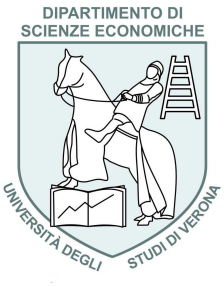

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Electoral Contributions and the Cost of Unpopularity

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Abstract

When considering electoral campaigns, those candidates that receive contributions from relatively unpopular industries should be regarded less favorably by voters that have information on the sources of funding. To offset this unpopularity effect, politicians may either demand more money for campaign advertising from these industries in order to persuade less informed voters, or shy away from unpopular contributors to avoid losing the support of the informed. Our model predicts that the first effect dominates, and that interest groups related to industries that experience a rise (decline) in unpopularity will increase (decrease) the amount of resources devoted to campaign financing. By using a set of alternative identification strategies to assess the impact of unpopularity on contributions for U.S. House elections, we provide robust evidence in favor of our predictions.

Keywords: Campaign Finance; Interest Groups; Elections; Popularity

JEL Classification: D72, P16

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1 Introduction

Does the popularity of interest groups matter in electoral campaigns or are candidates the only ones who should care about their reputation? According to Kroszner and Stratmann (2000), a good reputation helps politicians in collecting higher contributions from Political Action Committees (PACs) in order to run electoral campaigns. However, politicians are often financed by interest groups (IGs) that represent distinct industries that may be more or less popular amongst the electorate. When the information on campaign contributions is made publicly available, and if politicians are believed to be catering to the interests of their contributors, candidates that receive contributions from unpopular industries may suffer a loss in voter consent.

The recent U.S. political debate provides indirect evidence that is consistent with this idea. For example, in the 2015 Senate race in Maryland, Donna Edwards and Chris Van Hollen struggled to distance themselves from the banking industry.[1] Likewise, during the 2016 democratic presidential primary election, Bernie Sanders geared his campaign towards highlighting how, unlike Secretary Clinton, he never received money from the fossil fuel industry.[2] Indeed, according to the Gallup annual survey on business and sector images, from 2009 through 2012, Americans' opinion of banks was substantially more negative than positive, with an average difference between positive and negative opinions of -24 percentage points. From 2012 onwards, although the banking sector began to recover popularity, the gap with the other sectors has continued to widen. Similarly, for the oil and gas industry the share of negative evaluations tends to prevail, and in 2015 the oil and gas industry's net rating was -13 percentage points, based on 34% positive ratings and 47% negative ratings.[3]

Starting from this anecdotal evidence, a natural question immediately arises: if candi-

[1] It is worth noting that the Republican candidate Edwards repeatedly labeled her opponent a "Wall Street Democrat". ("Edwards, Van Hollen continue to battle for anti-Wall Street cred", Baltimore Sun - November 12, 2015)

[2] "Hillary Clinton and Bernie Sanders Spar Over Fossil Fuel Donations" , New York Times – April 1, 2016.

[3] Source: www.gallup.com/poll/12748/Business-Industry-Sector-Ratings.aspx

dates pay a higher price in terms of voter support when receiving contributions from interest groups that fare worst with the public, should we expect relatively unpopular IGs to contribute more, or less? On the one hand, candidates may wish to minimize the amount of funds they receive from stigmatized industries, in the attempt to avoid losing their political capital. On the other hand, however, if political campaigns are effective in persuading the least sophisticated (or uninformed) share of the voting population, contributions from unpopular groups should be higher in order to compensate for the greater electoral cost.

In order to assess which of these forces prevails, we develop a positive theoretical model of campaign finance. The setting we consider is one in which two parties compete in congressional elections at the district level. Candidates are financially constrained and require campaign contributions from interest groups to help them win the election by getting their word out to voters. Organized lobbies, that represent distinct business interests and share common preferences over a given policy issue, finance the political campaigns of congressional candidates that are willing to promote an agreed upon policy at the national level. Each of these business interests is characterized by a certain degree of unpopularity amongst the electorate. Once in office, winning candidates can support the policies agreed upon with their contributors at the national level.

A distinctive finding of our model is that contributions are always increasing in a given industry's relative unpopularity. Intuitively, an interest group that suffers a decline in popularity will face higher costs of obtaining policy favors. This is because a candidate that is associated with an unpopular industry will tend to lose voter support. In order to compensate the politician for this loss, the IG must provide greater contributions to finance a richer electoral campaign that can allow the candidate to regain her political reputation. Although candidates will tend to decrease their support for policies that favor less popular industries to avoid losing voter consent, this substitution effect only partially offsets the rising cost of being associated with unpopular industries. Thus, contributors that face a negative (positive) popularity shock will tend to increase (decrease) their contributions.

This result suggests that transparency has an effect on the cost of contributions. Indeed, industries that lose popularity will find it more costly to finance politicians only if voters are informed on where the money for campaigns is coming from, and take this information into account when making their voting decisions. Going one step further, if an industry's unpopularity reflects information on the distance between business interests and the preferences of citizens, this will make it more costly for industries that have a negative track record to influence policy choices. Thus, transparency may represent a valuable device for reducing the possible inefficiencies that may result from privately funded political campaigns. In this respect, our results are consistent with Fergusson (2014) that shows that a candidate's vote share is decreasing in the concentration of special interest contributions, suggesting that citizens punish political capture.

We empirically test our theoretical results by assessing the impact of interest group unpopularity on campaign contributions for the U.S. House of Representatives in four electoral cycles (i.e., 2002, 2004, 2006 and 2008).[4] Data on contributions comes from the Federal Election Commission (FEC) and includes contributions from both PACs and individuals, while our measure of unpopularity is based on a Gallup annual survey on business and industry sector images. In particular, a specific question from this survey asks Americans to rate more than 20 different sectors using a 5-point positive to negative scale.[5] Indeed, although organized business interests may not formally be part of a single interest group, it is reasonable to believe that distinct contributors belonging to the same industry will share the same reputation in the eyes of voters. As far as we know, this is the first attempt to directly measure IG unpopularity.

[4]Notice that, since 2010, the creation of Super PACs has noticeably complicated the U.S. campaign finance system. Super PACs are independent political committees that support a candidate with unlimited donations from companies, unions, or individuals. Unlike traditional PACs, Super PACs cannot donate money directly to candidates, but they can favor or harm a candidate through advertisements.

[5]Results for this Gallup poll are based on telephone interviews, with a random sample of approximately 500 adults, aged 18 and older, living in all 50 U.S. states and the District of Columbia. The margin of sampling error is ±6 percentage points at the 95% confidence level. Respondents were asked: "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". This question was introduced in 2001.

To deal with the fact that electoral contributions are typically censored at zero, we estimate a two step contribution model in which the first step addresses the censoring problem. We also control for important IG and candidate characteristics. In the last part of the analysis, we address possible endogeneity issues by using three alternative identification strategies. First, we replace the Gallup index with a more exogenous measure of IG unpopularity, such as the Harris Poll index. This index measures the degree of customer satisfaction of a given industry and is therefore less likely to be influenced by the industry's political involvement. Second, we adopt a two-stage instrumental variable (IV) approach to control for all possible sources of endogeneity. Finally, we also use a difference-in-differences estimator exploiting the loss of popularity experienced by the banking sector during the Great Recession.

Our analysis provides strong evidence that interest groups that are less popular will be paying more for a given level of favors. A natural question that arises is therefore whether unpopular IGs also tend to extract more rents from elected politicians. As a final result, we thus carry out an external validation analysis providing some insight on the relationship between unpopularity and policy returns. In order to do this, we compare our measure of unpopularity with the industry rates of return to political contributions as estimated by Bombardini and Trebbi (2011), and show that the relationship between these two variables is never positive. This finding suggests that unpopular interest groups will tend to contribute more primarily to offset the cost of their unpopularity, without obtaining greater policy returns with respect to more reputable IGs.

In terms of the theoretical literature, our paper is closely related to the positive theoretical 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 (2002a, 2002b), Coate (2004), and Ashworth (2006), we assume that voters are impressionable and can be swayed by advertisements in the spirit of Baron (1994) and Grossman and Helpman (1996).

Our paper is also related to the recent empirical political science literature that examines

the effect of the identity of contributors on both voters' perceptions, and on the willingness of candidates to associate with them. In particular, Dowling and Wichowsky (2013) conduct an experiment varying the information about the interests behind an attack ad sponsored by an unknown group and find evidence that voters may discount a group-sponsored ad when they have more information about the financial interests behind the message. In a similar setting, Huang et al. (2010) observe that voters react far more when information is revealed on the source of campaign funds than when the size of contributions is disclosed. McDonnell et al. (2014) focus instead on how firms that have been boycotted by activist movements tend to contribute less or even receive refunds from financed candidates.

Previous empirical literature has devoted only limited attention to the relevance of the popularity of interest groups in determining campaign spending. The main focus has been on determining the impact of contributions on vote shares 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 (Ansolabehere et al. 2003; Jayachandran 2006).

The first contributions on the determinants of campaign financing (Pittman 1988; Zardkoohi 1988; Grier et al. 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. 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 (2013), 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. In some respect, our work is complementary to this approach since our notion of popularity incorporates the broader concept of an industry's reputation which is not necessarily related to its share of employees, and is measured at the national level instead of exploiting district level variations.

Chamon and Kaplan (2013) 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 (2013) focus on the contributions of single Political Action Committees, while we consider contributions at the industry level, aggregating over PACs in order to investigate industry specific effects.

The rest of the paper is organized as follows. In Section 2, we introduce the theoretical model and in Section 3 we analyze the political equilibrium. In Section 4, we describe the data and the empirical analysis while in Section 5 we present our main results. Finally, Section 6 concludes.

2 The Model

We consider a jurisdiction composed of a finite number of electoral districts. In each district a legislator is elected and the legislative body (which we refer to as Congress) includes all of these elected officials. The role of Congress is to enact policies on each specific issue at the national level. Our focus is on the interaction at the district level and on the industry specific policies that each candidate agrees to endorse. We therefore abstract from how the elected legislators interact to set policies at the national level.

The model describes an electoral race at the district level with three classes of agents: voters, political candidates and interest groups. More specifically, voters indexed with $i \in I$ are called on to elect one of two candidates indexed with $j \in \{1, 2\}$. Candidates may receive

contributions for campaign advertising from a finite set of interest groups $\mathcal{K} = \{1, 2...K\}$ indexed with $k \in \mathcal{K}$. The possibility of abstention is not considered.

The policy space is made up of a finite set of policies $\mathcal{N} = \{1, 2...N\}$, and we assume that there exists a continuum of voters, each of which has a vector of policy preferences $\mathbf{p}_i \in$, that are distributed uniformly on $[-g_n - t, -g_n + t]^n$ for $t \geq 0$, where g_n represents the relative unpopularity of the industry operating on policy dimension n, with $g_n \in [0, 1]$ for every $n \in \mathcal{N}$. Industries with higher values of g_n are therefore considered less favorably by voters. Thus, two distinct policies on different dimensions, that are equally costly for voters in monetary terms, can be evaluated differently based on the relative popularity of the industries involved. For example, if on average the agricultural industry is seen more favorably with respect to the oil industry, when considering the introduction of an import tariff, a given voter will prefer if the tariff is applied to the latter rather than to the former industry.

Each voter therefore evaluates the policy vector chosen by candidates in reference to her policy preferences. Let $e \in \{1, 2\}$ denote the candidate who wins the election where $p_{j,n} \in \Re$ represents the policy chosen by candidate j on each dimension n, and $\mathbf{p}_j \in \Re^n$ is the vector of these policies. Note that the policies chosen by candidates represent the positions that each candidate commits to support at the national level if elected. We denote $Q_i \in \Re$ as the electoral advantage that candidate 1 has over candidate 2, from the perspective of voter i. The utility of voter i is:

$$U_i(e, Q_i, \mathbf{p}_1, \mathbf{p}_2) = \begin{cases} Q_i - \|\mathbf{p}_i - \mathbf{p}_1\| & \text{if } e = 1 \\ -\|\mathbf{p}_i - \mathbf{p}_2\| & \text{if } e = 2, \end{cases} \tag{1}$$

where $\|\mathbf{p}_i - \mathbf{p}_e\| = \sqrt{\sum_n (p_{i,n} - p_{e,n})^2}$ is the Euclidean distance between the preferences of voter i and the policy vector chosen by the elected candidate. This distance captures the fact that voters derive less utility from policies that are farther from their bliss point. In this multidimensional policy space a voting equilibrium exists and it is characterized by a

median voter with a vector of policy preferences $-\mathbf{g} \in [0,-1]^n$ (Davis et al., 1972; Prat, 2002b).

Variations in the relative popularity of a given industry may therefore have an impact on voter preferences. This may be justified both by information motives and by preferences for conformity. In the first case, popularity represents a public signal on new policy relevant information, and preferences correspond to updated expected preferences.[6] In the second case instead, voters derive an intrinsic value from sharing the positions of industries that are favorably perceived by public opinion and adapt their policy preferences in accordance with the consensus of the majority.[7]

Besides the policy vector $\mathbf{p}_j$ that candidates can choose, each candidate also has certain fixed characteristics such as charisma, track record or ideology. We denote B_i as the proclivity of each voter i for the fixed characteristics of candidate 1 with respect to candidate 2. The electoral advantage Q_i depends on B_i, but can also be influenced by campaign advertising as described below. Whenever $B_i > 0$, a given voter i has a relative preference for candidate 1 over candidate 2. Candidates do not know the exact policy preferences of each voter, but they know the relative popularity of each industry, which determines the pliable policy preferences of the median voter $-\mathbf{g}$, and they know that the fixed policy preferences of the median voter B_m are drawn from a known random distribution $F(B_m)$. Hence, there is always some uncertainty on the ex-ante electoral odds of one candidate with respect to the other.

We consider interest groups such as those associated with specific industries or sectors which, as Baron (1994) has pointed out, can be viewed as groups that try to influence particularistic policies as opposed to collective policies. Moreover, interest groups are usually

[6] If popularity, g_n reflects new information on the impact of a certain policy on the utility of voters, $p_{i,n}$ represents the Bayesian update on the preferences of voter i, conditional on the available information at a specific point in time.

[7] In our setup, conformity is more closely related with the idea that preferences may not be stable as noted by Ariely et al. (2003), and individuals modify their effective preferences based on the consensus of their social group as noted by Klick and Parisi (2008). This approach differs from that of Bernheim (1994), in which individuals act with the objective of falsifying their true preferences in order to increase their standing within a social group.

concerned about a limited set of issues. So, for example an interest group advocating the introduction of tariffs on steel imports will have little or no interest in policies affecting the textile industry. We capture this specialization feature by assuming that each IG is interested in a single policy dimension. Thus, each group does not face direct competition over its relevant policy dimension k, and there is at most one interest group for each policy dimension n, so that $K \leq N$.[8] An interest group therefore represents a subset of voters regarding policy dimension k, and seeks to maximize the utility of the median group member. We denote the policy concerns of an interest group on dimension k with $r_k \in \Re^+$, where IGs with higher values of r_k attribute a greater weight to obtaining their preferred policy. Going back to the previous example, assuming the agricultural industry has greater policy concerns with respect to oil and gas, the former will experience a greater loss from receiving a subsidy that is equally distant from the preferred level of each industry. Moreover, we assume that any two distinct interest groups are never identical, meaning that for any $x, y \in \mathcal{K}$ with $x \neq y$, it never holds that $r_x = r_y$ and $g_x = g_y$.

Interest groups do not have preferences on the fixed characteristics of one candidate or the other.[9] The IGs may therefore offer contribution schedules to both sides in the election. As long as each candidate is willing to bargain over policy k, the IG that is concerned about k has an incentive to try to influence the positions taken by both parties.

Contributions schedules made to each candidate, which we denote $C_{1,k}(p_{1,k})$ and $C_{2,k}(p_{2,k})$ respectively, are assumed to be continuous, differentiable and non-negative, meaning that each interest group can offer funding to politicians but cannot receive money from them. We also denote $\mathbf{C}_1 = \sum_k C_{1,k}(p_{1,k})$ and $\mathbf{C}_2 = \sum_k C_{2,k}(p_{2,k})$ as the total contributions received by each candidate. Each group's payoff is assumed to be separable in contributions and

[8] In order to simplify an already intricate analysis we abstract from the issue of competition within industries.

[9] Even if interest group members were concerned about both the pliable policies as well as the fixed characteristics of candidates, there may be a coordination problem between group members regarding preferences for one candidate or the other. Indeed, it seems reasonable to assume that PACs operating in the same industry can more easily converge on a common policy dimension that involves their specific industry, rather than on other issues.

policy. When candidate e is elected the payoff of interest group k is:

$$U_{IG,k} = -r_k(1 - p_{e,k})^2 - C_{1,k}(p_{1,k}) - C_{2,k}(p_{2,k}). \tag{2}$$

which captures the fact that each interest group derives greater utility from policies closer to its bliss point. The policy concern of each IG, r_k is assumed to be publicly observable.

Candidates can run campaigns to increase their chances of being elected. However, they have no funds of their own and campaigns are entirely financed by interest groups, that may offer contributions to each candidate in return for policy favors. We assume that the difference between contributions spent on campaign advertising has a positive impact on voters' preferences for the fixed characteristics of candidates. More formally, the advertising technology, $A(\cdot)$, is a non-decreasing function of $\mathbf{C}_1 - \mathbf{C}_2$. In other words, the candidate who outspends the other becomes relatively more attractive amongst voters.[10] Therefore, the expression for the electoral advantage is:

$$Q_i = B_i + A(\mathbf{C}_1 - \mathbf{C}_2). \tag{3}$$

This setup is equivalent to assuming that voters are concerned about policies but are also impressionable.[11] In other words, voters are aware of the impact that a certain policy stance (both pliable and fixed) has on their utility, but, at the same time, campaign advertising may increase a candidate's perceived quality.

Candidates may either interact with a particular interest group or not, because of exogenous reasons that we do not explicitly model. For instance, when candidates are opportunistic and therefore exclusively concerned about getting elected, they will consider a given

[10] In this setup, campaign spending cannot be seen as providing information since it does not play a role in reducing informational asymmetries but directly influences voters' preferences for the advertised candidate as in Baron (1994) and Grossman and Helpman (1996).

[11] 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.

industry specific policy to be pliable, and may be willing to cater to the interest group's policy requests in return for campaign contributions. On the other hand, candidates may have specific preferences on certain policy dimensions and may not wish to bargain over these issues regardless of the funds promised by interest groups.[12] Likewise, candidates may not always be in a position to sponsor certain issues, and interest groups may be aware of this and therefore choose not to entertain a relationship with these candidates.[13] In these latter cases, it is reasonable to assume that there is no interaction between a candidate and a particular interest group. We represent these different instances with an indicator function $\theta_{j,k} \in \{0, 1\}$, where $\theta_{j,k} = 1$ denotes the case in which candidate j agrees to interact with interest group k, and $\theta_{j,k} = 0$ represents the case in which she chooses not to.

We assume that candidates can credibly commit to pursue a given policy if they are elected, and that voters observe the policies chosen by each candidate. In designing its offers, an IG considers the participation constraints imposed by the fact that candidates need not accept a group's offer of support, if it is not convenient to do so.

The timing of the game is as follows. In the first stage, each interest group simultaneously designs its contribution schedule to every candidate with which it interacts. In the second stage, candidates choose 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 supports the policies she committed to endorse.

[12] As in the citizen-candidate model of Besley and Coate (1997), candidates may not be uniquely concerned about winning the election, but could also have specific preferences over policies. In other cases, as suggested by Kartik and Mcafee (2007), candidates may be unwilling to modify their policy stance in order to signal their character or integrity.

[13] For example, if in a specific district, a typically right wing industry such as oil and gas may not be willing to finance a left leaning Democratic candidate, this may not necessarily be the case in another electoral district, where the runner up is a more moderate democrat.

Election Probabilities

Voter i prefers candidate 1 if:

$$B_i + A(\mathbf{C}_1 - \mathbf{C}_2) - \|\mathbf{p}_i - \mathbf{p}_1\| + \|\mathbf{p}_i - \mathbf{p}_2\| \geq 0. \tag{4}$$

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

$$B_m + A(\mathbf{C}_1 - \mathbf{C}_2) - \|\mathbf{g} + \mathbf{p}_1\| + \|\mathbf{g} + \mathbf{p}_2\| \geq 0. \tag{5}$$

Since $F(B_m)$ and $\mathbf{g}$ are publicly known, the probability that candidate 1 is elected, which we denote $\pi_1(\mathbf{C}_1, \mathbf{C}_2)$, is equal to

$$\pi_1(\mathbf{C}_1, \mathbf{C}_2) = 1 - F[-A(\mathbf{C}_1 - \mathbf{C}_2) + \|\mathbf{g} + \mathbf{p}_1\| - \|\mathbf{g} + \mathbf{p}_2\|], \tag{6}$$

where $\pi_2(\mathbf{C}_1, \mathbf{C}_2) = 1 - \pi_1(\mathbf{C}_1, \mathbf{C}_2)$.[14] 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.

Functional Forms

For the sake of tractability, we assume $F(\cdot)$ to be a uniform distribution with mean b/f and density f, where b represents the ex-ante voter bias in favor of candidate 1. We also assume that the advertising function is separable in total contributions received by each candidate so that $A(\mathbf{C}_1 - \mathbf{C}_2) := h(\mathbf{C}_1 - \mathbf{C}_2)$, where h is a positive constant, implying that the advertising technology is linear.

It follows that the expression for the probability of electing candidate 1 conditional on the policies announced and contributions received by each candidate, represented by expression

[14] Since $F(\cdot)$ is a continuous function the event that the median voter is indifferent has measure zero, therefore considering strict or weak inequalities is equivalent. To simplify notation we thus assume that candidate 1 is elected in case of indifference.

(6), becomes:

$$\pi_1(\mathbf{C}_1, \mathbf{C}_2) = \frac{1}{2} + b + f\left[h(\mathbf{C}_1 - \mathbf{C}_2) - \|\mathbf{g} + \mathbf{p}_1\| + \|\mathbf{g} + \mathbf{p}_2\|\right], \tag{7}$$

$$\text{for } \left(h(\mathbf{C}_1 - \mathbf{C}_2) - \|\mathbf{g} + \mathbf{p}_1\| + \|\mathbf{g} + \mathbf{p}_2\|\right) \in \left[-\frac{1}{2f} + \frac{b}{f}, \frac{b}{f} + \frac{1}{2f}\right].$$

Without loss of generality, we assume that candidate 1 is more popular prior to campaigns being waged, so that $0 < b < 1/2$.

Expression (7) clearly illustrates that by accepting contributions from an interest group, a candidate receives a benefit in terms of enhancing her probability of winning, 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. Notice also 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 groups' offers are communicated privately or publicly.

3 Political Equilibrium

We consider a subgame-perfect Nash equilibrium of this political game. More specifically, a political equilibrium consists of: (i) a pair of policies $\left\{p^*_{1,n}, p^*_{2,n}\right\}$ for each n, (ii) a pair of contribution schedules $\left\{C^*_{1,k}(p_{1,k}), C^*_{2,k}(p_{2,k})\right\}$ for each interest group k, (iii) 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.[15]

When faced with the full set of contribution schedules, each candidate j wants to max-

[15]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 $\mathbf{g}$, $F(B_m)$, r_k, and the preferences of candidates, they can potentially infer the equilibrium contributions and policies of each candidate.

imize contributions while minimizing loss in vote shares that comes from catering to the interest group's requests. Since minimizing the Euclidean distance of the policy vector $\mathbf{p}$ from the median voter' preferred policy vector $-\mathbf{g}$ is equivalent to minimizing $\sum_n (g_n + p_{j,n})^2$, candidate $j's$ problem can be written in the following way:

$$\underset{p_{j,k}}{Max}\ h\sum\nolimits_k C_{j,k}(p_{j,k}) - \sum\nolimits_n (g_n + p_{j,n})^2. \tag{8}$$

Each IG takes the contribution schedules of the other lobbies as given and from the point of view of an IG on dimension k, candidate $j's$ problem becomes:

$$\underset{p_{j,k}}{Max}\ hC_{j,k}(p_{j,k}) - (g_n + p_{j,k})^2. \tag{9}$$

In equilibrium all interest groups correctly estimate the same probability $\pi_j(\mathbf{C}_1^*, \mathbf{C}_2^*)$ for every candidate j, which we denote π_j to ease notation.[16] Let us initially assume that interest groups do not finance candidates to enhance their electoral odds (in Proposition 2 we show that this is always the case for all of the contributing groups minus one), each IG therefore solves the following problem:

$$\begin{aligned}
&\underset{C_{j,k}(\cdot)_{j\in\{1,2\}}}{Max} -\pi_1[\theta_{1,k} r_k (1-p_{1,k})^2] - (1-\pi_1)[\theta_{2,k} r_k (1-p_{2,k})^2] \\
&-C_{1,k}(p_{1,k}) - C_{2,k}(p_{2,k}), \\
&s.t.\ p_{j,k} \in \arg\max hC_{j,k}(p_{j,k}) - (g_n + p_{j,k})^2
\end{aligned} \tag{10}$$

The participation constraints imply that each candidate that interacts with interest group k (those for which $\theta_{j,k} = 1$) will select a policy that differs from the median voter policy on dimension k, only if she is weakly better off by accepting positive contributions. It follows that candidates that do not interact with a given interest group k, always choose $-g_k$. Moreover, for all policy dimensions for which there is no active interest group, each

[16] Although π_j cannot be uniquely pinned down by equilbrium behavior, as in Grossman Helpman (1996), it is straightfward to show that for $b > (<)0$ equilibria in which $\pi_j < (>)1/2$ are Pareto dominated.

candidate naturally chooses policy $-g_n$.

Common agency games such as the one we are considering are typically characterized by multiple equilibria. In order to rule out this multiplicity, we consider a class of equilibria known as truthful equilibria which have been shown to be payoff equivalent to the class of coalition proof equilibria (Bernheim and Whinston, 1986). These equilibria are characterized by the fact that the shape of the contribution schedule of each IG follows that of the payoff function of the group minus a constant and save for non-negativity constraints.

It therefore turns out that each IG induces every candidate with which it interacts to behave as if she were selecting a policy on dimension k that minimizes the sum of the interest group's and the voters' losses:

$$p^*_{j,k} = \arg\max_{p_{j,k}}[-\pi_j r_k(1-p_{j,k})^2 - (g_k + p_{j,k})^2/h] \text{ for every } j \text{ for which } \theta_{j,k} = 1 \qquad (11)$$

This implies that industries that suffer a loss of popular consent will find it more difficult to induce candidates to cater to their interests (i.e., $p^*_{j,k}$ is decreasing in g_k). The rise in unpopularity leads to a reduction in equilibrium policy stances, since it makes the industry's preferred positions more costly to sustain. In order for a candidate to endorse a certain policy, the minimum contributions required turn out to be equal to the cost of policy favors in terms of vote shares, which is given by $(g_k + p^*_{j,k})^2/h$. Whenever a candidate supports a policy that differs from the median voter policy on dimension k, these minimum contributions are always strictly increasing in unpopularity, since the absolute value of the policy variation is always less than the variation in unpopularity. Therefore, for any $g_k > g'_k$ it is always the case that $(g_k + p^*_{j,k}) > (g'_k + p'^*_{j,k})$. These results are reassumed in the following proposition:

Proposition 1 *The policy chosen by each candidate $j \in \{1,2\}$ on dimension k is*

$$p^*_{j,k} = \frac{(\theta_{j,k} r_k h \pi_j - g_k)}{(1 + \theta_{j,k} r_k h \pi_j)} \qquad (12)$$

and the minimum amount of contributions needed to obtain policy $p^*_{j,k}$ is equal to

$$(g_k + p^*_{j,k})^2/h \tag{13}$$

Proof. See Appendix A. ■

It is important to notice that, if electoral motives play a role, the relationship between $C^*_{j,k}$ and g_k may in some particular cases be non-monotonic. For example, a given interest group characterized by policy concern r_k and unpopularity g_k may be more willing to provide one candidate with additional contributions to enhance her electoral odds, with respect to a less popular IG with different preferences. A priori, we therefore cannot exclude that overall contributions from a more popular industry may exceed those of a less popular one.

Nevertheless, as long as each interest group has different marginal returns from increasing the electoral odds of one candidate with respect to the other, at most one IG in a given electoral competition may be willing to finance a given candidate for electoral motives. To see this, notice that contributing more than what is strictly necessary to support the desired policy represents a public good for all groups that prefer a certain candidate's platform. As in other situations involving voluntary provision of public goods, if the group that benefits most from contributing for electoral motives is willing to do so, all the other IGs will free ride on this group's behavior. It follows that, excluding the interest group for which electoral motives may apply in a given district, all the remaining IGs will exhibit a positive relationship between contributions and policy:

Proposition 2 *If each IG has different marginal returns from increasing the electoral odds of one candidate over the other, then there exist at least* $\max[\sum_k \theta_{j,k} - 1, 0]$ *interest groups that finance each candidate* $j \in \{1, 2\}$ *exclusively for influence motives. For these IGs, contributions to each candidate are strictly increasing in the interest group's unpopularity,* g_k.

Proof. See Appendix A. ■

Notice that the condition for marginal returns to differ for each interest group is easily satisfied, since it may be violated only if the difference in popularity between two groups with the highest marginal returns from increasing electoral odds is exactly equal to a specific value. This is clearly a very particular case which we can reasonably rule out.

To see why contributions are strictly increasing in unpopularity for all active interest groups for which only influence motives apply, recall that for these IGs, contributions are exactly equal to the minimum contributions required to obtain policy $p^*_{j,k}$. Substituting (12) in (13) we therefore obtain the expression for equilibrium contributions in the absence of electoral motives:

$$C^*_{j,k} = \begin{cases} h\left(\frac{r_k \pi_j (1+g_k)}{(1+h r_k \pi_j)}\right)^2 & \text{for } \theta_{j,k} = 1 \\ 0 & \text{for } \theta_{j,k} = 0 \end{cases} \tag{14}$$

As previously mentioned, at most one of the active interest groups may contribute with the intention of affecting the outcome of the election. Therefore, for at least all the contributing groups minus one (i.e., $\max[\sum_k \theta_{j,k} - 1, 0]$), equilibrium contributions ($C^*_{j,k}$) are strictly increasing in unpopularity, as stated in Proposition 2. This result represents the main empirical implication of the model that we seek to test in the next section.

4 Empirical Analysis

4.1 Data

To construct our sample, we combined various data sources: the Federal Election Commission, for information on electoral campaigns; the Bureau of Economic Analysis for industry-level data; and the Gallup Polls to create an index of unpopularity for business sectors. Combining all data sources, we obtain a minimum number of uncensored observations equal to $36,241$. Table 1 reports some descriptive statistics and the classification of sectors according to their average unpopularity. Since, we assume that, at least in principle, a candidate can receive money from all IGs, the fraction of censored observations is particularly high

(i.e., more than 60%).

To evaluate the empirical implications of the model, we consider electoral contributions of $200 or more from PACs and individuals to federal candidates. In particular, our dependent variable is the amount of contributions that a candidate received from PACs and individuals in four electoral cycles (i.e., 2002, 2004, 2006 and 2008), as reported by the FEC. We associate PAC and individual contributions to each industry using the classification proposed by the Center for Responsive Politics (CRP). The classification of individual contributions is based on employer/occupation data reported by the donor.[17] The average amount is $\$13,802$ (this value rises to $\$34,495$ if we consider only uncensored contributions), and the highest contribution level is equal to $\$14,000,000$.

To measure interest group unpopularity, we use a reputation index based on the Business and Industry Sector Images provided by the Gallup Polls. This index is measured at the national level and is constructed by classifying the replies on the following question: "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 index ranges from 0 to 100 and represents an empirical measure of g_k expressed in percentage points, where higher values denote less popular sectors.[18] We have 24 sectors, and the average unpopularity is 45.76. In Appendix B, we provide a detailed description on how the index is constructed. The second part of Table 1 shows that the oil and gas industry is the least popular, while the most popular is the computer industry. Among the most unpopular sectors we find the legal field and healthcare, while sectors related to food production and distribution are relatively popular.

We also control for variables that can potentially affect how voters perceive the interest

[17] This approach is similar to that adopted by Bombardini and Trebbi (2011). Since individual contributions may contribute either for consumption or ideological reasons, including them may lead to a sort of measurement error problem. However, if individual contributions are unrelated to IG desired policies, their inclusion should lead to a downward bias in our estimates, reducing the strength of our main conclusions.

[18] Notice that contributions are at the industry level, while our popularity index is constructed at the sectoral level. That is, we are assuming that industries' popularity is more homogenous within sectors than among sectors.

group, influencing the amount of resources that an interest group must devote to campaign financing. For this reason, we include two important variables (at the national level): the fraction of workers employed in a given industry and the share of value-added generated by that industry. For instance, one can argue that workers might consider the sector in which they are employed to be more positive than others, simply because they favorably view their employer.[19] The mean sector occupies about 2% of workers, with the largest sector employing 11% of the total working population. Also, voters may consider high-value added sectors as better employment opportunities, thus leading these sectors to be perceived as more popular, and diminishing the amount of contributions that interest groups associated to these sectors 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. In general, including value added allows us to rule out that IG popularity may be a proxy for industry performance. Data on employment and value added comes from the aggregation of Annual Industry Accounts, an annual series provided by the Bureau of Economic Analysis.

Contributions also depend on candidate $j's$ probability of being elected, π_j. By definition, this probability is unobservable. Therefore, following an extensive empirical literature, we use information on incumbent candidates to control for the candidate's ex-ante probability of winning the elections. Many studies have documented the growing trend of the incumbency advantage in the U.S. (see, e.g., Cover, 1977; Cox and Katz, 1996; Levitt and Wolfram, 1997; Lee, 2001; Ansolabehere et al. 2006). For instance, Lee (2001) shows that an incumbent has a higher probability of winning the second election, even when facing an ex-ante identical candidate. According to this literature, incumbency generates both direct and indirect benefits, such as increasing a candidate's visibility among voters or discouraging high-quality challengers. Although our theoretical results do not depend on candidates'

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

ideologies, we include their political affiliation as an additional control variable. We also distinguish between lopsided and close races to control for the fact that contributions are higher in close races than in lopsided elections (Snyder, 1990). In particular, we define lopsided elections as those in which a candidate won with at least 70% of the votes. This allows us to have a number of close races comparable with the number of lopsided elections.

Finally, we use the percentages of women employed in office roles and craft occupations as instrumental variables for industry unpopularity. The source for this information is the Equal Employment Opportunity Commission which collects data from public and private employers, and unions and labor organizations on the composition of their work forces by sex and race.[20] In Table 1, we can see that, on average 28% of office roles and 19% of craft jobs are taken up by women. We leave the discussion on the validity of our instruments for the next section.

[20]The definition of office roles includes all clerical-type work regardless of level of difficulty, where the activities are predominantly non-manual though some manual work not directly involved with altering or transporting the products is included: bookkeepers, collectors (bills and accounts), messengers and office helpers, office machine operators (including computer), shipping and receiving clerks, stenographers, typists and secretaries, telegraph and telephone operators, legal assistants, and kindred workers. Craft workers are defined as manual workers of relatively high skill level having a thorough and comprehensive knowledge of the processes involved in their work. They exercise considerable independent judgment and usually receive an extensive period of training. These jobs include: the building trades, hourly paid supervisors and lead operators who are not members of management, mechanics and repairers, skilled machining occupations, compositors and typesetters, electricians, engravers, painters (construction and maintenance), motion picture projectionists, pattern and model makers, stationary engineers, tailors and tailoresses, arts occupations, handpainters, coaters, bakers, decorating occupations, and kindred workers.

Table 1: Descriptive statistics and Unpopularity Rank

Descriptive statistics					
Variable	Obs	Mean	Std. Dev.	Min	Max
Contributions ($US)	117,549	13,802	141,203	0	14,000,000
Unpopularity	111,733	45.762	26.348	0	100
Employment (% of total)	107,895	0.020	0.024	0.001	0.122
Value added (% of total)	107,895	0.024	0.026	0.004	0.119
Incumbency	117,694	0.324	0.468	0	1
Gender (1=male)	117,694	0.479	0.500	0	1
Lopsided	117,694	0.804	0.397	0	1
Office (% female)	107,898	0.282	0.164	0.021	0.657
Craft (% female)	107,898	0.191	0.126	0.018	0.668

Average Unpopularity Index by Sectors (from the most to the least popular)			
Industry	Unpopularity	Industry	Unpopularity
Computer industry	0.17	Automobile industry	47.16
Restaurant industry	6.37	Sports industry	48.69
Agriculture	16.52	Television and	51.71
Grocery industry	19.03	Movie industry	56.96
Retail industry	25.54	Airline industry	57.00
Internet industry	27.29	Advertising industry	57.50
Travel industry	29.42	Electric and gas utilities	65.57
Publishing industry	34.71	Pharmaceutical industry	69.91
Accounting	35.08	The legal field	73.57
Banking	40.63	The federal gov	74.48
Education	45.27	Healthcare industry	75.17
Real Estate industry	46.28	Oil and gas	100.00

Notes: We also consider candidate's political affiliation as an additional control variable. On average, Democrats receive $15.153, Republicans receive $13,888 while other parties receive $1,928.

4.2 Methodology

4.2.1 *Baseline Specification*

Our analysis aims to establish a link between electoral contributions and the unpopularity of an IG. In particular, we want to test for the existence of a positive relationship between the unpopularity of each interest group k and the contributions to each candidate j (Proposition 2).

Because IGs may not finance a particular candidate, data on electoral contributions are

typically left-censored at zero. In this case, standard OLS estimates are biased, and we must adopt a two step procedure to estimate equation (14). In particular, by using a Probit model, we first estimate a participation equation in which the dependent variable is $\theta_{j,k}$ – that is, a binary variable determining whether $C^*_{j,k}$ is zero or strictly positive – and then we estimate a linear contribution equation in which the dependent variable is the contribution level. Since we may have omitted variables affecting the error terms in the two equations, the Heckman (1979) selection model represents the natural approach to deal with the problem of zeros. Following Wooldridge (2010, p. 697), we estimate the participation equation for each year separately and then we include the estimated nonselection hazards (i.e., the inverse Mills ratios) into a Mundlak (1978) correction model to account for correlation between time-invariant factors and the vector of explanatory variables. This methodology allows us to control for both the probability of censoring and the omission of important IG characteristics.

By log-linearizing equation (14), we can easily obtain the following econometric specification:

$$\log C^*_{jkdt} = \alpha + \beta \log(1 + g_{kt}) + \gamma \log \pi_{jdt} + \delta M_{jk} + \varepsilon_{jkdt} \quad \text{for } \theta_{j,k} = 1, \tag{15}$$

where α is the constant term; C^*_{jkdt} represents the amount of contributions to each candidate j from interest group k, in district d, at time t; $(1 + g_{kt})$ is proxied with the unpopularity index for interest group k at time t; π_{jdt} is a measure of the candidate's electoral advantage and is proxied with a factor variable indicating whether a candidate j, in district d, is an incumbent, a challenger or is running for an open seat; M_{jk} are the Mundlak's correction terms and serve the purpose of absorbing the scalar effects of $\log(r_k)$ and $\log\left(\frac{1}{1+hr_k\pi_{jdt}}\right)$; ε_{jkdt} is the error term. Formally, Mundlak's correction terms are simply IG-incumbent average characteristics and allow us to control for both time-invariant sectoral heterogeneity and the fact that this heterogeneity may have different effects on incumbents and challengers. We also include two important sectoral covariates – namely, the share of employees and value

added observed in each IG – as well as cycle indicators and other candidate characteristics. Finally, in order to control for the omission of variables affecting both the participation and the contribution equation, our regressions contain an inverse Mills ratio for each electoral cycle.[21]

4.2.2 *Alternative Specifications*

After having controlled for heterogeneity and censoring, we check how regression coefficients behave when our specification is modified by adding or removing some regressors. In particular, we modify equation (15) to show that the unpopularity index is not proxying for other contribution channels already discussed in the literature.

First, we include a squared term for the employment level. In a recent paper, Bombardini and Trebbi (2011) find a hump-shaped relationship between the share of voting population represented by an IG and its electoral contributions. The authors explain this evidence with a bargaining model in which the size of an IG affects both the amount of surplus that can be shared with a candidate and the strength of voter support that the IG can offer to each candidate. The former channel is responsible for the increasing part of the relationship between contributions and the IG size, while the latter channel is responsible for the decreasing part of this relationship. In principle, a positive coefficient for the unpopularity index could mask this behavior. Indeed, if workers consider the industry in which they are employed to be more popular than others, large sectors can be characterized by a high level of popularity. On the other hand, if voters believe that small industries are less successful in distorting policies through lobbying activities, then even small sectors will be characterized by a high level of popularity. As a result, the inclusion of a squared term for the employment share should invalidate our conclusions, reducing the correlation between popularity and electoral funds. Second, in elections where one candidate is very likely to win, she may not maximize

[21] Inverse Mills ratios are computed as $\lambda(\gamma_t Z_{jkdt}) \equiv \frac{\phi(\gamma_t Z_{jkdt})}{\Phi(\gamma_t Z_{jkdt})}$, where $\phi(\cdot)$ is the standard normal density function, $\Phi(\cdot)$ is the standard normal cumulative distribution function, Z_{jkdt} is a set of explanatory variables entering the censoring mechanism and γ_t are the time-variant coefficients entering the selection equation.

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 (Snyder, 1990). We therefore consider both lopsided and close races separately in order to verify this hypothesis.

4.2.3 *Endogeneity*

Since an interest group's popularity is based on voter perceptions, a simultaneity problem can arise. It may in fact be the case that, by observing contribution levels, voters may change their opinion about the interest group. For example, if voters view contributions as a signal of corruption, they may be disappointed by interest groups that contribute more to electoral campaigns.

To address this issue, we adopt three different strategies to re-estimate our model. First, we use an alternative indicator of unpopularity based on the Harris Polls index, which is defined as the difference between the percentage of respondents that believe sector k does a bad job in serving its customers and the percentage of those that think it does well.[22] Since this index measures the ability of a sector to satisfy its consumers, it is less likely to be influenced by the political activity of a sector. Therefore, while the Gallup index may capture some dimensions related to political participation, the Harris index should be less exposed to reverse causality problems.

Second, to control for both censoring and endogeneity, we also follow the methodology proposed by Mroz (1987) and widely referred in the econometric literature (see Berndt, 1991; Wooldridge, 2010). This methodology consists of three stages. In the first stage, we obtain the inverse Mills ratio by estimating a Probit model in which the unpopularity index has been replaced with one or more instrumental variables. In the second stage, we regress the unpopularity index on our instrumental variables, the inverse Mills ratio and

[22]We use the Harris Polls index as a secondary proxy of unpopularity because it covers only thirteen sectors, while the Gallup index allows us to consider twenty sectors. Harris Polls are available on the Web: (www.harrisinteractive.com/NewsRoom/HarrisPolls)

the set of exogenous variables. Finally, we include the predicted values of the first two stages in the final regression to obtain unbiased coefficients for the unpopularity index. We instrument IG unpopularity with the percentage of women employed in office and clerical-type roles and the percentage of women working in craft occupations. A valid instrument must be strongly correlated with the unpopularity index (instrument relevance), but be unconditionally uncorrelated with the error term (instrument exogeneity). Concerning the relevance of our instruments there is a wide literature showing that corporate reputation is a positive function of female employment in certain occupations. For instance, Brammer et al. (2009) find that the presence of women in top positions is favorably viewed in those sectors that operate close to final consumers. Indeed, first stage estimates confirm this view showing that sectors with a higher fraction of women occupied in office roles are also perceived as more popular. The first stage regressions also reveal that sectors occupying women in more physically intensive occupations (i.e., craft jobs) are associated with a lower popularity. The idea is that industries guaranteeing equal opportunities in "good" jobs can have a popularity premium. Inglehart et al. (2002) document the growing support for gender equality in public opinion and how this concept is intimately involved in the process of democratization. Other studies suggest that male preferences towards redistribution have changed over time. According to Doepke and Tertilt (2009), human capital accumulation may have increased men's incentives to share power with women. Similarly, Fernández et al. (2013) argue that female participation in the labor market has shaped male preferences in favor of gender equality. Finally, Jensen and Oster (2009) have shown that media exposure positively effects the way in which female participation in society is perceived by public opinion. Concerning exogeneity, our instruments are unlikely to be unconditionally correlated with electoral contributions. Indeed, our instruments refer only to those occupations that typically do not set broad policies. Therefore, it is difficult to imagine a significant impact of those employed in these roles on campaign financing strategies. This argument is confirmed by a standard overidentification test. For this reason and given the inclusion of IG-incumbent

fixed effects, we can conclude that our estimates are extremely reliable.

However, because the validity of an IV is always debatable despite the results of validation tests, we also exploit the negative popularity shock that the financial crisis of 2007-2008 had on the banking sector.[23] The recent financial crisis had devastating impact on the reputation of the banking sector throughout the world. Citizens and media blamed the major US, UK and West European banks for the enormous amount of investments in risky activities (Verick and Islam, 2010), the nature of the incentives paid to senior managers (Cukierman, 2010) and the creation of complicated and worthless financial products (Akinbami, 2011). A survey of banking executives at 225 companies done by Ebiquity revealed that more than 80% of communications, marketing and investor relations managers at banks, brokerages and other financial services firms think the financial crisis caused long-term reputation problems (La Monica, 2014).

We use a difference-in-differences (DID) technique to test whether the negative popularity shock affected the average contributions of the banking sector. More specifically, we re-estimate our model considering a treatment indicator taking value 1 for contributions coming from the banking sector in 2008, and zero otherwise. If Proposition 2 holds, then our treatment variable should have a positive effect on average contributions.

4.2.4 *IG* Unpopularity and Rates of Return from Campaign Contributions

The final part of our analysis focuses on understanding whether more unpopular *IGs* tend to obtain higher or lower rates of returns from electoral contributions. To do so we exploit a result of the recent literature that has attempted to explain Tullock's puzzle, that is, the fact that political contributions are extremely low with respect to the amount of political favors that *IGs* actually obtain from elected candidates (see Tullock, 1972 and Ansolabehere et al.,

[23]The 2008 U.S. House of Representatives elections were held in November, while the discussion on the Emergency Economic Stabilization Act, commonly referred as the Wall Street bailout, started in early 2008 when the US recession began. More precisely, according to the U.S. National Bureau of Economic Research, the US recession began in December 2007 with the subprime mortgage crisis and lasted 18 months (NBER, 2010).

2003). These low levels of contributions imply rates of return from campaign contributions that are incomparably high with respect to any other investment in a market economy. Bombardini and Trebbi (2011) and Chamon and Kaplan (2013) have successfully addressed the puzzle and we can therefore rely on better estimates of the rates of return. These estimates provide a reasonable approximation of how benefits from political investment are distributed across sectors. Therefore, in the last part of the analysis, we compute IG payoffs and compare them with the rates of return estimated by Bombardini and Trebbi (2011). This exercise has a threefold purpose. First, it represents an external validation exercise, showing that our model provides reliable results. Second, we show that our theoretical model explains a large fraction of IG heterogeneity in political returns. Finally, it allows us to gather some insight on the relationship between unpopularity and the rates of return to campaign contributions.

5 Results

5.1 Main Results

Table 2 reports the estimates of Equation (15), while the estimates of the participation equation are reported in Appendix C. In Column 1 we estimated model (15) without considering both the IG value added and employment share. The coefficient on the unpopularity index is positive and statistically significant, but this coefficient could be biased because of the lack of important control variables. Therefore, in Column 2 of Table 2 we control for the industry's employment share and value added. According to Column 2, both the employment share and the average value added are positively correlated with the contribution level. In other words, bigger sectors tend to contribute more than smaller ones. Nonetheless, the inclusion of these two time-varying controls does not lower the impact of unpopularity on contributions. Notice that, with respect to challengers (the reference group), both incumbents and candidates running in open seat elections raise a higher amount of contributions.

Interestingly, these differences increase when we control for the employment share and the value added share. The statistical significance of the inverse Mills ratios supports the assumption that first stage and second stage error terms are correlated. The coefficients of the average unpopularity index (between effect) are always comparable with the coefficients of unpopularity index (within effects). From an empirical point of view, this means that a change in the current unpopularity or in the average unpopularity leads to similar increases in contributions; while, from a theoretical point of view, it also means that long-term unpopularity explains part of the structural differences in contribution levels.[24] In contrast, the within coefficient for the value added is slightly lower than the between coefficient. The scale effect capturing the interaction between the average unpopularity index and the incumbency advantage has the expected negative sign and is statistically significant.[25] By looking at the candidate's affiliation, we can see that Democrats (the reference category) receive less contributions than Republicans but more contributions than candidates running for third parties. Finally, women receive more contributions than men. This result can be explained with the fact that usually women run for an election only when they can raise enough funds and have a high probability of winning the election (Milyo and Schosberg, 2000).

In Columns 3 and 4 of Table 2, we change our main specification by considering possible confounding explanations. This allows us to probe further our conclusion that the unpopularity of an interest group is positively associated with its contribution levels. Because workers may have different reasons to consider both very large and very small sectors to be more popular, in Column 3, we included a quadratic term for the employment share. In this way, we test whether the unpopularity index is proxying for nonlinear effects related to the size of interest groups. However, even with this specification, contributions remain positively associated with unpopularity, while the coefficient on the quadratic term for the employment share is statistically insignificant. This result is partially due to the fact that

[24]We do not control for the average employment share because the employment share does not vary sufficiently within groups.

[25]Recall that the scale effect aims to control for the $\log(1+hr_k\pi_{j,k})^{-1}$ in the log-linearized form of equation (14).

the logs of contributions are less sensitive to employment share than the amount of contributions in natural scale. Finally, in Column 4, we interact the unpopularity index with a dummy variable taking value 1 in case of lopsided elections. Once again, the coefficient on the unpopularity index remains positive and statistically significant. In contrast, electoral contributions are lower in lopsided elections than in close races. This is consistent with the idea that in lopsided races, characterized by less uncertainty on the election outcome, candidates are less inclined to "sell" policy favors in exchange for contributions.

In general, we can say that a 1% increase in unpopularity leads to a 0.48% increase in contributions. To understand the relevance of the unpopularity effect, we can compare the impact of IG unpopularity on contributions with the impact of other important explanatory variables. By standardizing our explanatory variables, we get that unpopularity is the second most important explanatory variable after the incumbency status. Indeed, a one standard deviation increase in unpopularity is associated with a 25% standard deviation increase in predicted contributions.

Table 2: Electoral Contributions

	(1)	(2)	(3)	(4)
Constant	5.182***	3.735***	3.994***	4.565***
	(0.241)	(0.273)	(0.444)	(0.420)
Unpopularity (within)	0.461***	0.501***	0.482***	0.573***
	(0.045)	(0.046)	(0.054)	(0.051)
Incumbent	0.824***	4.260***	4.237***	4.068***
	(0.117)	(0.185)	(0.188)	(0.164)
Open seat	0.792***	3.304***	3.303***	3.026***
	(0.066)	(0.150)	(0.150)	(0.107)
Employment		0.240***	0.325***	0.630***
		(0.018)	(0.109)	(0.108)
Employment sq.			0.009	0.032***
			(0.012)	(0.012)
VA (within)		0.253***	0.240***	0.168**
		(0.068)	(0.070)	(0.069)
Republicans	0.205***	0.355***	0.365***	0.056
	(0.036)	(0.037)	(0.039)	(0.038)
Third parties	-0.914***	-3.274***	-3.197***	-0.995***
	(0.114)	(0.177)	(0.201)	(0.069)
Male	-0.129***	-0.498***	-0.497***	-0.357***
	(0.021)	(0.031)	(0.031)	(0.025)
Lopsided				-0.450***
				(0.077)
Unpopularity*Lopsided				0.011
				(0.021)
Unpopularity (between)	0.355***	0.397***	0.389***	0.437***
	(0.038)	(0.037)	(0.039)	(0.038)
Value added (between)		0.356***	0.361***	0.395***
		(0.063)	(0.063)	(0.063)
Scale effect	-0.120***	-0.189***	-0.184***	-0.209***
	(0.028)	(0.028)	(0.029)	(0.027)
Significance of Mills ratios	Yes	Yes	Yes	Yes
Time dummies	Yes	Yes	Yes	Yes
Observations	36,241	36,241	36,241	36,241
R-squared	0.130	0.148	0.148	0.165

Notes: The table reports the estimates of equation (15). In Column 1, we omitted both the employment share and the value added share. In Column 2, we included these two important control variables. Column 3 contains a quadratic term for the employment share, while Column 4 considers possible interaction effects between unpopularity and lopsided elections. Mills ratios are statistically significant as well as time dummies. Robust standard errors are reported in parentheses. Significant at: *10%, **5%, ***1%.

5.2 Addressing Endogeneity

In Table 3, we address endogeneity using the Harris Poll index, an IV approach and a DID methodology. Column 1 of Table 3 shows the estimates of equation (15) when unpopularity is measured using the additive inverse of the log of the Harris index.[26] By construction, this index is more exogenous than the Gallup index. Indeed, since the Harris Poll question refers to a precise sectoral dimension - namely, customer satisfaction - the relative answers should be less related to lobbying activities. In Column 1, there is a positive relationship between unpopularity and electoral contributions.

The estimates of a fixed effects model with a possibly endogenous regressor are reported in Columns 2, 3 and 4 of Table 3. Column 2 gives the second-stage estimates when we instrument the unpopularity index with the fraction of women employed in office and clerical positions. The first-stage F-test shows that this instrument is strongly associated with the Gallup index. In line with the existing literature on equal opportunities, we found a negative relationship between this instrument and the unpopularity index (see Appendix C). Although the coefficient of unpopularity in Column 2 is characterized by a larger standard error, second-stage results are consistent with Proposition 2. Usually, larger standard errors are the price we have to pay when we use an IV approach. In Column 3, the unpopularity index was instrumented with the fraction of women working in craft occupations. The first-stage F-test confirms the existence of a strong correlation between the unpopularity index and the instrument, while the second-stage results confirm the presence of a positive relationship between unpopularity and electoral contributions. Column 4 considers both instruments simultaneously. Empirical results support Proposition 2 on the relationship between IG unpopularity and contribution levels. According to the Sargan test, we cannot reject the joint hypothesis that the instruments are (unconditionally) uncorrelated with the error term and correctly excluded from the estimated model.

[26]Since the original Harris index is a measure of popularity, we take the additive inverse of its log in order to obtain a coefficient of unpopularity instead of a coefficient of popularity.

Columns 5-7 of Table 3 present the DID estimates obtained exploiting the negative popularity shock that hit the banking sector after the 2008 financial crisis. Column 5 reports the DID estimates obtained by using the entire pre-treatment period (i.e., 2002-2006). Three facts clearly emerge from the analysis. First, the average contribution level of the banking sector is usually higher than the average contribution level of the control group (i.e., the remaining 23 sectors). Second, the coefficient for the financial crisis period shows that contributions in 2008 were particularly high with respect to the pre-treatment averages. Finally, after the outburst of the financial crisis, the banking sector significantly increased its contribution levels with respect to the remaining sectors. This effect is captured by the DID coefficient. In Columns 6 and 7, we change the pre-treatment period in order to test the robustness of our conclusions and understand the entire dynamics of contributions before the crisis. The treatment effect (DID) is always positive, stable and statistically significant, confirming our theoretical predictions.

Table 3: Electoral Contributions (Harris index, IV-FE and DID)

	Harris	IV-FE (II stage)			DID		
Instruments		Office	Craft	Both	2002-2008	2004-2008	2006-2008
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Constant	4.969***				6.353***	5.387***	3.919***
	(0.460)				(0.272)	(0.342)	(0.395)
Banking sector					1.417***	1.377***	0.986***
					(0.044)	(0.053)	(0.063)
Financial crisis					0.352***	0.271***	0.237***
					(0.020)	(0.021)	(0.025)
Unpopularity/DID	1.019***	0.536**	0.891*	0.613**	0.227***	0.245***	0.299***
	(0.092)	(0.271)	(0.477)	(0.267)	(0.063)	(0.067)	(0.080)
Incumbent	1.076***	2.335***	2.344***	2.337***	3.580***	2.980***	2.828***
	(0.196)	(0.081)	(0.083)	(0.081)	(0.172)	(0.164)	(0.194)
Open seat	-0.228**	1.853***	1.857***	1.854***	2.847***	1.709***	1.777***
	(0.101)	(0.063)	(0.064)	(0.063)	(0.156)	(0.096)	(0.117)
Employment	-4.641***	4.008***	5.821**	4.400***	0.712***	-0.138	-0.962***
	(0.313)	(1.501)	(2.484)	(1.476)	(0.098)	(0.107)	(0.101)
Employment sq.	-0.630***	0.447***	0.636**	0.488***	0.059***	-0.020	-0.108***
	(0.038)	(0.155)	(0.258)	(0.153)	(0.010)	(0.012)	(0.012)
Value added	0.062	0.422***	0.594**	0.459***	0.259***	0.615***	0.056
	(0.160)	(0.149)	(0.242)	(0.147)	(0.070)	(0.093)	(0.119)
Republicans	-0.245***	0.075***	0.075***	0.075***	0.333***	0.265***	-0.156***
	(0.025)	(0.013)	(0.013)	(0.013)	(0.035)	(0.041)	(0.020)
Third parties	-2.406***	-1.851***	-1.853***	-1.851***	-2.483***	-2.046***	-3.666***
	(0.252)	(0.077)	(0.078)	(0.077)	(0.199)	(0.198)	(0.180)
Male	0.010	-0.200***	-0.202***	-0.201***	-0.378***	-0.133***	-0.163***
	(0.029)	(0.017)	(0.018)	(0.017)	(0.032)	(0.022)	(0.027)
Mundlak's corrections	Yes	No	No	No	Yes	Yes	Yes
Mills ratios	Yes	Yes	Yes	Yes	Yes	Yes	Yes
IG Fixed Effects	No	Yes	Yes	Yes	No	No	No
Time dummies	Yes	Yes	Yes	Yes	Yes	Yes	No
First stage F-test		176.424***	86.728***	86.275***			
Sargan p-value				0.433			
Observations	12,974	34,530	34,530	34,530	36,241	27,961	19,150
R-squared	0.273	0.109[a]	0.090[a]	0.106[a]	0.164	0.161	0.152

Notes: The table reports results from three different specifications dealing with endogeneity problems. In Column 1, unpopularity is measured through the Harris index. Columns 2-4 shows the second-stage IV estimates obtained by using our instrumental variables. Columns 5-7 present the DID estimates obtained exploiting the negative popularity shock that hit the banking sector after the 2008 financial crisis. Robust standard errors are reported in parentheses. Significant at: *10%, **5%, ***1%. [a]For IV-FE estimates, the R-squared refers to the within effect only.

Figure 1 provides a graphical representation of DID results. The figure on the left panel shows the predicted contribution levels for the banking sector (solid line) and for the remaining sectors (dashed line). In this graph, we can notice that contribution levels of the banking sector dramatically increased after the 2007 financial crisis. This result is even more evident in the second panel, where we consider the differences in the predicted contributions of the two groups in two contiguous cycles. According to the second graph, we cannot reject the parallel trend assumption for the pre-treatment period; in contrast, for 2008 electoral cycle, we observe a consistent deviation from the common trend.

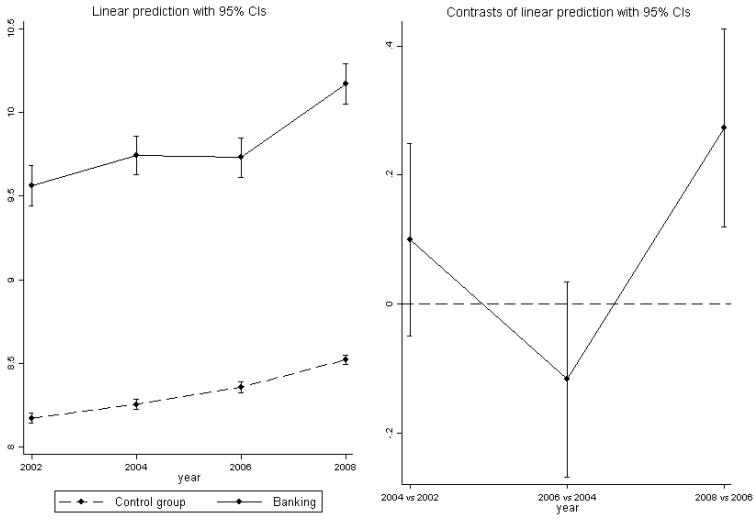

Figure 1: Predicted contributions and DID effect

5.3 *IG* Unpopularity and Rates of Return from Campaign Contributions

In response to Tullock's puzzle, the recent economic literature has attempted to explain why there is so little money in politics compared to the value of the policy favors awarded. However, as far as we know, there are no studies dealing with the fact that the rates of return from campaign contributions vary across sectors. In this section, we first show that our theoretical model provides a suitable explanation for this heterogeneity, we then exploit this result to show that unpopular interest groups do not obtain significantly greater rates

of return to campaign contributions.

In order to address heterogeneity of returns, we first use Equation (2) and the econometric estimates reported in Table 2 to compute the predicted IG payoffs, and then we compare the predicted payoffs with the rates of return estimated by Bombardini and Trebbi (2011). Using Equations (2) and (12), we can write the payoff of the k-th interest group in district d at time t as follows:

$$U_{IG,kdt} = -r_k \frac{(1+g_k)^2}{(1+r_k h \pi_e)^2} - C_{kdt}. \tag{16}$$

where π_e is the ex-ante electoral probability of the winning candidate and C_{kdt} is the amount of total contributions paid by the k-th interest group in district d at time t. To compute the first term on the RHS of (16), we use the coefficients estimated in Column 3 of Table 2. Indeed, because we proxy unpopularity with the Gallup index, in Equation (15), $(1+g_k)$ corresponds to the Gallup index to the power of $\beta/2$. The same reasoning applies for r_k and $(1+r_k h \pi_e)$. In this respect, we use the estimated coefficients of unpopularity (between) and value added (between) to compute r_k and the estimated coefficient of the scale effect to compute $(1+r_k h \pi_e)$.

In their article, Bombardini and Trebbi (2011) estimate two different rates of returns for each IG: a pre-correction return and a post-correction return. In the first case, they use their structural estimates to quantify the monetary benefits from the policy and then compute the rates of return to electoral contributions across sectors.[27] In the second case, they include the dollar value of the votes supplied by IGs at the moment of the election to determine total electoral contributions. Since these rates of return refer to the 2000 election cycle, we computed IG payoffs for our first cycle (i.e., 2002).

[27] Although these returns are estimated values, their mean value is in line with the average returns obtained using subsidy data.

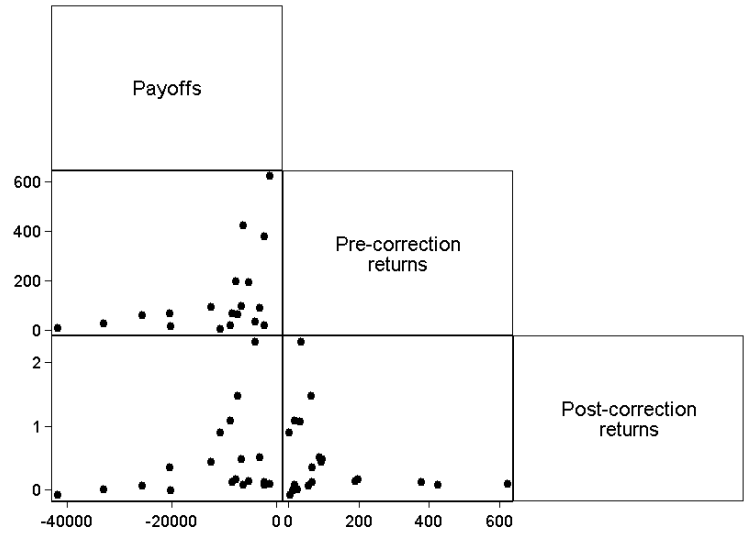

Figure 2: Payoffs and rates of returns

Figure 2 provides the scatter plots of average payoffs against pre- and post-correction rates of return estimated by Bombardini and Trebbi. In this figure, we can notice two important facts. First, the correction noticeably changes the distribution of rates of return across sectors. This means that the inclusion of the dollar value of votes in determining rates of return significantly affects their distribution across IGs. Second, both pre- and post-correction returns exhibit an exponential relationship with our payoff measure. Given the exponential relationship between payoffs and rates of return, we take the logarithms of the latter before computing all the pairwise correlation coefficients. Table 4 reports the estimated correlation coefficients between our utility and the logs of returns. According to this table, there is a positive and significant correlation between our utility measure and both pre- and post-correction returns. This means that our theoretical model can explain about 50% of the variability in rates of return, and this result is robust independently of whether we consider pre- or post-correction rates.

Having validated our model with these external measures of rates of return from electoral contributions, we now investigate whether unpopular IGs actually obtain more conspicuous benefits from contributions. Before proceeding, it useful to recall that a result of our model is that as g_k increases a given interest group will receive less favors but supply more funds.

Overall this translates into a decrease in payoffs, and this follows immediately by substituting the equilibrium values $p^*_{j,k}$ and $C^*_{j,k}$ in (2) and computing the first derivative with respect to g_k. However, when comparing payoffs across industries, since different industries may have different policy concerns (r_k) and these concerns may interact with the candidate's ex-ante electoral odds, it is not obvious whether we should expect less popular industries to exhibit larger or smaller payoffs. We therefore compare the correlation coefficients between g_k and our payoff estimates as well as the rates of return estimated by Bombardini and Trebbi (2011), in order to gather some further insight on this relationship. Table 4 indicates that the correlation between pre-correction returns to political contributions and unpopularity is negative and extremely high, while there is no significant correlation between our payoff estimates and unpopularity as well as between post-correction returns and unpopularity. This means that, independently of the measure of returns to political contributions, policy concerns and their interaction effects with the ex-ante electoral advantage do not have a strong enough impact on IG payoffs to reverse the negative effects of unpopularity on policy favors. Therefore, we can reasonably state that less popular industries tend to contribute more, mainly to compensate for the loss in voter consent that they impose on candidates, and without actually obtaining greater policy benefits with respect to less disdained industries.

Table 4: Pairwise correlation coefficients

	Payoffs	Pre-correction returns (log)	Post-correction returns (log)
Pre-correction returns (log)	0.498**	1.000	
Post-correction returns (log)	0.505**	-0.251	1.000
Unpopularity	-0.325	-0.740***	0.116

Notes: Significant at *10%, **5%, ***1%.

6 Conclusion

This study has proposed and tested a theoretical model in which campaign contributions depend on interest group unpopularity. According to our model, variations in the money spent on political campaigns by a given industry depend on that industry's reputation. More specifically, the electoral contributions from a given industry are always increasing

in its unpopularity. The intuition behind this result is rather 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, and since contributions from industries that are perceived less favorably by citizens are less effective in influencing voters, interest groups that represent these business interests will tend to spend more (less) when they experience a negative (positive) popularity shock. Our model shows that this effect prevails over the substitution effect which goes in the opposite direction, and should lead candidates to reduce their funding from less popular interests in order to avoid losing voter consent. Using data based on U.S. House elections, our econometric analysis confirms the theoretical results. As a final result, we provide some insight on the relationship between interest group unpopularity and the returns from campaign financing. By analyzing the relationship between our unpopularity index and the estimated rates of return from campaign contributions, we establish that unpopular industries tend to contribute more to electoral races primarily to compensate for their bad reputation, without obtaining significantly greater benefits with respect to more reputable interest groups.

Industry level popularity therefore plays an important role in determining political participation through campaign contributions. This seems to suggest that voters make use of the information relative to how politicians are financing their campaigns when casting their vote. Thus maintaining a good reputation, may be a valid way for an industry to successfully contain its political costs. An open issue for future research involves gathering a better understanding of whether unpopularity may affect the ability to solve the collective action problem within industries, by altering firms' incentives to coordinate. Moreover, it may be interesting to explore whether campaign advertising affects voter preferences over time.

Appendix

A. Proofs

Proof of Proposition 1. Each interest group k offers truthful contribution schedules:

$$C_{j,k}(p_{j,k}) = \max[0, -\theta_{j,k}\pi_j r_k(1-p_{j,k})^2 - X_{j,k}] \ , \forall j \in \{1,2\} \tag{A1}$$

where $X_{j,k}$ is a constant.

Assuming that all IGs finance candidates exclusively to influence policy (in Proposition 2 we show that there may exist at most one lobby that contributes also for electoral motives), from the FOCs of the maximization problem of each k, each group induces both parties to adopt a policy $p^*_{j,k}$ that satisfies the following condition:

$$p^*_{j.k} = \frac{(\theta_{j,k} r_k h \pi_j - g_k)}{(1+\theta_{j,k} r_k h \pi_j)}, \forall j \in \{1,2\}\,. \tag{A2}$$

This implies that $p^*_{j,k}$ is a decreasing function of g_k.

Assuming that all schedules are non-negative (which we later show is always true) we therefore have that:

$$C_{j,k}(p^*_{j,k}) = -\theta_{j,k}\pi_j r_k \left(\frac{1+g_k}{1+\theta_{j,k} r_k h \pi_j}\right)^2 - X_{j,k} \tag{A3}$$

In order to find $X_{j,k}$ we use the fact that truthful equilibria must satisfy the following

$$\max_{p_{j,k}} hC_{j,k}(p_{j,k}) - (g_k + p_{j,k})^2 = 0 \tag{A4}$$

which becomes:

$$hC_{j,k}(p^*_{j,k}) - (g_k + p^*_{j,k})^2 = 0 \tag{A5}$$

we therefore obtain that

$$X_{j,k} = \theta_{j,k}\pi_j r_k \left(\frac{1+g_k}{1+r_k h\pi_j}\right)^2 - (g_k + p^*_{j,k})^2 \tag{A6}$$

and substituting this value in (A3) we obtain:

$$C_{j,k}(p^*_{j,k}) = (g_k + p^*_{j,k})^2/h \tag{A7}$$

Finally, substituting (A2) in the expression above we obtain:

$$h\left(\frac{\theta_{j,k} r_k \pi_j (1+g_k)}{(1+\theta_{j,k} r_k h\pi_j)}\right)^2 \tag{A8}$$

It follows immediately that contribution schedules are non-negative, and whenever an interest group k interacts with a candidate j, the minimum amount of contributions needed to obtain policy $p^*_{j,k}$ are strictly increasing in g_k. ■

Proof of Proposition 2. Considering electoral motives, these apply whenever the marginal return of providing a given candidate j with more funds than those are strictly necessary to induce her to adopt a given policy, is greater then the cost.

We denote total contributions in absence of electoral motives with $\widehat{\mathbf{C}}_1$ and $\widehat{\mathbf{C}}_2$, and the corresponding probability of being elected of candidate j with $\widehat{\pi}_j$. When designing contributions to each candidate, each IG anticipates that $\widehat{\pi}_j = \pi_1(\widehat{\mathbf{C}}_1, \widehat{\mathbf{C}}_2)$ where:

$$\begin{aligned}\pi_1(\widehat{\mathbf{C}}_1, \widehat{\mathbf{C}}_2) &= \frac{1}{2} + b \\ &+ f\left[h(\widehat{\mathbf{C}}_1 - \widehat{\mathbf{C}}_2) - \sqrt{\sum_{n\neq k}(g_n + p_{1,n})^2} + \sqrt{\sum_{n\neq k}(g_n + p_{2,n})^2}\right],\end{aligned} \tag{A9}$$

Since $\partial\pi_1(\widehat{\mathbf{C}}_1, \widehat{\mathbf{C}}_2)/\partial C_{j,k} = fh$, electoral motives apply when the following inequality is satisfied:

$$fhr_k[(1-p^*_{-j,k})^2 - (1-p^*_{j,k})^2] > 1. \tag{A10}$$

Those interest groups for which this inequality holds will be willing to give additional contributions until the marginal benefit, given by the left hand side of (A10) is greater than marginal cost of contributions, which is equal to one.

The first thing to notice is that electoral motives never apply when $p^*_{1,k} = p^*_{2,k}$ since the left hand side of (A10) is always zero in these cases. Therefore considering the case in which policies differ, and assuming without loss of generality that $p^*_{1,k} > p^*_{2,k}$, it follows that only $j = 1$ can receive contributions for electoral motives, because the left hand side of (A10) is always negative for $j = 2$.

The second thing to observe is that if the marginal benefit of enhancing one candidate's chances of being elected differ for any two distinct interest groups $k, l \in \mathcal{K}$ with $k \neq l$, it follows that $r_k[(1 - p^*_{-j,k})^2 - (1 - p^*_{j,k})^2] \neq r_l[(1 - p^*_{-j,l})^2 - (1 - p^*_{j,l})^2]$. Therefore, since fh is the same for all IGs, at most one IG will finance the preferred candidate for electoral motives. Thus, for at least $\max[\sum_k \theta_{j,k} - 1, 0]$ IGs, (A8) holds with equality, which implies that $C^*_{j,k}$ is strictly increasing in g_k for at least $\max[\sum_k \theta_{j,k} - 1, 0]$ interest groups.

Notice also, that in order for there to be less than $\max[\sum_k \theta_{j,k} - 1, 0]$ IGs that finance candidates only for influence motives (i.e., more than one for which electoral motives apply), there must exist at least two distinct interest groups $k, l \in \mathcal{K}$ with $k \neq l$ such that $r_k > r_l$, for which $r_k[(1-p^*_{-j,k})^2-(1-p^*_{j,k})^2] = r_l[(1-p^*_{-j,l})^2-(1-p^*_{j,l})^2]$. By (A2) this can occur only for a specific value of $(g_l - g_k)$, and this value must be strictly positive implying that k must be more popular than l. Moreover, for these two groups the marginal return of contributing to enhance electoral odds must be the highest among all IGs, and it must satisfy (A10). ■

B. Unpopularity Index

We start from the following question taken from the Gallup 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". We calculate the net percentage of positive answers for each sector:

$$NP_{kt} = \%\text{very positive}_t + w(\%\text{positive}_t - \%\text{negative}_t) - \%\text{very negative}_t. \qquad \text{(B1)}$$

where $w = 1/2$. 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. Results are available upon request.

By respectively denoting maximum and minimum values of NP_{kt} with $\overline{NP}_t$ and $\underline{NP}_t$, we obtain our unpopularity index as follows:

$$g_{kt} = \left(1 - \frac{NP_{kt} - \underline{NP}_t}{(\overline{NP}_t - \underline{NP}_t)}\right) \cdot 100, \qquad \text{(B2)}$$

where $g_{kt} \in [0, 100]$.

C. Participation Equation and First Stage FE-IV Estimates

This appendix shows the estimates of the selection equations used as first stages in Table 2 and the first stage results of the FE-IV estimates reported in Table 3. Table C1 contains the estimates of the selection equation used to obtain the inverse Mills ratios used in Table 2. With the exception of 2006, unpopular IGs participate more to campaign funding than popular ones. The employment share is negatively correlated with the probability to finance a candidate, while the value added is positively related to this probability. Finally, incumbent, Republicans and female candidates are more likely to be financed. This result supports the idea that usually women run for an election only when they can raise enough funds and have a high probability of winning the election (Milyo and Schosberg, 2000).

Table C1: Electoral Contributions (Selection Equations)

	2002	2004	2006	2008
	(1)	(2)	(3)	(4)
Constant	-0.729***	-1.340***	0.790***	-2.895***
	(0.157)	(0.164)	(0.179)	(0.177)
Unpopularity	0.313***	0.326***	-0.003	0.443***
	(0.014)	(0.018)	(0.014)	(0.025)
Incumbent	1.246***	1.203***	1.226***	1.139***
	(0.026)	(0.024)	(0.023)	(0.024)
Open seat	0.947***	0.737***	0.821***	0.784***
	(0.037)	(0.039)	(0.044)	(0.040)
Employment	-0.154**	-0.641***	-0.242***	-1.265***
	(0.068)	(0.065)	(0.074)	(0.070)
Employment sq.	-0.031***	-0.078***	-0.035***	-0.147***
	(0.007)	(0.007)	(0.008)	(0.008)
Value added	0.231***	0.357***	0.343***	0.358***
	(0.018)	(0.019)	(0.017)	(0.018)
Republicans	0.149***	0.102***	-0.035	-0.096***
	(0.023)	(0.022)	(0.023)	(0.023)
Third parties	-0.878***	-0.966***	-0.893***	-1.497***
	(0.084)	(0.122)	(0.059)	(0.078)
Male	-0.193***	-0.131***	-0.133***	-0.159***
	(0.028)	(0.026)	(0.026)	(0.027)
Observations	14,519	15,513	16,786	16,156
Pseudo R-squared	0.198	0.193	0.206	0.213

Notes: This table reports the probit estimates used to obtain the entire set of inverse Mills ratios entering Table 2. Robust standard errors are reported in parentheses. Significant at: *10%, **5%, ***1%.

Table C2 reports the first-stage estimates of the IV-FE results presented in Columns 2-4 of Table 3. In Column 1, we only consider the fraction of women employed in office and clerical roles. In line with the literature on corporate reputation and equal opportunities, sectors with a higher fraction of women employed in these positions are perceived as more popular. In contrast, sector occupying more women in craft positions are perceived as more unpopular. By looking at the F-statistics, we can say that both instruments are strongly correlated with the unpopularity index. Notice that the size of the sector is negatively related to its unpopularity. That is, sectors occupying a larger fraction of the population or that

generate more value are also more popular. Finally, IG associated with incumbent candidates tend to be considered as more popular, although this result seems to be statistically weak.

Table C2: First-stage IV estimates

	(1)	(2)	(3)
Employment	-4.993***	-5.016***	-4.966***
	(0.117)	(0.118)	(0.118)
Employment sq.	-0.522***	-0.527***	-0.522***
	(0.012)	(0.012)	(0.012)
Value added	-0.492***	-0.498***	-0.498***
	(0.015)	(0.015)	(0.015)
Incumbent	-0.026*	-0.028*	-0.027*
	(0.015)	(0.015)	(0.015)
Open seat	-0.012	-0.013	-0.013
	(0.011)	(0.011)	(0.011)
Republicans	0.001	0.001	0.001
	(0.003)	(0.003)	(0.003)
Third parties	0.007	0.008	0.007
	(0.018)	(0.018)	(0.018)
Male	0.004	0.005	0.005
	(0.004)	(0.004)	(0.004)
Office (% women)	-0.452***		-0.388***
	(0.031)		(0.034)
Craft (% women)		0.275***	0.135***
		(0.027)	(0.030)
IG FE	Yes	Yes	Yes
Time dummies	Yes	Yes	Yes
F-test	176.424***	86.728***	86.275***
Observations	34,530	34,530	34,530
R-squared	0.425	0.423	0.425

Notes: This table contains the first stage coefficients of our IV estimates reported in Table 3. Columns 1-3 refer to Columns 2-4 of Table 3, respectively. Robust standard errors in parentheses. Significant at *10%; **5%; ***1%.

7 Acknowledgements

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Technical Appendix D: Regressions with a re-defined unpopularity index (Not Intended for Publication)

In Table D1, we provide a sample of the main regressions illustrated in the paper by using different weights for the construction of the unpopularity index. In particular, instead of using $w = 1/2$, we now use $w = 1$ (see Appendix B).

Table D1: Electoral Contributions (re-weighted Unpopularity)

	(1)	(2)	(3)	(4)
Constant	5.008***	3.861***	3.344***	4.579***
	(0.161)	(0.184)	(0.310)	(0.313)
Unpopularity	0.392***	0.380***	0.401***	0.382***
	(0.034)	(0.034)	(0.036)	(0.036)
Incumbent	0.833***	4.105***	4.093***	3.729***
	(0.098)	(0.167)	(0.167)	(0.145)
Open seat	0.573***	3.028***	2.998***	2.692***
	(0.068)	(0.147)	(0.149)	(0.103)
Employment		0.236***	0.012	0.314***
		(0.018)	(0.107)	(0.112)
Employment sq.			-0.025**	0.002
			(0.012)	(0.012)
Value added		0.299***	0.337***	0.275***
		(0.068)	(0.070)	(0.070)
Republicans	0.215***	0.326***	0.284***	-0.003
	(0.030)	(0.032)	(0.038)	(0.038)
Third parties	-0.773***	-3.086***	-3.274***	-0.994***
	(0.116)	(0.177)	(0.196)	(0.068)
Male	-0.085***	-0.441***	-0.435***	-0.321***
	(0.021)	(0.031)	(0.031)	(0.024)
Lopsided				-0.444***
				(0.084)
Unpopularity*Lopsided				0.008
				(0.022)
Unpopularity (between)	0.530***	0.556***	0.573***	0.570***
	(0.039)	(0.039)	(0.040)	(0.039)
Value Added (between)		0.291***	0.273***	0.298***
		(0.063)	(0.064)	(0.064)
Scale effect	-0.167***	-0.214***	-0.215***	-0.196***
	(0.024)	(0.025)	(0.025)	(0.024)
Significance of Mills ratios	Yes	Yes	Yes	Yes
Time dummies	Yes	Yes	Yes	Yes
Observations	36,098	36,098	36,098	36,098
R-squared	0.134	0.151	0.152	0.167

Notes: In this table we estimate the same specifications estimated in Table 2 using $w = 1$ instead of $w = 0.5$ to construct our unpopularity index (see also Appendix B). Robust standard errors are reported in parentheses. Significant at: *10%, **5%, ***1%.

Table D2 shows the second-stage IV-FE estimates for the re-weighted unpopularity index. These estimates are consistent with those reported in the article (Columns 2-4 of Table 3). The first-stage F-statistics are extremely large, whereas the p-value of the Sargan test is sufficiently high.

Table D2: Electoral Contributions (IV-FE)

	IV-FE (II stage)		
Instruments	Office	Professionals	Both
	(2)	(3)	(4)
Unpopularity	0.304**	0.991*	0.286*
	(0.153)	(0.547)	(0.153)
Incumbent	2.333***	2.366***	2.332***
	(0.081)	(0.087)	(0.081)
Open seat	1.857***	1.881***	1.857***
	(0.063)	(0.067)	(0.063)
Employment	3.232***	7.465**	3.117***
	(1.111)	(3.405)	(1.110)
Employment sq.	0.361***	0.794**	0.349***
	(0.113)	(0.348)	(0.113)
Value added	0.345***	0.771**	0.334***
	(0.118)	(0.346)	(0.118)
Republicans	0.075***	0.074***	0.075***
	(0.013)	(0.013)	(0.013)
Third parties	-1.849***	-1.859***	-1.849***
	(0.077)	(0.079)	(0.077)
Male	-0.201***	-0.206***	-0.201***
	(0.017)	(0.018)	(0.017)
Fixed Effects	Yes	Yes	Yes
Time dummies	Yes	Yes	Yes
First stage F-test	572.885***	84.291***	323.303***
Sargan (p-value)			0.173
Observations	34,387	34,387	34,387
R-square[a]	0.118	0.088	0.119

Notes: This table reports the second-stage IV-FE estimates for the re-weighted unpopularity index. Regressions include, time dummies, inverse Mills ratios and *IG* fixed effects. The R-squared refers to the within effect only. Robust standard errors are reported in parentheses. Significant at: *10%, **5%, ***1%.

Technical Appendix 2: Regression Diagnostics (Not intended for publication)

In this appendix, we test the assumptions behind our regressions.

Normality of Residuals

Figure E1 provides the kernel density estimates of residuals and the standardized normal probability plots for our main specification (Column 2 of Table 2). As you see below, residuals are rather close to a normal distribution. This means that we can trust our inferential analyses. This result is also confirmed by an interquantile range (IQR) test. According to this test, we have 0.4% of mild outliers (i.e., residuals that lie between 1.5 and 3 IQR away from the nearest quartile) and no severe outliers (i.e., residuals that lie above or below 3 IQR away from the nearest quartile).

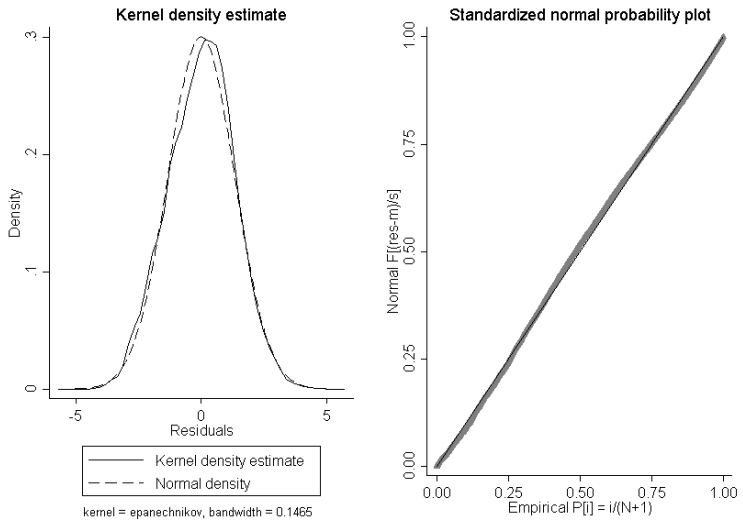

Figure E1: Diagnostic Plots for Normality of Residuals

Homoskedasticity vs Heteroskedasticity

In Figure E2, we plot the residuals versus fitted (predicted) values coming from Column 2 of Table 2. From this figure, we can see that the distribution of residuals is a little narrower for low fitted values than for high fitted values. This is an indication of heteroskedasticity and for this reason we used robust standard errors in our analysis.

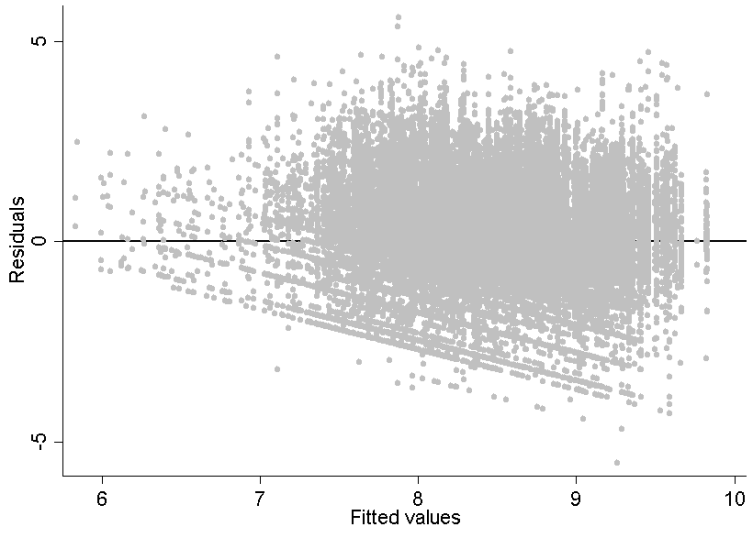

Figure E2: Diagnostic Plots for Heteroskedasticity

Nonlinear Effects of Unpopularity

Figure E3 shows a plot predicting contributions from unpopularity. Here, we compare a linear fit (solid line) with a lowess curve (dashed line). From this figure, we can easily see that the two lines overlap and therefore the relationship between the log of unpopularity and the log of contributions is linear. This evidence is perfectly consistent with our log-linear transformation of equation (14).

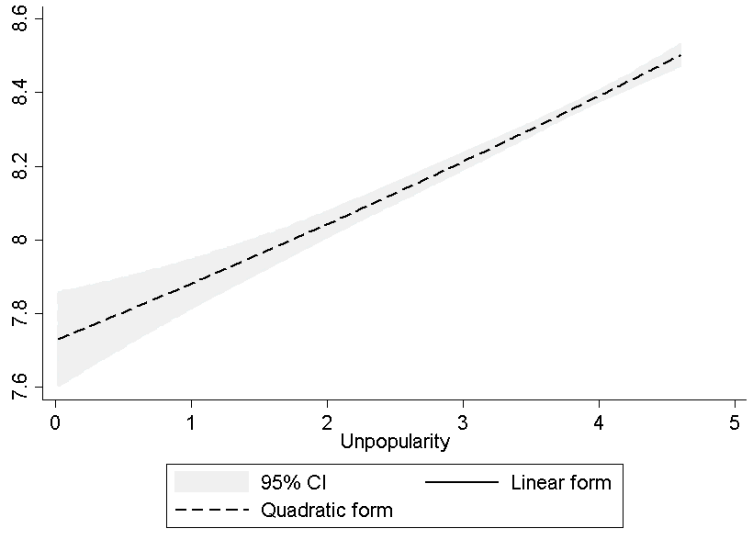

Figure E3: Diagnostic Plots for Linearity