Campaign Spending with Office-Seeking Politicians, Rational Voters and Multiple Lobbies

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Abstract

I introduce a microfounded model of campaign ¯nance with o±ce-seeking politicians, a continuum of voters, and a large number of heterogeneous lobbies. Lobbies make contributions to politicians according to a common agency framework. Politicians use contributions to ¯nance their electoral expenditures. Voters are not fooled by electoral expenditures: they are in°uenced in a way that is consistent with the equilibrium behavior of lobbies and politicians. The model is used to: (i) determine the relation between campaign spending and political deadweight; (ii) show the informational value of lobbies' contributions; (iii) evaluate the welfare implications of restricting campaign spending; and (iv) interpret the empirical ¯nding that campaign expenditures have a very low e®ect on election outcome. One can say that this model makes the best case in favor of campaign contributions. Nevertheless, under reasonable parameter values, a ban on campaign contributions is welfare-improving.

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1 Introduction

Money plays an increasingly important role in elections throughout the world. Candidates are spending larger and larger amounts on campaign-related expenditures such as TV commercials, billboards, rally organization, door-to-door propaganda, direct mailing, and professional political consultants. In 1996, the average cost of a winning U.S. House race was around $650,000 and the equivalent ¯gure for the Senate was above $4.5 million. In Europe spending has been traditionally at lower levels, but in some countries it growing very fast. In Britain, total spending by the two main parties has doubled from the 1992 election to the 1997 election to reach $75 million.

Campaign ¯nance is a hotly debated topic. People are generally uncomfortable with the mixing of money and politics. They fear that wealthy lobbies can obtain favors from politicians through implicit or explicit promises of campaign contributions. This fear is reinforced by the fact that some of the biggest contributors are unpopular industries, such as tobacco manufacturing. To respond to voters' concerns, most Western countries have introduced forms of campaign regulation.[1]

Unfortunately, we lack the theoretical framework to evaluate the welfare e®ects of campaign ¯nance regulation. As Austen-Smith [4], Morton and Cameron [26], La®ont and Tirole [20, p. 634], and Baron [7] have stressed, we do not have a microfounded theory of political competition which gives a role to campaign expenditures. Most of the existing models assume that electoral spending in°uences voters in an ad-hoc way, while in order to make welfare comparisons one needs to know the voters' primitives.[2]

In this paper I introduce a microfounded theory of campaign spending. There are three types of agents: politicians, lobbies, and voters. I employ a retrospective model of voting in which politicians maximize their chances of being re-elected. Voters are fully rational. They are heterogeneous and care about policy and valence of the politician in o±ce. Valence denotes politicians' personal attributes, such as competence or charisma, which a®ect all voters in a similar way.

There are a large number of organized interest groups.[3] Policy is multi-dimensional

[1] See Levitt [23] for a discussion of existing regulation in the US. In principle one may restrict candidates' entries (campaign contributions) or candidates' expenditures (campaign spending), or both. The US Supreme Court has ruled that limits on spending are uncostitutional because they constitute restrictions to the right to free speech. In contrast, limits on spending are in place in most European countries.

[2] There are a few exceptions, which will be discussed in the Literature subsection.

[3] This assumption seems realistic. Schlozman and Tierney [31] report over 5000 interest groups with paid personnel in Washington in 1981. Greenwood [15] reports more than 3000 groups with o±ces in

but each lobby is interested only in a small subset of policy dimensions. Given, the large number of lobbies, each lobby is small enough that the in°uence of its contributions on the electoral outcome is negligible. Therefore lobbies' contributions are service-induced. They o®er money to politicians in exchange for favors which take the form of policy positions bene¯cial to lobbies.[4]

Asymmetric information plays a central role. Professional lobbyists are in a better position than common voters to observe the valence of politicians. Lobbies take into account information on valence when they make their contribution choices. They do not do it because they care about valence directly, but because voters may end up ¯nding out about the politicians' valence. From the viewpoint of lobbies, the return of a dollar of contributions to a certain politician depends on the probability that the politician is re-elected. A high-valence politician is a better bet than a low-valence politician. Hence, lobbies are more willing to give to politicians they have positive information about.

Voters observe campaign expenditures and form beliefs about the valence of politicians. I require voters' beliefs to be consistent with the equilibrium behavior of lobbies and politicians. Campaign spending can in°uence voters only inasmuch as it brings them information.

One can say that the present paper makes the best case in favor of campaign contributions. All the assumptions made go in the direction of making campaign expenditures useful to voters: voters are not fooled; lobbies have no market power; and politicians do not pocket the contributions but only use them for informative purposes. One could have assumed that, confronted with campaign advertising, voters act on impulse and then regret it. Or that some large lobbies have bargaining power against single candidates. Or, still, that contributions are actually just a form of corruption, with the connected wasteful transaction costs.

It is therefore surprising that in this model, under reasonable parameteric assumptions, a ban on campaign contributions improves voter welfare. The intuition for this result does not have to do with the fact that campaign spending is a wasteful activity. Rather, it is akin to other negative welfare results in signaling games, such as Akerlof's rat race and can be sketched as follows. In equilibrium, a candidate who makes low campaign expenditures is perceived as a candidate who could not get money from lobbies because he was perceived as inept or uncharismatic. As this perception is correct in equilibrium, all good candidates

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[4] The service-induced model has been shown to have a good predictive power by Snyder [32].

are forced to sell out to lobbies. Under certain conditions (high informational asymmetry between lobbies and voters), the cost to voters of the candidate's selling out is higher than the expected informational benefit. In that case, if voters could pre-commit not to use campaign spending as a signal of candidate quality, they would gladly do it. But, as this commitment is not credible, there is scope for welfare-improving regulation.

The plan of this paper is as follows. The next subsection reviews the relevant literature. Section 2 presents the model and discusses its main assumptions. In order to keep the model tractable, I need to make simplifying assumptions on the role of challengers and on the information of voters. However, the model captures crucial aspects of campaign spending such as: voter information, incumbency advantage, value of insider information, and concentration of lobbies' fundraising ability.

Section 3 deals with the supply-side of campaign money. The goal of the politician is to collect a given amount of money (a war chest) with the lowest political cost possible (deadweight cost). The game between the politician and the lobbies is modeled according to the common agency framework introduced by Bernheim and Whinston [9]. As a result, deadweight is determined as a function of desired war chest, concentration of lobbies' fundraising abilities, and the lobbies' belief on the probability that the politician is re-elected.

Section 4 looks at the interaction between politicians and voters given the supply function of contributions. Voters are required to interpret campaign spending in a consistent way, that is, they cannot be `fooled' by politicians. With this requirement, I construct a revealing equilibrium in which the amount of campaign spending fully reveals the politician's valence to voters. The game has other equilibria as well but they do not survive the Intuitive Criterion refinement.

Section 5 analyzes the welfare properties of the revealing equilibrium in comparison with the equilibrium that would arise if campaign spending (or contributions) were forbidden by law. I identify a sufficient condition for campaign spending to decrease welfare. If the precision of voter information is low enough, then voters are better off if spending is forbidden. When voters are poorly informed, campaign spending is useful because it provides them with the information they lack. However, I show that the deadweight cost associated with campaign spending is greater than the informational benefit voters receive. This result may appear surprising in view of the fact that voters are fully rational. However, it has a parallel in the negative welfare results of other signaling games such as Akerlof's rat race.

Section 6 uses the present model to interpret the empirical ¯nding that campaign spending has very little e®ect on electoral outcome. A low observed e®ectiveness of campaign spending is shown to imply that campaign spending decreases voter welfare. Section 7 concludes.

Related Literature

This paper is closely related to two distinct strands of literature. The ¯rst is common agency theory. Developed by Bernheim and Whinston [9] and Dixit, Grossman, and Helpman [14] and applied by an increasing number of political economists, common agency o®ers a general theoretical framework to study the strategic interaction between interest groups and politicians. The theory (which will be brie°y reviewed in Section 3) provides strong arguments in support of one type of equilibrium, called truthful. Assuming that people play according to the truthful equilibrium, the theory yields sharp predictions on the outcome of the game and supplies an algorithm to compute equilibrium contribution schedules. Grossman and Helpman [16] use common agency to study a general model of spatial voting with two candidates and two interest groups. The model allows politicians to derive utility both from policy and from o±ce tenure and generates an endogenous distinction between electoral motive and in°uence motive. However, the existing applications of common agency do not model voters' decision making or (as in the case of Grossman and Helpman [16]) assume that voters are in°uenced by campaign spending in an ad-hoc way.

The second strand is the industrial organization literature on commercial advertising (Kihlstrom and Riordan [19] and Milgrom and Roberts [25]). Advertising is assumed to be not directly informative. Consumers are a®ected not by its message, but by the amount of money spent on it (advertising on mass media is the most visible and credible way of burning money). In a world of asymmetric information between ¯rms and consumers, a large amount of advertising by a ¯rm can be interpreted as a signal of some unobservable characteristics of the ¯rm. For instance, a ¯rm that is launching a new product may want to burn money in order to show its intention to stay in the market on the long-term. This in turn signals to consumers that the ¯rm believes to have a high-quality product.

I adopt the spirit of the literature on commercial advertising in assuming that voters (instead of consumers) interpret campaign expenditures (instead of advertising) in a way that is consistent with the structure of the model. The consistency requirement does not imply that each voter makes a complex inference every time he sees a political ad. It only means that voters as a body are not systematically fooled by campaign expenditures. The justification for the use of a consistency requirement in the present model is similar to the justification for the use of the rational expectation hypothesis in macroeconomics.

Two works go in the direction of microfounding campaign spending within spatial voting: Austen-Smith [3] and Prat [30]. In Austen-Smith [3], voters observe candidates' positions with a certain error, and campaign expenditures reduce the variance of that error. Thus, spending is assumed to be directly informative. An equilibrium is derived in which candidates' positions are affected by the desire of receiving contributions. However, in reality most political advertising seem to contain little verifiable information. Voters appear to be influenced by campaign expenditures, even when they are clearly devoid of any informational content (see the experiment conducted by Ansolabehere and Iyengar [2]).

In Prat [30], campaign expenditures do not have a direct informative value but they are used as a signal of candidates' valence. However, Prat [30] assumes that there is only one lobby. Besides the lack of realism, this is a significant limitation also because it puts all the bargaining power in the hands of the lobby. Hence, welfare results may be skewed on the negative side because the lobby is able to extract all surplus from the relation with politicians. Instead, the present work combines common agency and signaling to build a general model with a large number of heterogeneous lobbies.[5]

An entirely different way of microfounding campaign expenditures is proposed in Austen-Smith [5, 6]. Lobbies give contributions in exchange for access to politicians. Politicians are not interested in campaign money per se. They only care about the information that lobbies can provide them with. However, in the spirit of Crawford and Sobel's [12], the extent of truthful information transmission is increasing in the preference congruence between a lobby and the politician. Campaign contributions signal preference congruence and therefore induce the candidate to grant access to the lobbies that make them.

2 Model

The model introduced in this section includes features of spatial voting, retrospective voting, and signaling games. In the spirit of retrospective voting, the timing of the game is similar to Lohmann [24]. There are two terms. In the first term an incumbent (denoted

[5]See also Potters, Sloof, and van Winden [29] for a model of campaign expenditures as non-directly informative. However, their model is not embedded in the standard spatial competition model: candidates are modeled as selling unspecified favors.

with I) is exogenously put in power. During the first term, lobbies offer I monetary contributions in exchange for favorable policy choices. Lobbies' offers will be modeled in a common agency framework à la Bernheim and Whinston [9]. After observing the lobbies' offers, I chooses a position, which she will not be able to modify in the future. As a result of her policy choice, I collects campaign contributions which will form her war chest. In the end of the first term, a challenger appears and spends her war chest on campaign expenditures. Voters cast their ballot. In the second term, the election winner rules.

The model includes asymmetric information. I is characterized by a valence variable (charisma, integrity, ability, etc.) which benefits all voters independently of their political opinions. The valence variable is perfectly observed by lobbies and by I herself but only imperfectly observed by voters. Voters try to infer I's valence from the amount I spends on her campaign. One may object that such a deductive reasoning puts an unrealistically high burden on voters' reasoning ability. However, this inference need not be done in a conscious way. It is sufficient that campaign expenditures influence voters in a way that is consistent with the indirect informational content of such expenditures.

The present analysis focuses on two aspects: the competition among lobbies for political favors and the signaling role of campaign expenditures. By necessity, other important aspects of electoral competitions are left out of the analysis. In particular, the challenger role is modeled in the simplest possible way.

Incumbent: In the first term, a politician is exogenously put in power. Her valence is given by $g + \theta$. $g \in \Re$ is observed by all players including the voters and represents personal characteristics which can be verified (such as political record or performance in the first term). Instead, $\theta \in \{0, h\}$ is perfectly observed by lobbies and by the candidate and imperfectly observed by voters. θ captures those personal characteristics which cannot be verified (such as personal ability). I assume that the cases $\theta = 0$ and $\theta = h$ are equiprobable.

The policy space has n dimensions. I chooses $p \in \Re^n$. Examples of policy dimensions are: tariff rate on textiles, amount invested in education, strictness of abortion rule, etc. The choice of p is made in the first term and is valid for two terms. This assumption is meant as a reduced form of a reputational model in which politicians face a cost if they alter their policy positions significantly.

Voters: There exist a continuum of voters indexed by $j \in [-t, t]^n$ with $t \geq 0$. Given two vectors $x = (x_1, \dots, x_n)$ and $y = (y_1, \dots, y_n)$, let the Euclidean distance between them be denoted as $\|x - y\| = \sqrt{\sum_{i=1}^{n}(x_i - y_i)^2}$. If I has valence θ, chooses p, and is re-elected, Voter j receives a second-term utility

$$u_j^I(p; g; \theta) = g + \theta - \|p - j\|.$$

Thus, all voters equally benefit from valence but they have different opinions on policy.[6]

One may doubt that utility is separable in policy and valence. A left-wing voter may prefer an inept right-wing politician to an effective right-wing politician because the latter is more likely to live up to her promises and pass right-wing legislation. Still, an inept politician creates pure inefficiencies which are costly to all citizens. I assume that this generalized inefficiency effect dominates the partisan effect.

Lobbies: Both in the US and in the EU, there exist a very large number of organized lobbies. Typically each lobby cares only about a limited set of issues. For instance, a group representing textile producers will try to influence tariff rates on textile products but will have no interest in the strictness of abortion rules. Viceversa an anti-abortionist lobby will have no concern for textile tariffs. I capture this specialization phenomenon by assuming that each lobby cares only about one policy dimension.[7]

However, on each policy dimension there is usually more than one active lobby. To keep things simple, I assume that on each dimension exactly two lobbies are active and they have opposite interests. Each lobby minimizes the Euclidean distance from a bliss point, which is -1 for one lobby and +1 for the other. Hence, on dimension i, there is a "right" lobby R_i with payoff (net of contributions) $-k_i^R|1 - p_i|$ and a "left" lobby L_i with payoff $-k_i^L|1 + p_i|$.[8] The parameters k_i^R and k_i^L are both positive and will be discussed shortly.

Let π denote the probability of I winning the race, estimated by lobbies. I will discuss later how π is determined. The right lobby on i offers contribution schedule $c_i^R(p)$, while the left lobby on i offers contribution schedule $c_i^L(p)$. Contributions must be nonnegative.

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[6] As is well known, generically a voting equilibrium does not exist on a multi-dimensional policy space. However, the combination of the assumptions that voters are uniformly distributed on a hypercube and that their loss function is the Euclidean distance guarantees that a voting equilibrium exists and that the median voter theorem applies (Davis, DeGroot, and Hinich [13]).

[7] Lobbies represent voters, but only along one dimension. For instance, one voter may be represented on a dimension by his trade union, on another dimension by his religious affiliation, and yet on a third dimension by a car drivers' association. Conversely, a trade union may have religious members and non-religious members, and car lovers as well as bike lovers.

[8] The labels "left" and "right" have no relation with ideological positions. A left lobby on policy i has nothing in common with a left lobby on policy $j \neq i$.

The expected payoffs of the two lobbies on policy line i are:

$$\Pi_i^R = -k_i^R(1+\epsilon)|1-p_i| - c_i^R(p_i) \quad (1)$$

$$\Pi_i^L = -k_i^L(1+\epsilon)|1+p_i| - c_i^L(p_i) \quad (2)$$

The k-parameters play a crucial role in this analysis. They capture the importance of each lobby. A crucial aspect of interest group politics (See Lehman Schlozman and Tierney [31, Chapter 4]) is that lobby membership is not uniformly distributed across voters. Some segments of voters are overly represented in lobbying. This may be due to institutional settings (people who are in contact for other reasons are more likely to form a lobby) or to informational constraints (wealthy, better educated people are more likely to form a lobby). Thus the k-parameters can be viewed as the fundraising abilities of single lobbies.[9]

Given the contribution schedules of all lobbies, I selects $p^* \in \Re$ and receives $a = \sum_{i=1}^{n}[c_i^R(p) + c_i^L(p)]$. a represents I's war chest.[10]

Voter Information: At the election voters have imperfect information. I make the simplest possible assumption: with probability ρ voters have full information, that is, they observe a, p, and θ. With probability $1-\rho$ they have no direct information, that is, they only observe a. In that case, voters form belief $\beta(a)$ on the characteristics of I. $\beta(a)$ is determined in equilibrium.

Challenger: At the end of the first term a challenger appears. As the challenger has not been in office, he has not had the opportunity to collect a war chest. Therefore, the challenger makes zero campaign expenditures. I also assume that lobbies do not receive any insider information about the challenger. Thus, the expected valence of the challenger is common knowledge among all players and is given by expected valence $x \equiv E[g_c + \theta_c]$.

The assumption that only the incumbent can receive money is made for analytical simplicity. Of course, in reality, challengers do receive contributions and make expenditures. Nevertheless, incumbent spending dwarfs challenger spending. In the US, in more than

[9] Indeed (1) and (2) could be rewritten with k's at the denominator of contributions rather than as multiples of the benefit. The results will be unchanged.

[10] In reality, lobbies have two instruments to influence policy: campaign contributions and information provision. As Bennedsen and Feldman [8] have shown, the two instruments are not independent: the first tends to crowd out the second. However, this paper will only focus on the first instrument.

half of the districts the incumbent spends ten times more than the challenger.[11]

The challenger selects a policy vector p_c. Voter j casts his vote for the incumbent if and only if

$$g + E[\theta - \|p - j\|] \geq x - E[\|p_c - j\|]$$

Lemma 1. $p_c = 0$ is a dominant strategy for the challenger.

Proof. The challenger is elected if and only if the median voter votes for him (See Footnote 6). Hence, he maximizes the probability of being elected by selecting the median voter's ideal policy. □

Then, the incumbent is elected if and only if

$$g + E[\theta - \|p\|] \geq x$$

During the first term, the identity of the challenger is not known. I and the lobbies have common prior on x given by the cumulative distribution $F(x)$ continuous and with full support on $[0; \infty)$. $F(x)$ is assumed concave in x, which means that the frequency of challengers is decreasing with quality. The average quality of challengers may be lower, equal, or higher than the average quality of incumbents.

Probability of Election: From the preceding discussion, it follows that the ex ante probability of election for I is

$$e(g; \theta; p; a) = \rho F(g + \theta - \|p\|) + (1 - \rho) F(g + \beta(a)) \qquad (3)$$

that is, with probability ρ, I faces fully informed voters, while, with probability $1 - \rho$, she faces voters who only observe a. Clearly, I will face a tradeoff between increasing her war chest a and keeping p not too far away from the median voter. I has no policy preferences and chooses the policy vector p in order to maximize her probability of election.

[11] Prat [30] allows for contributions to both candidates (but with one lobby only), which adds additional negative welfare effects due to the strategic interaction between candidates. Morton and Myerson [27] show that, when both candidates can receive money and there are multiple lobbies, a coordination game among lobbies creates a generalized indeterminacy in the identity of the election winner.

Deadweight Cost: The term kpk represents the Euclidean distance of the policy selected by I from the median voter's ideal policy. I faces a tradeo® with regards to kpk. On one hand, she wants to minimize it in order to please the median voter. On the other hand, she may want to deviate from kpk = 0 in order to receive higher contributions from lobbies. The term kpk can be seen as the deadweight cost of campaign contributions, and will often be denoted with D. If campaign contributions are forbidden, I chooses D = 0. Hence, a deviation from 0 is only motivated by the desire of attracting higher contributions. Campaign contributions also provide an informational bene¯t to voters. The welfare analysis of Section 5 will explore the tradeo® between the informational bene¯t and the deadweight cost of campaign contributions.

Timing of the Race: To summarize:

1. First Term: The incumbent I is in o±ce. Everybody observes g. Lobbies and I observe µ. Lobbies choose contribution schedules. I sets p¤ and receives a war chest $a = \sum_{i=1}^{n}[c_i^R(p) + c_i^L(p)]$.

2. Electoral Campaign: A challenger with expected valence x appears. I uses a for campaign expenditures. With probability ½ voters are perfectly informed. With probability 1 ¡ ½ they only observe a. Voters cast their ballot.

3. Second Term: If I is elected, p is implemented. If C is elected, 0 is implemented. Payo®s are made.

3 The Supply of Campaign Funds

This section deals with the supply of campaign contributions. It is only a partial equilibrium analysis in which the incumbent's probability of election is taken as exogenous. Voters are not in the picture yet. The next section will consider the equilibrium of the whole model.

Each lobby o®ers a contribution schedule to I. A lobby interested in dimension i o®ers a payment contingent on p_i. This payment will also depend on the estimated probability that I is re-elected. As there are a large number of lobbies,

Assumption 1. Each single lobby takes I's probability of re-election as given.

As all lobbies have the same information, they estimate the same probability of re-election, which we denote with π. Clearly, π will depend on all the variables lobbies can observe, that is, g and θ.

Consider an incumbent with an estimated re-election probability π who wants to raise a campaign war chest a. From (3), her goal is to minimize the Euclidean distance of p from the median voter's preferred policy 0. Such distance is $\|p\|$. Then, I's problem can be rewritten as:[12]

$$\min_p \sum_{i=1}^{n} p_i^2 \quad (4)$$
$$\text{subject to} \sum_{i=1}^{n} \left[c_i^R(p_i) + c_i^L(p_i)\right] \geq a$$

We suppose that contribution schedules are continuous and differentiable (later, it will be shown formally that this is the case) and we form the Lagrangian for problem (4):

$$L(p; \lambda) = -\sum_{i=1}^{n} p_i^2 + \lambda \left(\sum_{i=1}^{n} \left[c_i^R(p_i) + c_i^L(p_i)\right] - a \right) \quad (5)$$

Each single lobby takes the contribution schedules of other lobbies and the Lagrange multiplier λ as given. Then, from the point of view of a lobby on dimension i, I's problem becomes:

$$L_i(p_i; \lambda) = -p_i^2 + \lambda\left[c_i^R(p_i) + c_i^L(p_i)\right] \quad (6)$$

Lobbies on i know that I gets a marginal benefit λ for each dollar of contributions from lobbies on i. This marginal benefit is independent of the contribution schedules of lobbies on i. If I reduces the amount of money she gets from dimension i, she can increase the amount she get from all other lobbies by an infinitesimal amount. As there are a large number of lobbies and contribution schedules are assumed to be differentiable, this has an infinitesimal effect on λ.[13]

[12] Clearly, minimizing $\sum_{i=1}^{n} p_i^2$ is equivalent to minimizing $\|p\|$. I use the former because it simplifies algebra.

[13] We must also exclude the extreme case in which $\frac{d}{dp_i} c_i^R(p_i) + c_i^L(p_i) = 0$ for all dimensions and all policies. To do that, it is sufficient to assume that there exist some dimensions on which $k_i^R \neq k_i^L$.

Thus, lobbies R_i and L_i solve respectively:[14]

$$\max_{c_i^R(\cdot)} k_i^R(1+\epsilon)p_i^* - c_i^R(p_i^*) \tag{7}$$
$$\text{subject to: } p_i^* = \operatorname{argmax}_{p_i} L_i(p_i;\lambda);$$

and

$$\max_{c_i^L(\cdot)} -k_i^L(1+\epsilon)p_i^* - c_i^L(p_i^*) \tag{8}$$
$$\text{subject to: } p_i^* = \operatorname{argmax}_{p_i} L_i(p_i;\lambda):$$

The game played between lobby R_i and lobby L_i according to (7) and (8) is a common agency problem. Common agency has been studied by Bernheim and Whinston [9] and by Dixit, Grossman, and Helpman [14]. There are several principals denoted with $m \in M$ (which correspond to lobbies in this model) and one agent (which corresponds to the incumbent). The agent must choose an action y out of a set of feasible actions Y. Principal m offers a contribution schedule $c_m : A \to [0;\infty)$. The principals' payoff is assumed to be separable in money and action. Thus, m chooses c_m in order to maximize $f_m(y) - c_m(y)$, where $f(\cdot)$ is the gross utility to m from action y. The agent's payoff depends on the total amount of contributions received and on the action chosen. In the present analysis, the payoff can be assumed to be separable in money and action. Hence, let the agent's payoff be $f(y) + \sum_{m \in M} c_m(y)$. The game is played in two stages. First, all principals simultaneously and noncooperatively choose contribution schedules. Second, the agent chooses an action y and receives the contributions corresponding to y.

Common agency games tend to have multiple equilibria. However, Bernheim and Whinston [9] show that only one type of equilibria is coalition-proof. This type of equilibrium emerges when all principals use truthful contribution schedules. Principal m plays a truthful contribution schedule if $c_m(\cdot)$ satisfies for all $y \in Y$

$$c_m(y) = \max(0; f_m(y) - \pi_m)$$

where π_m is a constant. A truthful contribution schedule is called "truthful" because it follows the shape of the principal's gross payoff bar the constant factor π_m and the satisfaction of the nonegativity constraint. Bernheim and Whinston show that, for any

[14] For simplicity, I assume that the bliss points of the two lobbies (-1 and 1) are never reached, so that the problem is equivalent to a problem in which the right lobby maximizes p_i and the left lobby minimizes p_i.

strategy played by the other principals, the set of best responses of principal m always contains a truthful schedule. Thus, each principal, can without loss restrict her attention to truthful schedules.

Thus, there are two reasons for thinking that truthful equilibria are more plausible than non-truthful equilibria: first, principals can focus without loss on truthful schedules; second, an equilibrium is coalition-proof if and only if it is truthful. Therefore, in this paper I will only consider truthful equilibria.

Lobbies on i offer truthful contribution schedules:

$$c_i^L(p_i) = \max(0; k_i^L(-(1+\epsilon)p_i - \pi_i^L)) \tag{9}$$

$$c_i^R(p_i) = \max(0; k_i^R((1+\epsilon)p_i - \pi_i^R)) \tag{10}$$

where π_i^L and π_i^R are constants.

Lemma 2. Given $\lambda > 0$ and ϵ, in the common agency game defined by (7) and (8), there exists a unique truthful equilibrium. In the truthful equilibrium, contribution schedules are as in (9) and (10) with

$$\pi_i^L = \frac{\lambda(1+\epsilon)^2}{4}[(k_i^R - k_i^L)^2 - (k_i^R)^2];$$

$$\pi_i^R = \frac{\lambda(1+\epsilon)^2}{4}[(k_i^R - k_i^L)^2 - (k_i^L)^2];$$

and I chooses policy

$$p_i^* = \frac{\lambda(1+\epsilon)}{2}(k_i^R - k_i^L).$$

We shall now combine Lemma 2 and minimization problem (4), to determine the policy vector p^* that is optimal for I given a and given the contribution schedules of all lobbies.

Proposition 1. Given ϵ, the total deadweight needed to raise a is

$$D \equiv \|p^*\| = \frac{a\delta}{1+\epsilon};$$

where

$$\delta = 2\frac{\sqrt{\sum_{i=1}^n (k_i^R - k_i^L)^2}}{\sum_{i=1}^n [(k_i^L)^2 + (k_i^R)^2]}$$

Proposition 1 gives an expression for the minimal deadweight cost associated with ϵ and a under the assumption that lobbies offer truthful contribution schedules. Let us briefly discuss the comparative statics of D

The fact that D is increasing in a is not surprising. If I has to give out D' to obtain a', then she will have to give out $D'' \geq D'$ to obtain a''. D is linear in a because the payoff functions of both lobbies and voters are linear in the Euclidean distance from their ideal policy. With other functional specifications, this relation need not be linear.

An important result is that D is decreasing in the estimated probability of election ϵ. With a higher ϵ, lobbies believe that it is more likely that I's policy vector p will be implemented for a second term. Therefore, they are willing to make higher contributions in order to steer p to their advantage. As we will see, ϵ depends positively on θ. Hence, given a, a candidate with $\theta = 1$ incurs a lower deadweight cost than a candidate with $\theta = 0$ in order to raise a. This will be the mechanism through which the amount of campaign contributions that one candidate has collected signal the candidate's θ to voters.

Finally, D is linear in δ. Recall that the k's represent the fundraising abilities of each single lobby. Then, δ can be seen as a concentration index of fundraising abilities. There are two extreme cases. If, on every policy dimension, both lobbies have the same fundraising ability, then $\delta = 0$. This is the best-case scenario for the incumbent. She collects the highest amount of contributions by choosing the median voter's ideal policy. The other extreme case occurs if on each dimension one lobby has no fundraising ability, which is as if only one lobby were active on each dimension. Let us assume without loss of generality that only right lobbies are active. Then, $\delta = \frac{2}{\sqrt{\sum_{i=1}^{n}(k_i^R)^2}}$. This is the worst-case scenario for the incumbent. Each lobby is a monopolist on its own dimension. Hence, for a given a, the deadweight cost increases as fundraising ability is more unequally distributed on each dimension.

4 Equilibrium on the Contribution Market

After examining the supply side of campaign finance, we turn to the demand side and we find the equilibrium of the whole model. The incumbent wants money to be able to influence voters. Voters are influenced by campaign expenditures because they take them as signals that the incumbent has a high valence. This section makes this argument formally by determining the existence and the properties of revealing equilibria.

Let us define:

$$D_\theta(a) = \frac{a\delta}{1+\varepsilon_\theta} \tag{11}$$

$$e_\theta(a) = \rho F(g + h - D_\theta(a)) + (1-\rho)F(g + \beta(a)) \tag{12}$$

The function $D_\theta(a)$ comes from Proposition 1 and represents the deadweight cost I must incur to collect a from lobbies if she is of type θ. The function $e_\theta(a)$ comes from (3) and gives the election chance of I if she collects a war chest a and if her type is θ. $\beta(\cdot)$ and ε are beliefs and will be determined in equilibrium.

Let us define a revealing equilibrium as $< a_0; a_1; \varepsilon_0; \varepsilon_1; \beta(\cdot) >$ such that

$$a_0 \neq a_1; \tag{13}$$

and, for $\theta \in \{0; 1\}$,

$$a_\theta = \mathrm{argmax}_a e_\theta(a); \tag{14}$$

$$\varepsilon_\theta = e_\theta(a_\theta); \tag{15}$$

$$\beta(a_\theta) = \theta + D_\theta(a_\theta): \tag{16}$$

Condition (13) guarantees that in equilibrium incumbents with $\theta = 0$ are separated from incumbent with $\theta = h$. (14) says that I maximizes her election chances given the beliefs of voters and lobbies. (15) and (16) require beliefs to be consistent. If these two conditions were not satisfied in equilibrium, it would mean that some agents in the model are systematically fooled. In particular, (15) requires the lobby's estimated probability of election to be consistent with the actual probability of election, while (16) implies that voters are influenced by campaign spending only to the extent that it transmits indirect information about I's type.

By combining (14) and (16), we immediately see that

Lemma 3. In a revealing equilibrium: (i) $e_0(a_1) \leq e_0(a_0)$; (ii) $e_1(a_1) \geq e_1(a_0)$; and (iii) $a_1 > a_0$.

Conditions (i) and (ii) are familiar incentive-compatibility constraints. Condition (iii) guarantees that the high-type takes a more costly action (in terms of deadweight) than the low type. If this were not the case, then the low type would gain by pretending to be a high type, which would violate (i).

To find a revealing equilibrium we guess the form of voters' beliefs and we construct the equilibrium from there. The resulting equilibrium has the property of achieving revelation at the lowest deadweight cost. Suppose that voters have beliefs

$$\beta(a) = \begin{cases} -D_0(a) & \text{if } a < a^* \\ h - D_1(a) & \text{if } a \geq a^* \end{cases} \tag{17}$$

for some $a^* > 0$. In other words, if total campaign expenditures are below a^*, voters believe that I has $\theta = 0$, while, if expenditures are at least a^*, they believe that $\theta = h$.[15] With this type of beliefs, any $a \in (0, a^*)$ is dominated by $a = 0$ and any $a \in (a^*, \infty)$ is dominated by $a = a^*$. Therefore, we can restrict our attention to $a \in \{0, a^*\}$. The three conditions of Lemma 3 become two: $e_0(a^*) \leq e_0(0)$ and $e_1(a^*) \geq e_1(0)$. However, we will assume that the former condition holds as an equality (this assumption is motivated in footnote 16). Thus, the conditions for a revealing equilibrium are:

$$e_0(a^*) = e_0(0) \tag{18}$$

$$e_1(a^*) \geq e_1(0) \tag{19}$$

By combining (12) and (17) and noticing that $D_0(0) = D_1(0) = 0$, we have

$$e_0(0) = F(g); \tag{20}$$

$$e_0(a^*) = \rho F(g - D_0(a^*)) + (1 - \rho)F(g + h - D_1(a^*)); \tag{21}$$

$$e_1(0) = \rho F(g + h) + (1 - \rho)F(g + h - D_1(a^*)); \tag{22}$$

$$e_1(a^*) = F(g + h - D_1(a^*)). \tag{23}$$

$e_0(0)$ and $e_1(a^*)$ are probabilities of election if I behaves according to her type. $e_0(a^*)$ is the probability of election of a low type who collects a war chest a^* in order to be perceived as a high type. With probability ρ voters will call her bluff, otherwise they will fall for it. $e_1(0)$ is the probability of election for a high type who does not bother to collect campaign funds. With probability ρ voters will find out her valence anyway, otherwise they will think she is a low type.

Now, we are ready to prove that the incentive-compatibility constraint for the low type (18) implies the incentive-compatibility constraint for the high type (19). This is a standard result in signaling games, but as the present game differs from games analyzed in the literature, a proof is needed:

[15] This type of beliefs is common in the industrial organization literature on advertising with rational voters. See, for instance, Milgrom and Roberts [25].

Lemma 4. (18) implies (19).

From Proposition 1, for any $a'' > a'$ the following inequality holds

$$D_1(a'') - D_1(a') < D_0(a'') - D_0(a').$$

This is a single-crossing condition. The policy cost of additional campaign finance is higher for the lower type, which explains why Lemma 4 holds.

Again, by Proposition 1, there is a simple relation between $D_0(a^*)$ and $D_1(a^*)$:

$$D_0(a^*) = \frac{1+\epsilon_1}{1+\epsilon_0} D_1(a^*)$$

However, by (15), lobbies' belief must be consistent. Therefore,

$$D_0(a^*) = \frac{1 + F(g + \theta_1 - D_1)}{1 + F(g)} D_1(a^*) \tag{24}$$

By putting together (18) and (24), we have

$$F(g) = \rho F\left(g - \frac{1 + F(g + h - D_1(a^*))}{1 + F(g)} D_1(a^*)\right) + (1-\rho) F(g + h - D_1(a^*)) \tag{25}$$

in which the only unknown is $D_1(a^*)$. Let the minimum positive solution of (25) be denoted with D^*. A fixed point argument on $D_1(a^*) = 0$ and $D_1(a^*) = h$ shows that D^* exists.

By using Proposition 1, we have that $a^* = \frac{(1+\epsilon_1)D^*}{\delta}$, which, by (15), implies that

$$a^* = \frac{(1 + F(g + h - D^*))D^*}{\delta} \tag{26}$$

The preceding discussion is summarized in:

Proposition 2. There exists a revealing equilibrium in which $a_0 = 0$ and $a_1 = a^*$, where

$$a^* = \frac{(1 + F(g + h - D^*))D^*}{\delta}, \tag{27}$$

and D^* is the minimum positive solution of

$$F(g) = \rho F\left(g - \frac{1 + F(g + h - D^*)}{1 + F(g)} D^*\right) + (1-\rho) F(g + h - D^*) \tag{28}$$

To interpret Proposition 2, recall that voters are informed with probability ρ and uninformed with probability $1 - \rho$. If voters turn out to be informed, a high-type incumbent has a higher election chance than a low-type incumbent. For this reason, lobbies are more willing to contribute to a high-type incumbent, which means that a high-type has a lower deadweight cost than a low type for each level of campaign contributions. If voters stay uninformed, then they are influenced by the level of campaign expenditures. Only if the level is above the threshold a^*, voters believe that the incumbent is a high type. This threshold is high enough that a low-type incumbent is indifferent between collecting a^* or making no expenditures at all. Instead, a high-type incumbent has a strict benefit from collecting a^*.

The equilibrium of Proposition 2 is not the only sequential equilibrium of the game considered here. In particular, there is a pooling equilibrium in which voters refuse to draw inferences from campaign expenditures and therefore the incumbent has no reason to make any. In a pooling equilibrium, when voters are uninformed, they do not learn the type of the candidate. The pooling equilibrium is supported by voters' beliefs

$$\beta(a) = \frac{1}{2}h \text{ for } a \in [0; \infty): \qquad (29)$$

Suppose that voters were to observe an incumbent with a positive level of campaign expenditures. According to belief (29), they should conclude that a positive expenditure can come with equal probability from a low-type or from a high-type.

To check whether the pooling equilibrium is plausible, one can apply the well-known Intuitive Criterion by Cho and Kreps' [11] which checks the plausibility of out-of-equilibrium beliefs. Suppose the incumbent makes a positive level of campaign expenditures a'. Voters should ask themselves what she is trying to signal. Suppose that, if voters believed that a' could only come from a high-type, then in fact a high type would be better off with $a = a'$ rather than with $a = 0$, while a low type would be worse off with $a = a'$ than with $a = 0$. Then, voters should conclude that only a high type may want to undertake such a deviation. In this case, one would say that the pooling equilibrium does not survive the Intuitive Criterion. Indeed, I prove that this is the case.

Proposition 3. The pooling equilibrium does not survive the Intuitive Criterion.

Hence, the fully revealing equilibrium of Proposition 2 appears to be more robust than the pooling equilibrium. From this point on, I will focus exclusively on the revealing equilibrium.[16]

[16] There are other revealing equilibria besides the one in Proposition 2, which involve higher expenditure levels than a^*. From the analysis on pooling equilibria, it is immediate to see that also these other revealing equilibria are killed by the Intuitive Criterion. Suppose that voters believe that a candidate is a high type only if she spends at least $a' > a^*$. Then, with those beliefs, in equilibrium only $a = 0$ and $a = a'$ are played. But, a deviation to $a \in (a^*; a')$ can only come from a high type.

Let us conclude the section with some comparative statics. In particular, it is interesting to see how an increase in voter information ρ affects deadweight and advertising expenditures.

Proposition 4. An increase in ρ causes a decrease in D^* and in a^*.

Both deadweight cost and campaign expenditures go down as voters become more informed. A higher probability that voters will be informed reduces the incentive for a low-quality candidate to mimick a high-quality candidate and the latter can signal his type with a lower war chest. As a result, the high-quality candidate needs to make less concessions to lobbies. Accordingly, countries where voters are highly informed will have low campaign expenditures. This prediction appears to be confirmed in Europe. Campaign expenditures are extremely low in the Netherlands and in Scandinavian countries, where the combination of small populations and high education levels make voter involvement notoriously high. On the other hand, campaign finance appear to be an important phenomenon in Italy, France, and, increasingly, Britain – three larger countries with a less informed electorate.[17]

5 Voter Welfare

We would like to understand whether campaign spending is beneficial or detrimental for voters. With campaign spending, I have argued that a revealing equilibrium is likely to arise. Voters learn the type of the candidate even when they are uninformed, but high-type candidates deviate from the median voter's ideal policy in order to secure campaign contributions from lobbies. Without campaign spending, the incumbent cannot signal her type. With probability $1 - \rho$ voters ignore θ. On the other hand, the incumbent always choose the median voter's ideal policy.

Voter welfare is defined here as the integral of utility over the continuum of voters. As voters are symmetrically distributed, maximizing voter welfare is then equivalent to maximizing the median voter's utility. Thus, in this section I will focus exclusively on the median voter's utility.[18]

[17] Kaid and Holtz-Bacha [18] provide a comparative analysis of the use of political advertising in the US and several European countries.

[18] If voters were not symmetrically distributed or if the social planner cared more about some voters than others, then the bias introduced by campaign advertising could actually be welfare improving because it would correct the distortion created by the median voter's dictatorship. Of course, the bias could also go in the opposite direction. So the symmetry assumption is an agnostic compromise.

Two remarks are in order with respect to the definition of welfare. First, the definition does include the utility of lobby members. They are counted in the same way as other voters. Second, the definition does not include the direct inefficiency arising from campaign spending per se. Electoral expenditures are unproductive and can use scarce resources such as labor or paper. This additional cost should be counted in the welfare measure, but is not. Thus, if we find that welfare is higher when campaign spending is prohibited, this result holds a fortiori if we include the direct inefficiency arising from campaign spending.

Let w_θ be the median voter's expected utility if it is known that the incumbent has zero deadweight and type θ. w_0 and w_1 depend on the distribution of the challenger's quality x:

$$\begin{aligned} w_0 &= E_x[\max(g; x)]; \\ w_1 &= E_x[\max(g + h; x)]: \end{aligned}$$

Similarly, let $\hat{w}$ be the median voter's expected utility if voters do not know what type the incumbent is (neither directly because they are informed nor indirectly because they infer it from campaign expediture):

$$\hat{w} = E_x[\max(g + \frac{1}{2}h; x)]:$$

Finally, let $\tilde{w}_1$ be the median voter's expected utility if it is known that I is a high type who has incurred a deadweight cost D^*:

$$\tilde{w}_1 = E_x[\max(g + h - D^*; x)]:$$

Let W be the median voter's ex-ante utility, that is, his expected utility before receiving any information about the incumbent. Let W_n denote the case in which campaign spending (or campaign giving) is forbidden and let W_s denote the case in which it is allowed. In the former case,

$$W_n = \rho\left(\frac{1}{2}w_0 + \frac{1}{2}w_1\right) + (1 - \rho)\hat{w}; \tag{30}$$

while, if campaign spending is allowed,

$$W_s = \frac{1}{2}w_0 + \frac{1}{2}\tilde{w}_1: \tag{31}$$

By putting together (30) and (31) we have:

Proposition 5. $W_n > W_s$ if and only if

$$\frac{1}{2}(w_1 - \bar{w}_1) > (1-\rho)\left(\frac{w_0 + w_1}{2} - \hat{w}\right) \tag{32}$$

Proposition 5 has an intuitive meaning. The left-hand side of (32) represents the expected benefit for the median voter of allowing campaign spending, while the right-hand side represents the expected cost. The expected cost is the difference between having a high-type incumbent with no deadweight cost and a high-type incumbent with D^*. The $\frac{1}{2}$ indicates that this cost is not sustained when the incumbent is low-type. The expected benefit comes from the ability of discriminating between high-types and low-types. It is immediate to see that it is always positive. The benefit is pre-multiplied by $(1-\rho)$ because if voters receive direct information, they can discriminate between high-types and low-types anyway.

Both sides of (32) are decreasing in the probability voters are informed: ρ. The expected cost is decreasing because D^* is decreasing in ρ. The expected benefit is decreasing because campaign spending is useful only when voters do not receive information directly. Therefore, Proposition 5 does not tell us whether the inequality $W_s > W_n$ is more likely to hold for low ρ's or for high ρ's. However, we can prove the following:

Proposition 6. For any g and h, if ρ is small enough, then $W_n > W_s$.

Proof. From Proposition 5, $\lim_{\rho\to 0}(W_n - W_s) > 0$ if and only if

$$\lim_{\rho\to 0}\left[\frac{1}{2}(w_1 - \bar{w}_1) - (1-\rho)\left(\frac{w_0 + w_1}{2} - \hat{w}\right)\right] > 0;$$

which – as w_0, w_1, and $\hat{w}$ do not depend on ρ – is equivalent to

$$\hat{w} - \frac{1}{2}w_0 - \frac{1}{2}\lim_{\rho\to 0}\bar{w}_1 > 0. \tag{33}$$

Consider (28) and take the limit as ρrightarrow0. The left-hand side is unchanged. Instead, the right-hand side tends to $F(g+h-D^*)$. Hence, we have

$$\lim_{\rho\to 0} F(g+h-D^*) = F(g)$$

$$\lim_{\rho\to 0} g+h-D^* = g$$

$$\lim_{\rho\to 0} E_x[g+h-D^*; x] = E_x[\max(g; x)]$$

$$\lim_{\rho\to 0} \bar{w}_1 = w_0.$$

Thus, (33) reduces to $\hat{w} > w_0$, which is true because $h > 0$. □

Proposition 6 identi¯es a su±cient condition for campaign spending to decrease welfare. If voters are almost completely uninformed, then welfare is higher if campaign spending is forbidden. This may seem surprising because campaign spending brings the highest informational bene¯t when voters are the least informed. However, also the deadweight cost associated with campaign spending is at its highest when voters are least informed. If voters are unlikely to get a direct signal about the incumbent's type, then a low-type incumbent has a high incentive to mimick a high type. In the limit, as ½ tends to zero, the bene¯t from campaign spending is equal for a low type and for a high type. To separate herself from the low type, the high type must \burn" through deadweight cost the whole bene¯t of being revealed as a high-type, that is, h.

One may wonder about the rationality of voters: if campaign spending reduces their welfare, why don't they just refuse to listen to it? Unfortunately, they cannot commit before the election to disregard electoral advertising. Once the the incumbent has sustained the expenditure, it is in the interest of voters to extract as much information as they can.

This negative welfare e®ect has a parallel in other signaling games. In the famous rat race, Akerlof [1] considers a principal who hires two agents of unknown type. After, say, six years, the principal must decide to promote only one of the two agents to a higher-paying job (notice the similarity with a ¯rst-past-the-post election). The principal cannot observe the amount of e®ort agents put in their work but only their outputs. Clearly, the optimal strategy for the principal is to promote the agent with the higher output. Knowing that, agents will work very hard in the ¯rst six years { harder than it is socially e±cient. Therefore, to accept the job in the ¯rst place, agents will demand a high salary. Under certain conditions, the principal would be better o® if she could commit in advance to promoting one agent at random. This would bring a bene¯t in terms of reduced salary that is higher than the informational loss. However, ex post the principal has an incentive to promote the agent with the higher output.[19]

6 The Observed E®ectiveness of Campaign Spending

Several authors have estimated the e®ect of campaign spending on voting behavior (for a survey, see Levitt [23]). Various datasets and econometric methodologies have been used. The vast majority of these studies suggest that campaign expenditures by an incumbent have very little in°uence on the incumbent's probability of re-election. For instance,

[19] A rat race e®ect has been documented by Landers, Rebitzer, and Taylor [21] for junior US lawyers.

Levitt [22] cannot reject the null hypothesis that campaign spending has no e®ect at all on election outcome. Although most of these studies use US data, Palda and Palda [28] ¯nd analogous results for French legislative elections.[20]

This section examines this somewhat surprising empirical ¯nding in the light of the present model. As we will see, the fact that the observed e®ectiveness of campaign spending is low has stark welfare implications.

Consider a political environment that behaves according to the game theoretical model described so far. An external observer ignores the underlying parameters as well as the function $F(¢)$. The only data the observer has are election outcomes and campaign spending. Because the model is binary, only two levels of campaign spending will be observed: 0 and $a^{¤}$. By regressing election outcomes on campaign spending, the observer obtains the gross e®ectiveness of campaign spending. The e®ectiveness is called \gross" because it overlooks the fact that spending and deadweight are determined together.[21] In our binary model the gross e®ectiveness of campaign spending consists of two election probabilities: one when $a = 0$, which we denote with $ª_0$, and one when $a = a^{¤}$, which we denote with $ª_1$. Based on these two election probabilities, what conclusions can the observer draw about voter welfare?

Proposition 7. Suppose that h À 0, there exists a $k > 0$ such that if $ª_1$ ¡ $ª_0 < k$ then $W_n > W_s$.

Proof. By Proposition 1, low-type incumbents choose $a = 0$ and high-types choose $a = a^{¤}$. Thus, by (20) and (23),

$$ª_0 = e_0(0) = F(g);$$
$$ª_1 = e_1(a^{¤}) = F(g + h ¡ D^{¤}):$$

Therefore, $ª_1$! $ª_0$ implies $F(g + h ¡ D^{¤})$! $F(g)$. The result that $W_n > W_s$ obtains as in the proof of Proposition 6. □

The intuition for Proposition 7 is straightforward. If one observes a low gross e®ectiveness of campaign spending, one should conclude that most of the informational bene¯t of

[20] Early studies based on cross-sectional data such as Jacobson [17] found that, while incumbent spending had little e®ect, expenditures by challengers were much more e®ective. However, recent studies based on more sophisticate approaches (such as Levitt's use of panel data) ¯nd that the e®ect of challenger spending is almost as low as that of incumbent spending.

[21] I assume however that the parameter g is constant across observations. This can be achieved in panel data such as those used by Levitt.

spending is offset by the deadweight needed to raise contributions. Then, it is as if voters were faced with two types of candidates: low types with no deadweight and high types with a deadweight which almost makes up the difference between a high type and a low type. This situation is certainly worse than the situation without contributions. There, voters are faced with `average' candidates who are superior to both a low type and a high type with high deadweight.

In this model a low observed effectiveness of campaign spending does not mean that spending is useless. Electoral expenditures still provide voters with valuable information. Unfortunately, the deadweight cost needed to raise contributions more than offsets the informational benefit. If we observe a low effectiveness, we should infer that the political system is in the rat race dilemma discussed in the end of the previous section. In such circumstances, forbidding campaign spending improves voter welfare.

7 Conclusions

In this paper I have constructed and analyzed a model of electoral competition with interest groups in which: (i) There are a large number of heterogeneous lobbies competing for political favors; (ii) Lobbies are better informed than voters on the personal characteristics of politicians; and (iii) Campaign expenditures influence voting behavior in a way that is consistent with equilibrium choices of politicians and lobbies. Such a rich model can quickly become unwieldy. Thus, I have had to make a number of simplifying assumptions, which can hopefully be relaxed in future research.

First, challengers have been modeled in a sketchy way. There is no asymmetric information about them. Although in reality, the bulk of campaign money goes to incumbents, a part of it does go to challengers. It would be interesting to model the signaling role of challenger spending as well. Prat [30] has studied the case of one lobby contributing to two candidates, which turns out to be quite complicate. This paper has tackled the case of several lobbies contributing to one candidate. Future research may solve the general problem of several lobbies contributing to several candidates.

Second, both in the US and especially in Europe, campaign finance is often managed by parties. Party leaders receive contributions (whether public financing, legal private funds, or illegal private funds) and make political expenditures on behalf of candidates of that party. The signaling role of expenditures is mediated by the signaling role of parties (which is studied by Caillaud and Tirole [10]). It would be important to examine the interaction between the two types of signals.

The main contribution of this paper is to show that it is possible to build a microfounded model of campaign ¯nance and to draw policy implications. More work is needed to obtain richer {but still microfounded{ models that can capture the full complexity of interest group politics and serve as the basis to evaluate the welfare e®ect of existing or proposed campaign regulation.

References

[1] George Akerlof. The economics of caste and of the rat race and other woeful tales. Quarterly Journal of Economics, 90:599{617, 1976.

[2] Stephen Ansolabehere and Shanto Iyengar. Going Negative: How Political Advertisements Shrink and Polarize the Electorate. The Free Press, New York, 1996.

[3] David Austen-Smith. Interest groups, campaign contributions, and probabilistic voting. Public Choice, 54:123{139, 1987.

[4] David Austen-Smith. Rational consumers and irrational voters: A review essay on black hole tari®s and endogenous policy theory. Economics and Politics, 3:73{92, 1990.

[5] David Austen-Smith. Strategic transmission of costly information. Econometrica, 62:955{63, 1994.

[6] David Austen-Smith. Campaign contributions and access. American Political Science Review, 89:566{581, 1995.

[7] David P. Baron. Electoral competition with informed and uninformed voters. American Political Science Review, 88(1):33{47, 1994.

[8] Morten Bennedsen and Sven E. Feldmann. Persuasion through the purse: How political contributions crowd out information. mimeo, Harvard University, 1998.

[9] B. Douglas Bernheim and Michael D. Whinston. Menu auctions, resource allocations, and economic in°uence. Quarterly Journal of Economics, 101(1):1{31, 1986.

[10] Bernard Caillaud and Jean Tirole. Parties as political intermediaries. Florence: June 4-8, ESF-EUI Conference on \The Political Economy of Economic Policy, 1997.

[11] In-Koo Cho and David Kreps. Signaling games and stable equilibria. Quarterly Journal of Economics, 102(2):179{221, 1987.

[12] Vince Crawford and Joel Sobel. Strategic information transmission. Econometrica, 50:1431{53, 1982.

[13] Otto A. Davis, Morris DeGroot, and Melvin J. Hinich. Social preference orderings and majority rule. Econometrica, 40:147{157, 1972.

[14] Avinash Dixit, Gene M. Grossman, and Elhanan Helpman. Common agency and coordination: General theory and application to government policy making. Journal of Political Economy, 105(4):753{769, 1997.

[15] Justin Greenwood. Representing Interests in the European Union. MacMillan, London, 1997.

[16] Gene M. Grossman and Elhanan Helpman. Electoral competition and special interest policies. Review of Economic Studies, 63:265{286, 1996.

[17] Gary C. Jacobson. Money and votes reconsidered: Congressional elections: 1972-1982. Public Choice, 47(1):7{62, 1985.

[18] Lynda Lee Kaid and Christina Holtz-Bacha. Political Advertising in Western Democracies: Parties and Candidates on Television. SAGE, 1995.

[19] Richard E. Kihlstrom and Michael H. Riordan. Advertising as a signal. Journal of Political Economy, 92:427{450, 1984.

[20] Jean-Jacques La®ont and Jean Tirole. A Theory of Incentives in Procurement and Regulation. MIT Press, Cambridge and London, 1993.

[21] Ren¶ee M. Landers, James B. Rebitzer, and Lowell J. Taylor. Rat race redux: Adverse selection and the determination of work hours in law ¯rms. American Economic Review, 86(3):329{348, 1996.

[22] Steven D. Levitt. Using repeat challengers to estimate the e®ect of campaign spending on election outcomes in the US house. Journal of Political Economy, 102(4):777{798, 1994.

[23] Steven D. Levitt. Policy watch: Congressional campaign ¯nance reform. Journal of Economic Perspectives, 9(1):183{194, 1995.

[24] Susanne Lohmann. Electoral incentives, informational asymmetries, and the policy bias toward special interest groups. mimeo, UCLA, 1997.

[25] Paul Milgrom and John Roberts. Price and advertising signals of product quality. Journal of Political Economy, 94:796{821, 1986.

[26] Rebecca Morton and Charles Cameron. Elections and the theory of campaign contributions: A survey and critical analysis. Economics and Politics, 4(1):79{108, 1992.

[27] Rebecca Morton and Roger Myerson. Decisiveness of contributors' perceptions in elections. mimeo, University of Iowa, 1998.

[28] Filip Palda and Kristian Palda. The impact of campaign expenditures on political competition in the french legislative elections of 1993. Public Choice, 94:157{174, 1998.

[29] Jan Potters, Randolph Sloof, and Frans van Winden. Campaign expenditures, contributions and direct endorsements: The strategic use of information and money to in°uence voter behavior. European Journal of Political Economy, 13:1{31, 1997.

[30] Andrea Prat. Campaign advertising and voter welfare. Discussion paper no. 97118, Center for Economic Research, Tilburg University, 1997.

[31] Kay Lehman Schlozman and John T. Tierney. Organized Interests and American Democracy. Harper and Row, New York, 1986.

[32] James M. Snyder. Campaign contributions as investments: The US house of representatives, 1980-1986. Journal of Political Economy, 98(6):1195{1227, 1990.

Appendix: Proofs

Proof of Lemma 2: By (9) and (10),

$$\hat{p}_i \equiv \operatorname{argmax}_{p_i} \lambda[c_i^R(p_i) + c_i^L(p_i)] - p_i^2 = \frac{\lambda(1+\epsilon)}{2}(k_i^R - k_i^L)$$
$$p_i^R \equiv \operatorname{argmax}_{p_i} \lambda c_i^R(p_i) - p_i^2 = \frac{\lambda(1+\epsilon)}{2}k_i^R$$
$$p_i^L \equiv \operatorname{argmax}_{p_i} \lambda c_i^L(p_i) - p_i^2 = -\frac{\lambda(1+\epsilon)}{2}k_i^L$$

Suppose that $c_i^R(\hat{p}_i)$, $c_i^L(\hat{p}_i)$, $c_i^R(p_i^R)$, and $c_i^R(p_i^L)$ are all nonnegative (we will check later that this is indeed the case). Then we can disregard the nonnegativity constraints in (9) and (10) and we have

$$c_i^R(\hat{p}_i) = \frac{\lambda(1+\epsilon)^2}{2}k_i^R(k_i^R - k_i^L) - \pi_i^R; \tag{34}$$
$$c_i^L(\hat{p}_i) = -\frac{\lambda(1+\epsilon)^2}{2}k_i^L(k_i^R - k_i^L) - \pi_i^L; \tag{35}$$
$$c_i^R(p_i^R) = \frac{\lambda(1+\epsilon)^2}{2}(k_i^R)^2 - \pi_i^R; \tag{36}$$
$$c_i^L(p_i^L) = \frac{\lambda(1+\epsilon)^2}{2}(k_i^L)^2 - \pi_i^L. \tag{37}$$

To find π_i^L and π_i^R, we apply Dixit, Grossman, and Helpman [14, Proposition 4]. Truthful equilibria satisfy

$$\max_{p_i} \lambda[c_i^R(p_i) + c_i^L(p_i)] - p_i^2 = \max_{p_i} \lambda c_i^R(p_i) - p_i^2 = \max_{p_i} \lambda c_i^L(p_i) - p_i^2,$$

which corresponds to

$$\lambda[c_i^R(\hat{p}_i) + c_i^L(\hat{p}_i)] - (\hat{p}_i)^2 = \lambda c_i^R(p_i^R) - (p_i^R)^2 = \lambda c_i^L(p_i^L) - (p_i^L)^2 \tag{38}$$

By substituting (34), (35), (36), and (37) into (38), we have a system of two equation in two unknowns, π_i^R and π_i^L:

$$\frac{\lambda^2(1+\epsilon)^2}{4}(k_i^R - k_i^L)^2 - \pi_i^R - \pi_i^L = \frac{\lambda^2(1+\epsilon)^2}{4}(k_i^R)^2 - \pi_i^R = \frac{\lambda^2(1+\epsilon)^2}{4}(k_i^L)^2 - \pi_i^L.$$

Provided that $\lambda > 0$, the statement of the lemma is proven.

It remains to check that $c_i^R(\hat{p}_i)$, $c_i^L(\hat{p}_i)$, $c_i^R(p_i^R)$, and $c_i^R(p_i^L)$ are indeed nonnegative. By substituting π_i^R and π_i^L in (34), (35), (36), and (37), we have

$$\begin{aligned}
c_i^R(\hat{p}_i) &= \frac{\lambda(1+\varepsilon)^2}{4}(k_i^R)^2 > 0; \\
c_i^L(\hat{p}_i) &= \frac{\lambda(1+\varepsilon)^2}{4}(k_i^L)^2 > 0; \\
c_i^R(p_i^R) &= \frac{\lambda(1+\varepsilon)^2}{4}[(k_i^R)^2 + k_i^R k_i^L] > 0; \\
c_i^L(p_i^L) &= \frac{\lambda(1+\varepsilon)^2}{4}[(k_i^L)^2 + k_i^R k_i^L] > 0.
\end{aligned}$$

By (9) and (10), this also proves that $c_i^R(\cdot)$ is differentiable on an open interval containing $\hat{p}_i$ and p_i^R and that $c_i^L(\cdot)$ is differentiable on an open interval containing $\hat{p}_i$ and p_i^L.

Proof of Proposition 1: Let $c_i(p) \equiv c_i^R(p) + c_i^L(p)$. Then, from Lemma 2,

$$c_i(p_i^*) = \frac{\lambda(1+\varepsilon)^2}{4}[(k_i^L)^2 + (k_i^R)^2]. \tag{39}$$

By summing (39) over i and by recalling that $\sum_{i=1}^n c_i(p_i^*) = a$,

$$\lambda = \frac{4a}{(1+\varepsilon)^2 \sum_{i=1}^n [(k_i^L)^2 + (k_i^R)^2]}, \tag{40}$$

which shows that $\lambda > 0$. This is not surprising. If $\lambda = 0$, it means that I has no use for marginal contributions. Thus, lobbies can reduce contributions without causing a change in policy.

From (9) and (10), we have that I's first-order condition for dimension i is

$$p_i^* = \frac{\lambda(1+\varepsilon)(k_i^R - k_i^L)}{2} \tag{41}$$

If we substitute (40) into (41), we have

$$p_i^* = \frac{2a(k_i^R - k_i^L)}{(1+\varepsilon)^2 \sum_{i=1}^n [(k_i^L)^2 + (k_i^R)^2]}.$$

By summing over policy dimensions, Proposition 1 is proven.

Proof of Lemma 4: Suppose that (18) holds as an equality. Then, (18) and (19) rewrite as

$$\begin{aligned}
\rho(F(g) - F(g - D_0(a^*))) &= (1-\rho)(F(g+h - D_1(a^*)) - F(g)) \\
(1-\rho)(F(g+h - D_1(a^*)) - F(g)) &\geq \rho(F(g+h) - F(g+h - D_1(a^*)))
\end{aligned}$$

or

$$F(g+h) - F(g) \leq F(g+h-D_1(a^*)) - F(g-D_0(a^*))$$

which is implied (because, from Proposition 1, $D_1(a^*) \geq D_0(a^*)$) by

$$F(g+h) - F(g) \leq F(g+h-D_1(a^*)) - F(g-D_1(a^*))$$

The latter inequality is true because $F(\cdot)$ is concave.

Proof of Proposition 3: In a pooling equilibrium, from (12), if $a = 0$, I's probability of election is given by

$$e_0(0) = \rho F(g) + (1-\rho)F(g + \frac{1}{2}h)$$
$$e_1(0) = \rho F(g+h) + (1-\rho)F(g + \frac{1}{2}h)$$

Consider the deviation $a = a'$ and suppose voters (if uninformed) believe that an incumbent with a' must be a high type. Then,

$$e_0(a') = \rho F(g - D_0(a')) + (1-\rho)F(g+h-D_1(a'))$$
$$e_1(a') = \rho F(g+h-D_1(a')) + (1-\rho)F(g+h-D_1(a'))$$

The deviation is profitable for a high type but not for a low type if $e_0(0) \geq e_0(a')$ and $e_0(0) < e_0(a')$, which correspond to

$$\rho(F(g) - F(g-D_0(a'))) = (1-\rho)(F(g+h-D_1(a')) - F(g+\frac{1}{2}))$$
$$(1-\rho)(F(g+h-D_1(a')) - F(g+\frac{1}{2})) \geq \rho(F(g+h) - F(g+h-D_1(a')))$$

From this point on, the proof proceeds as in Lemma 4. It is proven that such a' exists and, therefore, there the pooling equilibrium does not survive the Intuitive Criterion.

Proof of Proposition 4: Let

$$\psi(D^*;\rho) = \rho F\left(g - \frac{1+F(g+h-D^*)}{1+F(g)}D^*\right) + (1-\rho)F(g+h-D^*) - F(g):$$

From the fact that $F(g-D_0) < F(g+h-D^*)$, we see that $\frac{\partial\psi}{\partial\rho} < 0$. Also, as both $F(g-D_0(D^*))$ and $F(g+h-D^*)$ are decreasing in D^*, $\frac{\partial\psi}{\partial D^*} < 0$. By the Implicit Function Theorem,

$$\frac{dD^*}{d\rho} = -\frac{\frac{\partial\psi}{\partial\rho}}{\frac{\partial\psi}{\partial D^*}} < 0:$$

From (27), we see that $\frac{da^{¤}}{dD^{¤}} > 0$, which implies that

$$\frac{da^{¤}}{d½} = \frac{da^{¤}}{dD^{¤}}\frac{dD^{¤}}{d½} < 0:$$