js} + \widetilde{f}(\pi_{js}) + \varepsilon_{js}, \tag{20}$$

where function $\widetilde{f}(\pi_{js})$ represents the nonparametric term and is *a priori* unknown. Another advantage of Equation (20) is that we can test whether the inclusion of a nonlinear term influences the magnitude of β. Following Wood (2006), we estimate Equation (20) by iteratively re-weighted least squares, where the smooth term $\widetilde{f}(\cdot)$ is obtained by using a quadratically penalized GLM in which the appropriate degree of smoothness is determined by Generalized Cross Validation (GCV).[17] For the sake of completeness, we also estimated a GAM in which both the extremism index and the ex-ante probability can interact in a nonlinear way; however, we did not find important interaction effects between the two variables. This means that Equation (20) is sufficiently general to capture all possible nonlinearities.

Finally, at the end of the section, we repeat the previous analysis by using the split index defined in Section 4 as the dependent variable. This will allow us to validate point (*ii*) of Result 2.

5.2 Data

The sample we use in the analysis consists of 466 observations from the U.S. House elections between 2000 and 2004 in 17 districts. These districts represent 4% of statewide seats, but approximately 15% of total contributions.[18] To create a representative data set, we chose

[17] See Hastie and Tibshiran (1986, 1990) for the associated inference.

[18] Notice that the number of observations per year is comparable with that of other studies (see, e.g., Jacobson, 1990).

the most expensive races and selected the top industry contributions for each district.[19] Furthermore, we considered both incumbent and open seat elections, since as observed by Snyder (1990) empirical predictions may differ in these different types of elections.

Incumbent elections are typically lopsided because one candidate is better known and therefore presumably has an electoral advantage. In principle, in elections where one candidate is very likely to win, she may not maximize contributions, and hence not promise the maximum number of political favors. In close races instead, candidates may try to exploit the full potential of contributions by offering as many favors as possible. Nevertheless, when we include a dummy variable to control for incumbent elections, this differential behavior does not emerge.[20]

The main data was gathered from three different sources: the Federal Election Commission (FEC), for data on incumbent versus open seat elections; the Center for Responsive Politics, for data on the top industry contributors for each election, and the Gallup polls to create an index of relative extremism of policy preferences for each business sector.[21] Data on sectoral value added comes from the aggregation of Annual Industry Accounts, an annual series provided by the Bureau of Economic Analysis, and we used the 2004 NAICS data set. Finally, the source for the data on industry employment is the Country Business Patterns database, an annual series published by the U.S. Census Bureau.[22]

As specified above we concentrate on business interest groups. The underlying idea is that these interest groups finance politicians in order to ply policies towards their preferences, and are not concerned about the fixed policies (or ideology) of candidates.

An innovative aspect of this study comes from identifying an empirical proxy for the policy preferences of interest groups. This was done by attributing an extremism index to each business sector based on voter perceptions. The index was constructed by classifying the replies over a five year period ($2001 - 2005$) on the following question taken from the Gallup

[19] See the appendix for the descriptive statistics of the data set and the sector classification criteria.

[20] This finding is consistent with Snyder (1990), where he finds that only in very lopsided elections (over 85 percent probability of winning of one candidate) do politicians tend to accept fewer contributions.

[21] Data for top contributors includes the top 50 industries that contributed to congressional candidates (i,e., hard money) in three electoral cycles (2000, 2002, 2004) as reported by the Federal Elections Comittee (FEC). It includes both PAC (Political Action Committee) contributions and individual contributions above 200$. While PAC money is easy to classify by industry, individual contributions to candidates and parties are classified based on employer/occupation data reported by the donor.

[22] Data is aggregated at the congressional district level using the MABLE-Geocorr software. We further aggregated it at the national level, in order to have a variable comparable with the extremism index.

Polls: "For each of the following business sectors in the United States, please say whether your overall view of it is Very positive, Somewhat positive, Neutral, Somewhat negative, or Very negative". The extremism index is based on the Gallup index for classifying responses taking the average percentage of replies over the five years and generating an index for each sector:

$$\begin{aligned} I_s \;=\; & \left[\frac{1}{5}\sum_{t=2001}^{2005}(\text{very positive }\%)_t\right] + w\left[\frac{1}{5}\sum_{t=2001}^{2005}(\text{positive }\%)_t\right] \\ & + \left[\frac{1}{5}\sum_{t=2001}^{2005}(\text{neutral }\%)_t\right] - w\left[\frac{1}{5}\sum_{t=2001}^{2005}(\text{negative }\%)_t\right] \\ & - \left[\frac{1}{5}\sum_{t=2001}^{2005}(\text{very negative }\%)_t\right]. \end{aligned}$$

The criterion for using the five year average is because it seems reasonable to assume that policy preferences are invariant over time. In order to test for robustness, we allowed for different weights, w, to be assigned to the positive and negative replies. Varying w from $1/2$ to 1 reduces the relative impact of the more extreme responses. However, our estimates do not change substantially when we modify the value of w, confirming the robustness of our findings.

It is important to notice, that we consider the effect of interest group preferences at the national level, on district level contributions. As mentioned previously, one can argue that workers might consider the sector in which they are employed to be less extreme than others, simply because they favorably view their employer. However, if workers' opinions were biased in this direction, we should observe a strong and negative correlation between the share of workers employed in a given sector and the extremism index of that sector even at the national level. This correlation is small and positive (0.24).[23] Thus, we can reasonably claim that workers employed in a given sector do not consider interest groups in their same sector to be operating on their behalf. This claim is confirmed by the fact that

[23]Note that our approach is complementary to the one adopted by Bombardini and Trebbi (2011) that consider the effect of the share of employees in a given sector, on the level of contributions of the same sector at the district level. Since we find little correlation between g and the share of employees, this implies that our extremity variable is measuring a distinct effect.

our extremism index plays a significant role in House elections at the district level, even if it is measured at the national level.

5.3 Results

Our first task is to test whether our explanatory variables affect the contribution levels observed in electoral campaigns. Table 2 reports our estimates for the baseline model described by (17).

Table 2: Results for Eq. (17)

Dependent variable: Ln_Contribution				
Main Variables				
Intercept	11.86***	12.20***	11.68***	12.05***
	(0.349)	(0.389)	(0.464)	(0.497)
Ln Index	0.28***	0.23***	0.28***	0.23***
	(0.075)	(0.079)	(0.075)	(0.079)
Ln Probability	3.99***	3.99***	3.98***	3.99***
	(0.255)	(0.254)	(0.255)	(0.254)
Control Variables				
Value added	–	Y_-^*	–	Y_-^*
Number of IGs	–	–	Y_+	Y_+
Obs	466	466	466	466
R-sq.(adj)	0.355	0.360	0.355	0.359
Std. error in parenthesis.				
***, **,* significance level at 1%, 5% and 10%, respectively.				

The intercept appears to have a relatively high positive value. The coefficients of g and π are both positive and statistically significant, confirming Result 1 and point (i) of Result 2, respectively. The most prudent estimate of β is 0.23. This means that a 1 percent increase of the extremism index is associated with a 0.23 percent increase in the contributions paid by an interest group. However, the coefficient on the extremism variable is of a lower magnitude with respect the coefficient on the vote share, indicating that in any case, the ex-ante probabilities of election play a major role in determining contribution levels. We

find that $\gamma = 3.99$, so that increasing the ex-ante electoral advantage by 1 percent increases contributions by 3.99 percent. Finally, our estimates are robust to the inclusion of potentially relevant covariates. The only additional factor that seems to play a (negative) role on the contribution level is value added, but its magnitude is almost negligible. This means that the extremism index we use is not a proxy for other important sectoral characteristics. We also controlled for the size of the sector (in terms of number of employees), however, this control is weak and its effect is completely captured by the inclusion of value added. The coefficient on the number of contributing IGs in each district is not statistically different from zero. That is, Result 3 is confirmed by a linear regression model, and the contribution level of each industry is not influenced by the behaviour of other industries.

Figure 1 generalizes the previous analysis, showing the coefficient plots for Equation (18), that is, our quantile regression. The figure reports the values of coefficients $\alpha(\tau)$, $\beta(\tau)$, and $\gamma(\tau)$ corresponding to the τ-th quantile of c_{js}.

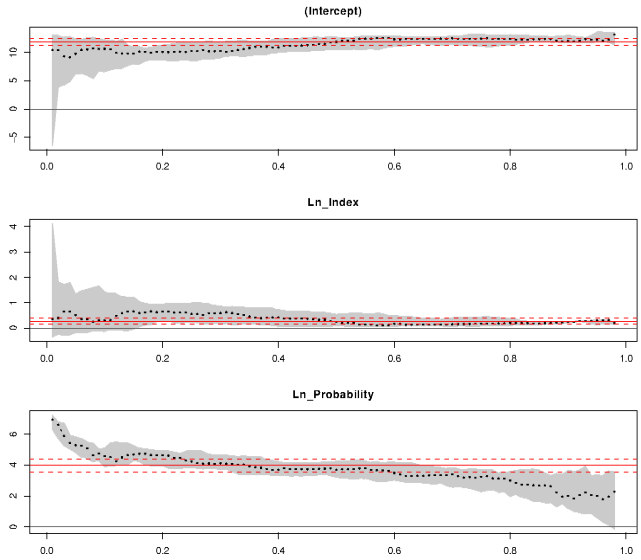

Figure 1: Quantile regressions on contribution levels

We can summarize the results of the quantile regression as follows. First, we cannot reject the hypothesis that the value of $\beta(\tau)$ remains the same along the distribution of our dependent variable. The intercept seems to rise when the contribution level grows. However, this tendency does not appear relevant enough to change our specification. Therefore, we will

continue to use a linear specification for both the extremism index and the constant term. Second, the impact of the ex-ante probability of election on contributions changes along the distribution of our dependent variable. More precisely, the marginal impact of π_{js} is lower, for higher levels of contributions, capturing the idea of decreasing returns to electoral probabilities. This means that the electoral advantage affects the contribution levels in a nonlinear way. This evidence further justifies the use of a semiparametric estimation method. In any case, the validity of Results 1, 2 and 3 is confirmed along the entire distribution of c_{js}. On the contrary, the coefficient of the value added becomes significant only for the highest two deciles.

Table 3 presents the estimates for Equation (20), where NP denotes that the variable enters the nonparametric part of the equation. By conducting an F-test, we reject the hypothesis of a linear effect of π_{js} on c_{js} at 1% level of confidence.

Table 3: GAM results for Eq. (20)

Dependent variable: Ln_Contribution				
Main Variables				
Intercept	8.96^{***}	9.38^{***}	8.80^{***}	9.23^{***}
	(0.272)	(0.314)	(0.396)	(0.426)
Ln Index	0.27^{***}	0.20^{***}	0.27^{***}	0.20^{***}
	(0.069)	(0.073)	(0.069)	(0.073)
Probability	NP^{***}	NP^{***}	NP^{***}	NP^{***}
Edf	(8.58)	(8.61)	(8.59)	(8.62)
Control Variables				
Value Added	–	Y_{-}^{***}	–	Y_{-}^{***}
Number of *IGs*	–	–	Y_{+}	Y_{+}
Obs	466	466	466	466
R-sq.(adj)	0.448	0.456	0.447	0.455
GCV-score	1.254	1.240	1.259	1.245

Std. error in parenthesis.

***, **,* significance level at 1%, 5% and 10%, respectively.

Edf (Estimated degree of freedom).

In Table 3, we can see that the use of a semiparametric technique always reduces the magnitude of the intercept. This means that our non-linear specification partially reduces the value of the intercept previously estimated. Also the magnitude of β slightly decreases when we use a GAM. Nonetheless, Result 1 still holds. The coefficient of the extremism index ranges from 0.20 to 0.27. Again, the number of IGs does not influence contribution levels, confirming the validity of Result 3. As for the baseline model, results presented in Table 3 are robust to the inclusion of some relevant control variables. In particular, the sectoral value added slightly reduces the effect of g on c.

The nonparametric components of Equation (20) are shown in Figure 2. The horizontal and vertical axes respectively display the ex-ante electoral probability, and the response of contributions (on the scale of the linear predictor). The relationship between the probability of election and the amount of contributions is clearly nonlinear. Specifically, considering the width of the confidence intervals, $\widetilde{f}(\pi_{js})$ can be approximated by a concave or a logistic function. This specification provides the best fit with respect to previous specifications and is perfectly consistent with our quantile regressions.

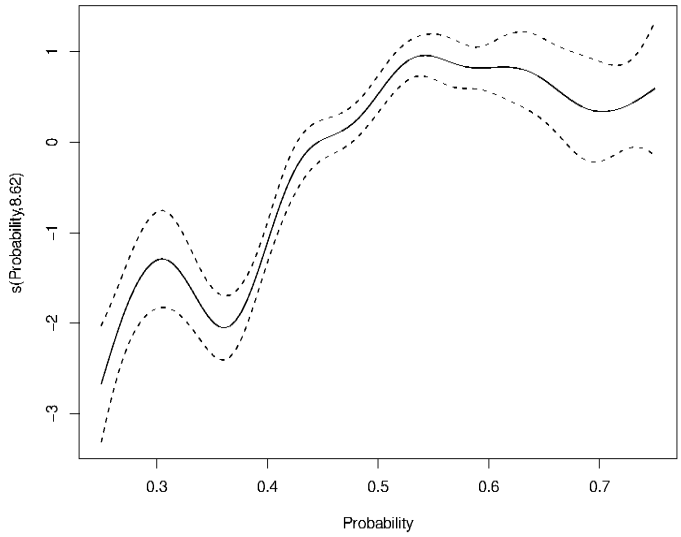

Figure 2: Nonparametric components of GAMs

Figure 3 shows our quantile regressions when we consider the split index as the dependent variable. According to this figure, the coefficient of the ex-ante probability is always negative

and significant, confirming point (ii) of Result 2. At the same time, the extremism index does not affect the split index.[24] This provides evidence that even if interest groups finance a given candidate to enhance her electoral odds, these electoral motives do not significantly affect the difference between the contributions allocated to each candidate. Both a parametric and a semiparametric analysis confirm the results reported in Figure 3.

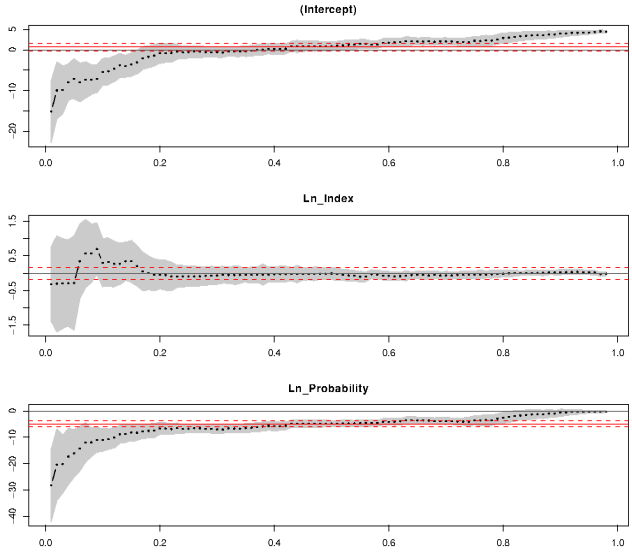

Figure 3: Quantile regressions for the split index

6 Conclusion

Starting from the main stylized facts on campaign financing by business interest groups, we proposed and tested a theoretical model in which campaign contributions depend both on the candidates' ex-ante popularity and on interest group preferences. According to our model, contributions are always increasing in the distance between interest group preferences, and the median voter's preferred policy. Therefore, the amount of money spent on political campaigns depends on interest group extremism. The intuition behind this result is rather

[24] In order to obtain the confidence intervals, we attempted to estimate a sandwich form of the asymptotic covariance matrix. However, negative estimates resulted because of crossing of the neighboring quantile surfaces used to compute the difference quotient estimate. This may be due to the presence of further nonlinearities in the relationship we are estimating. Therefore, we decided to use a bootstrap method.

straightforward: the amount of contributions that a lobby is willing to pay, must at least recover the popularity lost by a candidate in supporting its positions.

Our theoretical model delivers the following of testable empirical implications. First, contributions are weakly increasing in the preferences represented by an interest group, as well as in the ex-ante electoral probability. Second, in a given electoral race, contributions of each non-ideological interest group do not directly depend on the contributions of other groups. In other words, competition between interest groups does not play a role.

Using a new data set on U.S. House elections in 17 districts, we have seen that parametric and semi-parametric analyses confirm the previous results. In particular - by taking a neutral stance, absent any assumptions on the functional forms – we detected a positive effect of extremism on the amount of contributions, and a positive nonlinear relationship between each candidate's ex-ante probability of election and the total amount of contributions. Our empirical analysis also confirms that competition between sectors is weak, suggesting that it may be reasonable to conclude that each interest group is not driven by ideology, and is exclusively concerned about particularistic policies. We applied the same techniques to the relative distribution of contributions between candidates, finding evidence that interest group preferences have no effect on the share of contributions allocated to competing candidates. Thus, preferences are not relevant in determining an interest group's incentives to influence the electoral outcome.

Industry level preferences therefore play an important role in determining political participation through campaign contributions. In simple terms, it is reasonable to conclude that business interests make their campaign financing decisions by combining national and local considerations in the following way. Local factors may effect both the allocation of funds to single congressional districts, as well as the share of these that are attributed to each candidate based on electoral odds. However, campaign finance budgets appear to be determined nationally on the basis of policy positions that are business specific.

Appendix

A Model of Campaign Finance with Multiple Non-Ideological Interest groups

Each voter has a preferred pliable policy $p_i^n \in \Re$ for each of the n dimensions of the policy space, which is weakly increasing in i. Let $e \in \{1, 2\}$ denote the candidate who wins the election, where $\mathbf{p}_j \in \Re^n$ is the vector of policies chosen by candidate j. We assume that voters observe the policies chosen by each candidate. We denote $Q_i \in \Re$ as the popularity differential that candidate 1 has over candidate 2, for voter i. The utility of voter i is:

$$U_i(e, Q_i, \mathbf{p}_1, \mathbf{p}_2) = \begin{cases} Q_i - \sum_n d_v(p_i^n - p_1^n) & \text{if } e = 1 \\ -\sum_n d_v(p_i^n - p_2^n) & \text{if } e = 2 \end{cases} \tag{A1}$$

where $d_v(\cdot)$ is increasing in $\mid p_i^n - p_e^n \mid$, and captures the fact that voters derive less utility from policies that are farther from their bliss point in each dimension n of the policy space. We assume that voters' preferences satisfy the single crossing property so that there exists a median voter with a vector of policy preferences $\mathbf{m} \in \Re^n$.

Besides the policy $\mathbf{p}_j$ that candidates can choose, each candidate also has certain fixed characteristics such as ideology or charisma. Candidates know the pliable policy preferences of the median voter $\mathbf{m}$, and they know that the fixed policy preferences of the median voter B_m are drawn from a known random distribution $\Phi(B_m)$.

We therefore reasonably assume that there is at most one interest group for each policy dimension n, since each group does not face direct competition over its relevant policy dimension. We denote k as the number of interest groups where $k \leq n$. The fact that the interest groups are non-ideological implies that each group does not have a preference for the fixed characteristics of one candidate or the other. In other words, $B_{IG}^k = 0$ for every k and this is common knowledge.

Each interest group leader can be seen as the representative of a subset of voters regarding the policy dimension. The group leader maximizes the policy component of the utility of the median group member g^k. We assume that $g^k > m^k$ for every k.

Contributions made to each candidate, which we denote C_1^k and C_2^k respectively, are assumed to be non-negative, meaning that the interest group can offer funding to politicians

but cannot receive money from them. We also denote $\mathbf{C}_1$and $\mathbf{C}_2$ as the total contributions received by each candidate. Each group's payoff is assumed to be separable in contributions and policy. When candidate e is elected the payoff of interest group k is:

$$U_{IG}^k = -d_{IG}(g^k - p_e^k) - C_1^k - C_2^k, \tag{A2}$$

where $d_{IG}(\cdot)$ is increasing in the distance between g^k and p_e^k for each policy dimension k. Each interest group makes take it or leave it offers to candidates $j \in \{1, 2\}$ in the form of a pair (p_j^k, C_j^k). We assume that the difference between contributions spent on campaign advertising has a positive impact on candidate popularity amongst voters as defined by the advertising technology, $A(\cdot)$, which is a non-decreasing function of $\mathbf{C}_1 - \mathbf{C}_2$. In other words, the candidate who outspends the other has a visibility advantage. More specifically:

$$Q_i = B_i + A(\mathbf{C}_1 - \mathbf{C}_2). \tag{A3}$$

We normalize the space of policy preferences by setting $m^n = 0$ for each n, and assume that $A(\mathbf{C}_1 - \mathbf{C}_2) \equiv h(\mathbf{C}_1 - \mathbf{C}_2)$ where h is a constant.

We therefore obtain the following expression for the probability of electing candidate 1 conditional on the policies announced and contributions received by each candidate:

$$\pi_1(\mathbf{C}_1, \mathbf{C}_2) = \frac{1}{2} + b + \phi \left[h(\mathbf{C}_1 - \mathbf{C}_2) - \sum\nolimits_n d_v(p_1^n) + \sum\nolimits_n d_v(p_2^n) \right], \tag{A4}$$

$$\text{for } \left(h(\mathbf{C}_1 - \mathbf{C}_2) - \sum\nolimits_n d_v(p_1^n) + \sum\nolimits_n d_v(p_2^n) \right) \in \left[-\frac{1}{2\phi} + \frac{b}{\phi}, \frac{b}{\phi} + \frac{1}{2\phi} \right].$$

We denote π_1^{-k} as the probability of electing candidate 1 in the absence of contributions from interest group k:

$$\pi_1^{-k} = \phi \left[\frac{1}{2\phi} + \frac{b}{\phi} + h \left(\sum\nolimits_{l \neq k} C_1^l - \sum\nolimits_{l \neq k} C_2^l \right) \right], \tag{A5}$$

without loss of generality we assume that $0 < b < 1/2$ so that candidate 1 has an electoral advantage.

A political equilibrium consists of

- a pair of policies $\{p_1^{n*}, p_2^{n*}\}$ for each n
- a pair of contributions $\left\{C_1^{k*}, C_2^{k*}\right\}$ for each interest group k
- an electoral probability $\pi_1(\mathbf{C}_1^*, \mathbf{C}_2^*)$ (where $\pi_2(\mathbf{C}_1^*, \mathbf{C}_2^*) = (1 - \pi_1(\mathbf{C}_1^*, \mathbf{C}_2^*))$

such that interest group and candidate strategies must be mutual best responses given voter behavior, and voter behavior must be consistent with interest group and candidate strategies.

The $IG's$ offer to each candidate can therefore be represented by the following maximization problem:

$$\underset{(p_j^k, C_j^k)_{j\in\{1,2\}}}{Max} \; -\pi_1(\mathbf{C}_1, \mathbf{C}_2) d_{IG}(g^k - p_1^k) - (1 - \pi_1(\mathbf{C}_1, \mathbf{C}_2)) d_{IG}(g^k - p_2^k) - C_1^k - C_2^k, \quad \text{(A6)}$$

subject to the following constraints:

$$\begin{aligned} \pi_1(\mathbf{C}_1, \cdot) &\geq \pi_1(\textstyle\sum_{l\neq k} C_1^l, \cdot), \quad \text{(A7)} \\ \pi_2(\cdot, \mathbf{C}_2) &\geq \pi_2(\cdot, \textstyle\sum_{l\neq k} C_2^l). \end{aligned}$$

In other words, each candidate must be weakly better off accepting than refusing the offer. If the candidate refuses the offer from interest group k, she always prefers to choose the policy preferred by the median voter, $m^k = 0$ as this maximizes her vote share in the absence of contributions from interest group k. Each candidate naturally chooses policy $m^n = 0$ for all policy dimensions for which there is no active interest group.

Given this behavior, the IG must offer the candidate a level of contributions that would guarantee at least the same electoral probability that the candidate would obtain, by refusing the offer and choosing $m^k = 0$ for every k. The participation constraints for each candidate j are therefore:

$$C_j^{k*} \geq \frac{d_v(p_j^{k*})}{h}. \quad \text{(A8)}$$

Thus, if the IGs finance candidates only to affect policy (*influence motives*), each group k induces both parties to adopt a policy p_j^{k*} that is a convex combination of the policy preferred

by the median interest group member and that preferred by the median voter:

$$p_j^{k*} = \arg\max_{p_j}[-\left(\pi_j^{-k}\right) d_{IG}(g^k - p_j^k)^2 - \left(\frac{1}{h}\right) d_v(p_j^k)], \tag{A9}$$

from the first order conditions of the interest group's maximization problem with respect p_j^{k*} we have:

$$\pi_j^{-k} h = \frac{d_v'(p_j^{k*})}{-d_{IG}'(g^k - p_j^{k*})}, \forall j \in \{1, 2\}. \tag{A10}$$

Since $d_v(\cdot)$ and $d_{IG}(\cdot)$ are strictly increasing in their domain, we obtain that p_j^{k*} is an increasing function of g^k and π_j^{-k}. Given the participation constraint (A8), this implies that $\frac{\partial C_j^{k*}}{p_j^{k*}} \geq 0$, from which it follows immediately that C_j^{k*} is also weakly increasing in g^k and π_j^{-k}.

The nature of the equilibrium is such that when $b > 0$ we cannot rule out the case in which $\pi_1^{-k} < 1/2$, in other words the ex-ante advantaged candidate receives less contributions than her opponent and sees her electoral probability reduced. With a similar argument as the one suggested by Grossman and Helpman (1996), it is easy to show that any such equilibrium is Pareto dominated by any equilibrium in which $\pi_1^{-k} > 1/2$

Proof. Suppose the equilibrium is characterized by $b > 0$ and $\pi_1^{-k} < 1/2$. A new equilibrium can be constructed as follows. In the new equilibrium, let each IG offer to candidate 2 exactly what it offered to candidate 1 in the previous one. Let each interest group make its new offer to party 1 by subtracting a fixed amount from the offers to party 2 in the old equilibrium, plus an additional amount that increases with the distance from the initial policy, p_2^{k*}. Now, let these fixed reductions be chosen so that candidate 1 obtains the same electoral probability in the new equilibrium as party 2 did in the old, and let the additional reductions be chosen, so that parties will not decline offers from any interest group in selecting their policy vector. These new contribution offers are best responses to one another, and they induce each party to choose a new equilibrium platform that is the same as the one her opponent chose in the old equilibrium. Since each candidate has the same electoral probability in the new equilibrium as the other candidate had in the old, the new equilibrium has exactly the same distribution of policy outcomes as the old. Thus, all interest groups gain. ■

Generalization of Proposition 1 for Concave Advertising Technology

We show that for any strictly increasing functions $d_v(p_i - p_j)$ and $d_{IG}(g - p_j)$ and any (weakly) concave advertising technology, C_j is always weakly increasing in g and π_j.

Concave Technology ($A(\cdot) = (h(C_1) - h(C_2)$ where $h'(C_j) > 0$ and $h''(C_j) \leq 0$ for each candidate j)

In this case the participation constraint is:

$$C_j \geq \gamma[d_v(p_j)], \tag{A11}$$

where we denote $\gamma(\cdot) \equiv h^{-1}(\cdot)$. Since $h(\cdot)$ is weakly concave it follows that $\gamma(\cdot)$ is a weakly convex function.

When only the influence motive applies (and the participation constraint is binding) the first order condition of the $IG's$ maximization problem with respect to p_j^* is:

$$-\pi_j d'_{IG}(g - p_j^*) = \gamma'[d_v(p_j^*)]d'_v(p_j^*). \tag{A12}$$

Since $d_V(\cdot)$ and $d_{IG}(\cdot)$ are strictly increasing in their domain, we have that $\frac{\partial p_j^*}{\partial \pi_j} > 0$ and $\frac{\partial p_j^*}{\partial g} > 0$, and given the participation constraint, C_j^* is always weakly increasing in π_j and g.

Data Description

Table A1 reports some descriptive statistics for the sample we used.

Table A1: Descriptive Statistics

Statistics	Contributions	extremism	Probabilities
Mean	48154.67	55.89	0.49
Std. Dev.	66955.43	25.26	0.10
Variance	$4.48\ e+09$	638.06	0.01
Skewness	4.21	0.09	0.11
Kurtosis	30.16	1.37	3.11
Quantiles			
.25	11750	34.71	0.41
.50	28000	40.72	0.48
.75	59524	80.41	0.55
Obs	466	466	466

Table A2 provides the classification of sectors (and the relative top industries) in terms of extremism.

Table A2: Classification of Sectors (From Less to Most Extreme)			
Sectors	Top Industries	Sectors	Top Industries
Computer industry	Computer Equipment	Publishing industry	Printing & Publishing
Grocery industry	Beer, Wine & Liquor	Automobile industry	Automotive
	Food & Beverage	Accounting	Accountants
Farming and agriculture	Agricultural Services/Products	Education	Education
	Crop Production & Basic	Airline Industry	Air Transport
	Poultry & Eggs	Telephone industry	Telecom Services
	Forestry & Forest Products		Telephone Utilities
Retail industry	Retail Sales	Electric and gas utilities	Electric Utilities
Real Estate industry	Building Materials & Equipment		Misc. Energy
	Construction Services	The federal government	Defense Aerospace
	Home Builders		Defense Electronics
	Real Estate	Pharmaceutical industry	Pharmaceuticals/Health
Banking	Commercial Banks	Healthcare industry	Health Professionals
	Credit Unions		Health Services/HMOs
	Finance/Credit Companies		Hospitals/Nursing Homes
	Insurance		Misc. Health
	Misc. Finance	The legal field	Lawyers/Law Firms
	Savings & Loans	Oil and gas industry	Oil & Gas
	Securities & Investment		

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