Business and Politics

Volume 6, *Issue* 3 2004 *Article* 2

The (Sometimes Surprising) Consequences of Societally Unrepresentative Contributors on Legislative Responsiveness

Michael Bailey*

*Georgetown University, baileyma@georgetown.edu

The (Sometimes Surprising) Consequences of Societally Unrepresentative Contributors on Legislative Responsiveness*

Michael Bailey

Abstract

The conventional view of private campaign contributions is that they distort policy to the detriment of society. Formal models consistent with such views, however, are based on restrictive assumptions about the nature of campaigns, interest groups and policy dimensionality. This paper relaxes those assumptions and allows for informative campaigns, multiple interest groups and multiple issue dimensions. It uses analytical and computational methods to demonstrate that private campaign contributions from societally unrepresentative contributors can, under reasonable conditions, improve social welfare. Multidimensionality is important because politicians need to be responsive on salient issues to prevent opponents from raising money based on less salient issues and using the money to publicize positions on salient issues.

KEYWORDS: campaign finance, representation, computational models

---

*I am grateful to Sven Feldman, Ian Gale, Jeff Milyo, Thomas Stratmann and participants at talks at University of California, Berkeley, the University of Chicago, Georgetown University and George Mason University for helpful comments.

1 Introduction

Understanding the influence of money in politics is a high stakes enterprise. Not only does our view of money affect how we perceive the possibility and practice of democracy, it also undergirds an ongoing – and contentious - political battle over the proper way to regulate campaigns and fundraising. The conventional wisdom about money in politics is that private contributions reduce social welfare by skewing policy toward policies preferred by contributors (see *inter alia* Drew 1999; Clawson, Neustadtl and Weller 1998). This view is consistent with leading formal models on the topic that find that campaign contributions push candidates toward the policies preferred by donors (Austen-Smith 1987; Baron 1994; Grossman and Helpman 2001; Prat 2002).

The formal literature on this topic is quite diverse, but existing models make restrictive assumptions. Often there is an assumption – sometimes implicit – that candidates can buy votes. Policy is also typically assumed to be one-dimensional and sometimes there is only one candidate in the model. I show in this paper that these assumptions bias models toward an overly negative view of money in politics. In particular, the welfare-reducing effect of private contributions is not robust to relaxing the assumptions of vote buying and unidimensionality, even when contributors are self-interested and unrepresentative of the voting population.

I base this argument on analytical and computational analysis of a model of representation in which interest groups fund political candidates who spend the money informing voters. The model is distinct from Austen-Smith (1987) and Baron (1994) by, among other things, having multiple dimensions with multiple interest groups. It is distinct from Grossman and Helpman (2001) by, among other things, having campaigns that inform voters. I discuss below empirical results that support such an assumption.

The central result is that allowing or increasing private contributions increases net democratic responsiveness under empirically plausible conditions, including conditions in which money comes from contributors who are not representative of society. The reason is that if candidates are not responsive on salient issues, rivals can use policy positions on a less salient issue to raise money that they can spend informing voters of a popular issue stand on the salient issue. In equilibrium, candidates anticipate this with the result that increasing potential contributions can *increase* responsiveness on issues voters care about at the expense of decreased responsiveness on less salient issues. Such a tradeoff is consistent with much empirical work on interest groups; modelling it provides a useful point of reference for thinking about reform and the future agenda of research on money in politics.

This paper proceeds as follows. Part 1 identifies key assumptions in the existing formal literature on money in politics and raises the possibility that relaxing these assumptions may fundamentally alter results. Part 2 develops a model which relaxes these assumptions based on results from the empirical literature. Part 3 uses analytical and computational methods to characterize equilibrium behavior in the model.

2 Modelling Money and Representation

Money enters politics in roughly the following process. A politician takes policy positions and raises money from contributors. The politician then spends the money in a campaign that affects voters' election day choices. This section works backward through this process by examining existing approaches to modelling how money affects voters, where it comes from, who raises it and the nature of the policy space. In doing so, I identify key assumptions that are empirically implausible and demonstrate how they may lead to overly negative assessments of the effect of money on politics.

2.1 Effect of Money on Voters

My point of departure is the point at which money spent by candidates affects voter choices. In many papers, scholars assume that the more a candidate spends, the more votes he or she gets (see, for example, Snyder 1989, 637). In other words, ads buy votes; the more ads a citizen sees, the more likely he or she is to vote for the candidate placing the ad. It is intuitively appealing to say candidates increase their votes by spending more money; after all, why else would politicians spend it? The conclusion from this literature is "if campaign expenditures 'buy' the votes of citizens, then campaign contributions will 'buy' at least some of the votes of elected representatives" (Mueller and Stratmann 1994, 73). But the mechanism is too simple. It requires voters to be profoundly naive, responding favorably to campaign spending no matter what the issue positions of the candidates are (Morton and Cameron 1992). Bias toward contributors in this context is not surprising.

Some scholars soften the vote-buying assumption by including voters who cannot be bought. Baron (1994) and Grossman and Helpman (2001, chapter 10) divide voters into perfectly informed voters who vote rationally based on candidate policy positions and uninformed voters who are swayed by spending. But the original critique - that the results hinge on the naivete of voters – persists. In addition, both papers assume that the proportion of

uninformed voters is fixed, thereby excluding a central element of campaigns – the strategic conversion of uninformed voters to informed voters.

Another approach to modelling the effect of money is to view campaign spending as a signal of candidate quality. In Prat (2002), a single campaign contributor observes candidate quality better than relatively uninformed voters do. Candidate quality is taken to be a set of non-policy related characteristics that are unambiguously good for all voters. The contributor avoids wasting money on low-quality candidates who will probably lose, so he or she only contributes to high quality types. Candidate spending, then, can be a credible signal to voters that a candidate is of high quality. To finance the spending, though, a high quality candidate must make it worth the contributor's while by selecting a policy favorable to the contributor. The net result is that voters can be worse off: even as they have more reliable information about candidate quality, voters pay for it in terms of policy favors high quality candidates grant the contributor.

While signaling models offer extraordinary promise, several of the assumptions in the existing signaling models bias the results against money. For example, voters in Prat's model are perfectly informed of candidate policy positions and campaign ads provide no substantive information, thereby eliminating a main reason the money raised in campaigns may have redeeming value. Assuming voters are perfectly informed about policy also creates an extraordinarily optimistic no-money baseline in which candidates converge to the median voter's preference. One would suspect that in the absence of campaign spending, candidates converge to policies disproportionately favorable to well-informed voters. In addition, there is only one interest group in the model, meaning that group competition – a potential constraint on the influence of money – is not considered. Prat (2000) introduces multiple lobbies in a signaling model, but retains the assumption that no policy information is transmitted in ads and adds further assumptions, including one that only the incumbent receives contributions and that voter preferences satisfy the Plott conditions in multiple dimensions.

A final approach to modelling money in politics is to assume that money buys campaign efforts that inform voters (see also Bailey 2003; Coate 2001; Mueller and Stratmann 1994; Ashworth 2003). This approach posits that voters are relatively sophisticated about information and that endorsements, third party verification and other means allow politicians to transmit meaningful information to rational voters (Banks 1990; Popkin 1991; Lupia and McCubbins 1998). This approach is reasonable in light of empirical evidence. For example, Coleman and Manna (2000: 757) find that campaign spending

> improves the public's ability to place candidates on ideology and is-

> sue scales, and encourages certainty about those placements. Rather than permit House members to mask their voting records, incumbent spending helps improve the accuracy of citizen perceptions of the incumbent's ideology.

Additional evidence that campaigns inform voters is provided by Brians and Wattenberg (1996); see Bailey (2004) for additional discussion of this literature.

2.2 Sources of Campaign Contributions

Where does the money come from? In Bailey (2003), candidates' money is exogenous; it simply appears with no strings attached. In that model, money has few negative effects, but this is hardly surprising given the aspect of most concern about money – that contributors give it in order to influence policy – is not in the model. The main concern about money is precisely that it is proffered with some self-interested intent by an individual or group who may not share the general public's preferences. How then can we model the contribution process in a general way?

The challenge here is that modelling contributions in a general manner may render a model intractable. Therefore, it is common in the literature to model contributions in a stylized manner. For example, Baron (1994) and Coate (2001) assume that contributors are irrevocably attached either to a specific party or candidate. This assumption is artificial – it is, after all, common for groups to give to candidates from both parties or to switch from one party to another. Such assumptions limit competition and could exert a powerful influence on results: on the one hand, contributors could become captive to extortion by politicians or, on the other hand, politicians could become captive to a fixed group of contributors.

2.3 Political Actors

The identity and characteristics of the politicians are important as well. Some models have only one politician (Grossman and Helpman 2000, chapters 7 and 8). These models assume that contributions increase the utility of the policymaker; countervailing forces from competition by other candidates and contributors are modelled with an exogenous term that indicates the relative weight the policymaker places on the public welfare. This avoids the central question of how political competition generates countervailing incentives to promote the public welfare (if it does at all). Prat (2000) has an incumbent and challenger, but only the incumbent can receive campaign contributions.

2.4 Dimensionality of Policy Space

Finally, tractability concerns typically limit models to one dimensional policy space. Given the huge effect multidimensionality has in standard spatial voting models, ignoring multidimensionality in contribution games is a major lacuna. As I show below, the effect of having multiple dimensions is profound because cross-dimensional coalition building by politicians strongly affects equilibrium choices.

3 A Model with Multiple Issues and Interest Groups

3.1 Informative campaigns and multiple dimensions

This paper seeks to avoid many of the potential biases identified so far by developing a multidimensional model of informative campaigns. In this section, I summarize the modelling strategy and formalize the game.

In the model, money provides information to voters. One way to model informative campaigns is to allow campaign spending to reduce the variance of the uncertainty voters have about candidate positions (Austen-Smith 1987; but see also Hinich and Munger (1994) who allow spending to increase or decrease uncertainty). If voters are expected utility maximizers, reducing this variance necessarily increases utility. This means that all candidates benefit from spending on all voters, irrespective of the candidates' issue positions. For example, all voters become more likely to vote for David Duke or Al Sharpton as these candidates increase their spending. In effect, this reduces informative campaigning to vote buying, albeit with a more explicit policy component than other parts of the literature.

In order to prevent the informational model from becoming functionally equivalent to a vote-buying model, I assume that campaign spending increases the probability that a voter chooses the spatially closer candidate. In such a perspective, spending increases voter information in a manner that reduces the likelihood a voter picks the "wrong" candidate. For example, a candidate can convert money into information by spending money on a campaign advertisement that documents his or her votes on partial-birth abortion legislation and also includes a video clip of an opponent's speech on the issue. Or, a candidate may use campaign funds to air an ad which touts an endorsement by the Sierra Club, a credible indication that the candidate is more amenable to government environmental regulations than his or her opponent. The assumption is that these ads do not lead voters to believe things that are not

true (something that may or may not be completely true and which I discuss in the conclusion) and that ads do not change voters positions on issues.

The model also allows for more general competition than is typical in the literature. There are two candidates and multiple contributors in the model. Groups are not wedded to a given party or candidate as in other models. I also allow the policy space to be multidimensional; this is not crucial for all results, but is essential to the last – and most important – results about what money does to responsiveness when contributors are not representative of the society.

3.2 The model

In the model voters vote probabilistically for the candidate who is spatially closer (Enelow and Hinich 1989).[1] Specifically, let

$$\begin{aligned} \text{Pr i votes for C} &= P[\epsilon_i < -\sum_{m=1}^{M} \gamma_{im}(x_{im} - x_m^C)^2 + \sum_{m=1}^{M} \gamma_{im}(x_{im} - x_m^I)^2] \quad (1) \\ &= P[\epsilon_i < d_i] \quad (2) \end{aligned}$$

where C is the challenger, x_m^k is the position of candidate k on dimension m, γ_{im} is voter i's intensity of preferences on issue m, x_{im} is voter i's ideal point on dimension m, ϵ_i^k is a random shock and d_i is the shorthand for spatial difference for voter i between the challenger and incumbent. The random shock is distributed according to a linear probability density discussed in the appendix. The dimensions can be policy dimensions or predictive ideological dimensions (Hinich and Munger 1994). There is no abstention.

Voters are members of one of B homogenous voting blocs in which all voters have identical preference parameters (but realize individual realizations of the random variable). Henceforth, all voter parameters will be subscripted by b to indicate membership in a voting bloc. If all voters are unique, the number of voting blocs is the number of voters.

The random shocks come from a different distribution for each voting bloc. Blocs with significant uncertainty have wide distributions (such that large shocks are relatively likely) and blocs with little uncertainty have narrow distributions. The variance parameter is for each bloc is $v_b = \frac{v_{0b}}{1+R_b}$, where v_{0b} is initial uncertainty and R_b is the total amount of resources allocated toward

[1] As with most models in the literature, this is a reduced form treatment of a complex process. I do not consider the potential for voters to infer policy positions based on contributions or spending behavior. Since low-information voters are at the heart of the model, this is not unreasonable here or elsewhere.

informing the bloc by both candidates. The more candidates spend informing a bloc, the less randomness is associated with voting by the bloc's voters.

Candidates maximize expected votes. They commit to positions and do not change their positions once announced. The expected number of votes for the challenger and incumbent are

$$V^C = \sum_{b=1}^{B} n_b \mathrm{F}[d_b, v_{0b}, R_b] \quad (3)$$

$$V^I = \sum_{b=1}^{B} n_b (1 - \mathrm{F}[d_b, v_{0b}, R_b]) \quad (4)$$

where n_b is the number of voters in bloc b and F is the CDF of the random variable.

Contributors care about the amount they contribute to the candidates and the expected policy of the candidate elected. I use the terms contributors and interest groups interchangeably. They calculate expected policy outcomes in terms of expected votes. The utility of group g is

$$\mathrm{U}_g = \sum_{m=1}^{M} \gamma_{gm} \{V^C x_m^C + V^I x_m^I\} - R_g \quad (5)$$

where γ_{gm} measures group intensity of interest on dimension m and R_g indicates total contributions made by the group. If γ_{gm} is negative, the group desires policy to be as low as possible on dimension m; if γ_{gm} is positive, the group desires policy to be as high as possible on dimension m. Policy interest, resource levels and campaign finance policy affect the γ for the groups. For example, if a one group has limited resources relative to another, the opportunity costs of spending money on contributions will likely be higher, making the γ parameter relatively low. Contributors are allowed to contribute to neither, either or both candidates.

The group utility equation incorporates two simplifying assumptions. The first is nonsatiation by the interest groups. That is, interest groups always want higher policies if $\gamma > 0$ or lower policies if $\gamma < 0$. This is a reasonable approximation for most interest groups who, in the realm of viable policy space are at preference extremes. This assumption allows us to avoid mathematical complications that arise from using spatial preferences for contributors. The second simplifying assumption is that expected policy is calculated in terms of vote share rather than probability of winning. This is a mathematically convenient way to approximate the probability of winning. Austen-Smith (1987, 128) uses it as well.

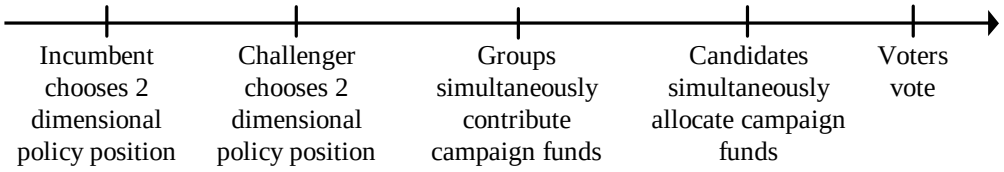

Figure 1: Sequence of Game

The sequence of the game is depicted in Figure 1. The candidates select two dimensional policy positions, groups contribute and then there is a campaign. Both candidates are perfectly informed about all voter attributes except the realization of random shocks. The incumbent moves before the challenger. This is empirically attractive, as incumbents have to build a record in office before challengers need to declare their positions. This is also a modeling necessity. If candidates were allowed to choose policy simultaneously, equilibrium cannot be guaranteed because equilibrium in simultaneous choice probabilistic voting models requires a sufficient degree of uncertainty (Enelow and Hinich 1989). As uncertainty decreases, at some point a simultaneous choice model would have the same indeterminacy of multidimensional deterministic models.[2]

In the contribution stage, the two groups simultaneously contribute to candidates. If multiple groups wish to contribute to a candidate, the total amount contributed is the amount preferred by the group desiring to contribute the most. If contributions to the candidate are less than this amount, at least one group has an incentive to contribute more; if contributions to the candidate are more than this amount, all groups have an incentive to contribute less. I do not model the allocation of burden across groups who wish to support the same candidate. It is possible that collective action problems would undermine

[2] One concern is that the challenger may have a second mover advantage. That is, it is possible that the challenger, upon observing the choice of the incumbent, can at least guarantee a tie in expectation by mimicking whatever the incumbent has done. However, if incumbents have "valence" advantages for voters (in terms of personal qualities, name recognition or ability to generate government spending) and valence advantages for interest groups (in terms of being able to deliver policy today instead of in the future, as for the challenger), the second mover advantage of the challenger can be more than offset. This implies that sequential choice does not necessarily imply that the challenger will be more likely to win the election. Adding these elements to the model dampens, but does not eliminate the results below. Doing so also complicates the analysis and presentation considerably and, in the interest of keeping the discussion clear, I do not incorporate them here.

the ability of groups to reach this level (see the useful discussion on collective action problems for contributors in Grossman and Helpman 2001).

In the campaign stage, candidates strategically allocate the money they have raised across the voting blocs. This money goes toward reducing the variance of the random shock of the voting bloc. The effect is the same in this context whether the campaign informs voters about either or both of the candidates.

After the campaign, voters vote based on policy positions and realized levels of the random shock. Voters in blocs with considerable information (either due to high ex ante information or due to increases in information during the campaign) will likely vote for the spatially closer candidate. Voters in blocs with little information will be less likely to vote for the candidate who is spatially closer.

4 Results

The goal of the model is to understand when money helps or hinders responsiveness. I evaluate responsiveness in terms of social welfare of a equilibrium policy. It is the negative sum of distances of the policy from each voter. A policy that is, on average close to voters' ideal points yields a higher social utility than a policy that is, on average, far from voters' preferred policies. It is

$$W(x_m) = -\sum_{b=1}^{B} n_b \sum_{m=1}^{2} \gamma_{bm}(x_{bm} - x_m)^2. \tag{6}$$

The socially optimal policy position maximizes this quantity.[3] A political equilibrium consists of a subgame perfect equilibrium in which policy positions, campaign contributions and campaign allocations have been chosen optimally given the optimal responses of the other players.

4.1 Democracy without Campaigns

To provide a baseline for the analysis first consider a model in which no contributions are allowed (or, equivalently, $\gamma_{gm} = 0 \ \ \forall \ \ g, m$) (see also Bailey 2003). This causes the contribution and allocation stages to be moot.

[3] Campaign contributions do not directly enter in our social welfare calculations because it is not clear how to make utility over campaign contributions comparable to utility over policy preferences. The direct effect of campaign spending on social welfare is probably real, but small as total campaign spending is around 0.01 percent of GDP in an election year.

Proposition 1 *When no contributions are allowed and voting blocs have unequal uncertainty, the equilibrium policy choice for both candidates is biased away from the social optimum toward the preferences of well-informed voters.*

Simply put, the no-money political equilibrium benefits the well informed at the expense of the poorly informed. If there are no ex ante information differences across voting blocs, there is no bias. If there are informational differences, however, politicians place more weight on the preferences of the well-informed voters because well-informed voters respond more decisively to policy differences than do poorly informed voters. The significance of this result for what follows cannot be understated. *Politics without money is not a goal, but a challenge.*

This result is similar in many respects to Lohmann (1998, 811) in which she argues that "special interests prevail because they are better able to monitor the incumbent's activities than are diffuse interests." She focuses on individual incentives to gather information and argues that free-rider problems lead individuals in large groups to be less likely to gather information and hence endogenously more likely to be ignored by politicians. In contrast, in what follows I allow politicians to bear the costs of information gathering and transmission and thereby explore whether campaign contributions reinforce or counteract informational biases inherent democratic decision-making.

4.2 Campaign Contributions and Expenditures

To analyze the effect of contributions, we introduce them into the game in the manner discussed above and solve for a subgame perfect equilibrium. The following lemmas indicate on whom and what amount candidates spend and to whom and what amount groups contribute. The first three results are consistent with the arguments of Mueller and Stratmann (1994, 58). These analytical results extend to m dimensional cases. Proofs are in the appendix.

Definition 1 *A voting bloc is favorable to the candidate who is spatially closer.*[4]

Lemma 1 *Candidates expend resources informing only favorable voting blocs.*

If a voter is spatially closer to candidate than another is, the candidate desires the voter to be subject to as little randomness as possible. Conversely, candidates want as much randomness as possible for voters who are spatially further from them than from the other candidate and hence will not spend money informing such voters.

[4] Voting blocs with $d_b > 0$ are favorable to the challenger; voting blocs with $d_b < 0$ are favorable to the incumbent.

Lemma 2 *Candidates seek to equalize the marginal vote gain across favorable voting blocs.*

Candidates target spending on groups for whom the marginal vote gain is the greatest. When candidates have a lot of money, they equalize marginal vote gain per dollar spent across all voting blocs. When candidates do not have enough money to do this, they spend money on the voting blocs that provide the highest marginal expected vote gain per dollar.

Lemma 3 *Groups contribute to at most one candidate.*

Groups have the option of contributing to both candidates, but do not do so as they wish to help only the candidate who offers more attractive policies. Empirically, while many interest groups – especially firms – give to candidates of both parties, few give to both candidates in a race. Groups will give to candidates of both parties if there are candidates from each party who are favorable to their interests. This is common on less salient issues; for example the Baby Bells, oil companies and others often find legislators in both parties who support their interests.

Lemma 4 *The total contributed to candidate k is*

$$R^{k*} = \max_{g \in G^k} \{ \sum_{b \in B^k} \max\{0, |\frac{v_{0b}}{d_b}| - |\frac{v_{0b}^2}{d_b^2 n_b \sum \gamma_{gm}(x_m^C - x_m^I)}| - 1\}\} \quad (7)$$

where G^k is the set of groups preferring candidate k and B^k is the set of voting blocs favorable to candidate k.

This equation determines how much each candidate receives. It is the sum of the amount that the most generous interest group wants to spend on informing the blocs favorable to its favored candidate.

4.3 Privately Funded Campaigns

With these lemmas in hand we can assess the effect of contributions on equilibrium policy choice. The effect of money depends on the configuration of interest groups in the system. Hence I consider several different configurations in turn below. Analysis of these requires computational methods because closed form solutions are not possible. In using computational methods, we are – to paraphrase Judd (1998, 9) – making a tradeoff between knowing everything about a small class of analytically solvable models or knowing a lot about a larger class of computationally solvable models. In this case, the assumptions

underlying analytically solvable models in the literature may bias results as discussed earlier; computational methods allow us to examine equilibrium behavior in a broader class of models of money in politics, including those in which assumptions about dimensionality and vote-buying are relaxed.

I generate the results with MATLAB code described in Appendix C. In order to investigate the generality of the findings, I summarize solutions for a broad range of parameter settings in Appendix D. To keep the discussion clear, this section focuses on the incumbent's policy choice and the working example described in Table 1. Bloc 1 contains a large number of "typical" voters who have high levels of uncertainty about politics. These voters prefer low policy in both dimensions. Bloc 2 is a small, relatively well-informed bloc that prefers policies in the middle on both dimensions. Bloc 3 is a small, well-informed bloc that prefers "high" policies on both dimensions. It can be considered a special interest that follows politics closely. All groups in the working example place more emphasis on the first policy dimension. The results in the appendix also examine cases in which the voting blocs' preferences are less correlated on the two dimensions ("Configuration B") and in which "typical" voters are moderates on both issues and relatively uninformed (see line 1.d.ii in each table), among other possibilities.

Table 1. Representative District

Variable	Parameter	Bloc 1	Bloc 2	Bloc 3
Group Size	n	600	200	200
Ideal Point	x_1	0.2	0.4	0.8
	x_2	0.1	0.3	0.6
Intensity	γ_1	0.7	0.7	0.7
	γ_2	0.3	0.3	0.3
Uncertainty	v_0	2.0	1.0	0.5

The expositional strategy is to present results for several scenarios, working from implausible scenarios – such as equal and opposite interest groups - to the more empirically plausible scenario in which there are multiple interest groups that are not representative of society. The multidimensionality of issue space is not necessary for the first two claims, but is crucial to the third claim which is the central result of the paper. By looking at a variety of interest group configurations, we get a sense of the conditions under which money is more or less helpful.

4.3.1 Equal and Opposite Interest Groups

First consider a "symmetric group" scenario in which two equal groups are on opposite sides of one issue ($\gamma_{11} = -\gamma_{21}; \gamma_{12} = \gamma_{22} = 0$).

Claim 1 *When contributions are allowed and groups are symmetric, the incumbent's equilibrium policy choice produces a higher social welfare than when contributions are not allowed unless (a) there is no information asymmetry among voting blocs or (b) the most informed bloc of voters constitutes a majority.*

To illustrate the logic behind this claim, consider an out-of-equilibrium example in which contributions are allowed from these symmetric interest groups and the incumbent has located at the no money political equilibrium (indicated by a square in Figure 2). The challenger can do better than mimicking the incumbent (which, by Proposition 1, is the no-campaign equilibrium) by locating closer to Bloc 1, the uninformed and large voting bloc. Doing so allows the challenger to raise money from the Interest Group 1 (which prefers low policies on dimension one) and to spend the money informing the uninformed voters (who are attracted to low policies on dimension one). Even though both candidates will be able to raise money (the incumbent raises money from interest group two which prefers high policies on dimension one), the challenger will be able to mobilize many voters favorable to his or her position. The incumbent, meanwhile, will be stuck spending his or her contributions on the small and already reasonably well informed bloc of voters preferring his or her policy.

In equilibrium the incumbent anticipates the challenger's response and advocates a policy less vulnerable to the fundraising and mobilizing by the challenger. Depending on the willingness and ability of interest groups to contribute (which depends on γ), the equilibrium choice by the incumbent moves along the arrowed line in the figure, with each triangle indicating equilibrium for $\gamma = 1, 10, 20, 30, 40$ and 50 where $\gamma = 1$ implies in this case that the interest group γ parameters are {-1, 0}, {1, 0}; $\gamma = 10$ implies here that the groups' γ parameters are {-10, 0}, {10, 0} and so on. The equilibrium overshoots the social optimum, although the change gets very small for higher levels of γ; even in these cases, the equilibrium is better than the no-money equilibrium.

In general, there are multiple equilibria for the challenger. This occurs because the incumbent's optimal policy balances the multiple potential threats from the challenger. For example, if for any given x^I the challenger's best response is to challenge from below (e.g. appealing the uninformed voting bloc) the incumbent would prefer a policy that is lower and reduces the gain

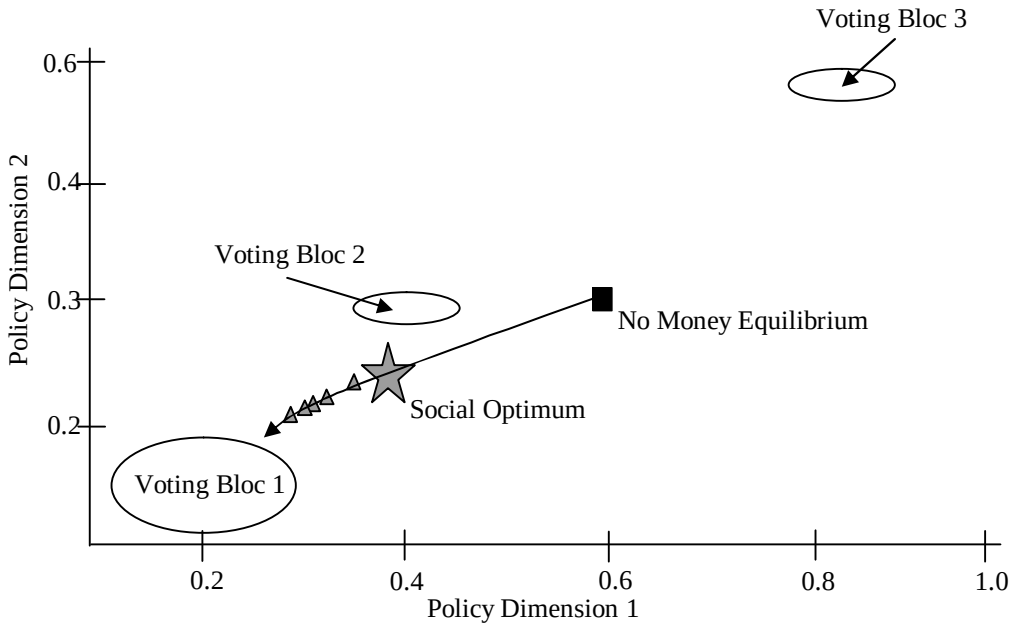

Figure 2: Incumbent Policy Choice with Symmetric Interest Groups

for the challenger by challenging from below. If the incumbent moves too low, however, the challenger's best choice will be to challenge from above. Only when the threats from above and below are equal has the incumbent maximized his or her expected votes.[5]

Table 2 in the appendix provides equilibrium social welfare for a range of parameter settings. In general, allowing contributions increases welfare even as the marginal effect on social welfare of increasing contributor intensity is negative due to the overshooting phenomenon discussed above. One exception to the pattern (lines 2.d and 2.e) follows directly from Proposition 1 which implies that the no-money political equilibrium is the social optimum when there are no informational disparities.

The other exception occurs when well-informed voters constitute a majority (line 1.e). In this case, the no money equilibrium (which overweights the most informed group) has already overshot the social optimum and adding money causes the equilibrium to continue to move away from the optimum to-

[5]I focus on the incumbent's optimal position in the presentation below. Typically there is at least one challenger optima that is quite good for social utility and at least one other that is not very good for social welfare. The game, as currently constituted, has no mechanism for picking one challenger equilibrium over another. Presumably, forward looking behavior and penalties for changing policies would lead challengers to prefer the equilibria closer to the incumbent's optimal choice. Were the challenger to win, the challenger (now incumbent) would have to move less to get to the incumbent equilibrium.

ward the preference of the large bloc of voters. With enough resources, the incumbent can get virtually all the votes from any given group for any location of the challenger by locating at the ideal point of the group. If a group constitutes a majority, then the incumbent can guarantee at least half the votes by locating at the ideal point of the majority group, as the challenger can either locate at another point and get, at most, less than half the votes or locate at the majority group's ideal point and split the votes with the incumbent. This situation is unlikely if we expect the more numerous voters to be the less informed, however.

These results provide our first counterexamples to the conventional wisdom that private contributions are necessarily welfare reducing. They also show that even in these "best case" scenarios for privately funded campaigns – where contributors are equally matched and arguably representative of society – there are situations in which money does not enhance representation and cases in which additional money causes the political equilibrium to overshoot the societal optimum. The assumption that resources are equally distributed across contributors is empirically untenable, however. Therefore, the next sections therefore investigate the effects of money when contributors are unbalanced in a variety of ways.

4.3.2 A Single Dominant Interest Group

First consider the case in which there is only one contributor.

Claim 2 *When private contributions are allowed and there is only one contributor, the effect of campaign contributions depends on the characteristics of the contributor.*

a. *If the contributor prefers the policies preferred by uninformed voters, increasing contributor propensity to contribute can be good for social welfare.*

b. *If the contributor prefers the policies preferred by informed voters, increasing contributor propensity to contribute reduces social welfare.*

The first part of the claim is that it is possible for a single contributor to improve social welfare. Suppose there is only one group and that it prefers policy on dimension one to be as low as possible. Across the board the social utility of the incumbent's equilibrium choice is higher than in the no money case. This is not surprising: any time the incumbent chooses a position not preferred by the large and uninformed Bloc 1 on dimension 1, a challenger can

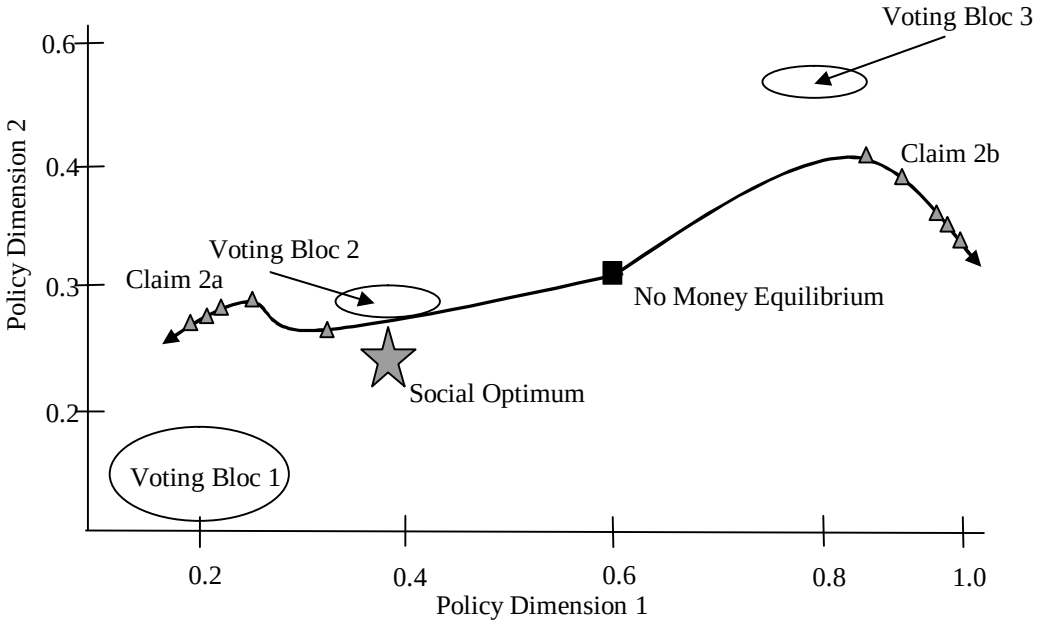

Figure 3: Incumbent Policy Choice When There is Only One Interest Group

offer a low position on dimension one, raise money from the interest group and have an issue with which to mobilize voters. The group in this situation acts as the watchdog for the uninformed voters, funding opposition to incumbents who do not take seriously the preferences of uninformed voters. The "cost" is that policy in all equilibria is low on dimension one, something that is generally not bad for society because the large uninformed group prefers low policies on dimension one. As before, however, increasing money can cause the optimal incumbent policy choice to overshoot the mark by leading the incumbent to place more weight on the uninformed bloc than is socially optimal.

The line marked Claim 2a in Figure 3 depicts this for the working example, with the triangles indicating the incumbent's equilibrium policy choice for $\gamma = -1, -10, -20, -30, -40$ and -50 where $\gamma = -1$ implies in this case that the interest group γ parameters are {-1, 0}, {0, 0}; $\gamma = -10$ implies here that the groups' γ parameters are {-10, 0}, {0, 0} and so on. The incumbent's position initially moves toward the optimum, but overshoots the mark.

The second part of the claim is that there are also conditions under which money from a single group unambiguously reduces social welfare. Some may find this very surprising as campaign money informs voters in the best sense of open political dialogue under the First Amendment. This happens because a single contributor on the side of the well-informed voting bloc will fund only candidates supportive of its interests. The incentive for the incumbent

therefore is to advocate policies high on the first dimension such that the challenger would need to move very high on the first dimension in order to raise money. (The incumbent is kept from going too high on the first dimension by the threat that the challenger could choose a lower policy on dimension one and try to get votes from the relatively uninformed voters, even though these voters respond weakly to policy differentials.) Being unable to raise money, the challenger is unable to activate the voting blocs who would be turned off by the incumbent's policy position.

The result is Claim 2b which indicates that a single contributor on the side of the informed voters exerts an unambiguously bad influence on incumbent's optimal policy. Table 3 in the Appendix shows this for an array of parameter settings. Wealth dominates so much in this case that the incumbent's equilibrium policy position is often *more extreme than the most extreme voter* – even though campaign spending informs voters!

4.3.3 Multiple Societally Unrepresentative Interest Groups

It is unrealistic, however, to suppose that there will be only one group. What happens when there are multiple contributors? We have already seen the effect of equal and opposite contributors. A more relevant concern, though, is what happens when contributors do not directly balance each other and are unrepresentative of the public.

Given the empirical relevance of this scenario, this is the central question of this paper. There can be no doubt that contributors are a very select subset of the population: they are white (99 percent), male (78 percent) and rich - most make more than $100,000 and many make more than $250,000 (Francia et al, 2000). Other sources of money are also unrepresentative of the country: more than eighty percent of soft money – when it was legal – came from businesses and business interests also dominate PAC contributions and unregulated issue ad spending.[6]

I therefore explore the effects of money when contributors are systematically unrepresentative of the largest bloc of voters. Specifically, I examine cases in which one interest group opposes Bloc 1 by preferring high policies on dimension one ($\gamma_{11} > 0, \gamma_{12} = 0$) and the other interest group opposes Bloc

[6] Data on regulated spending is available from The Center for Responsive Politics at Business-Labor-Ideology Split in PAC, Soft and Individual Donations to Candidates and Parties (2000), at www.opensecrets.org/overview/blio.asp. Data on unregulated issue ad spending is available from Annenberg Public Policy Center of the University of Pennsylvania at appcpenn.org/political/issueads/. The attribution of contributions to "business" should be taken with a grain of salt, as the Center for Responsive Politics associates contributions made by individuals with whatever the individual lists as his or her employer.

1 by preferring high policies on dimension two ($\gamma_{21} = 0, \gamma_{22} > 0$). One could think of one interest group as a pharmaceutical company interested in extending patent protection for its prize drug and the other interest group could be an oil company interested in drilling on federal land. These interest groups are unrepresentative of the voting population, but do not have identical policy preferences due to interest in different policy dimensions. This is a simplified, characterization of the actual case in which diverse but not necessarily conflicting or representative interest groups dominate American politics (see Heinz, Laumann, Nelson and Salisbury 1993).

Claim 3 *If voting blocs have asymmetric information levels and a majority bloc is not the best informed, the initial effect of allowing contributions when groups are systematically unrepresentative is to lower social welfare from the no money political equilibrium. At some point, however, increasing the intensity of unrepresentative contributors can increase social welfare.*

The claim is janus faced. On the one hand, low levels of contributions from unrepresentative contributors usually reduce social welfare relative to the no-money political equilibrium. For example, suppose there is a small contributor friendly to informed voters on each dimension (with $\gamma_1 = \{1, 0\}$ and $\gamma_2 = \{0, 1\}$). The equilibrium for the incumbent is worse than the no-money equilibrium; in this case, the challenger cannot seriously threaten an incumbent who is unresponsive to uninformed voters. The incumbent can simply move higher on dimension two, such that the challenger would have to go so high on dimension two to raise money (and would raise so little once that happened), that she would not have an ability to mobilize voters against the incumbent.

The outcome improves as interest groups become more willing to contribute money, as depicted in Figure 4 for the working example. This happens because the challenger can find a coalition of contributors and voters that exploits non-responsive positions by the incumbent. If the incumbent is very high on dimension one, the challenger can be moderate on that dimension (a position popular with voters) and can raise money to publicize the position by being high on dimension two. If the incumbent is very high on dimension two, the challenger can do the reverse. If the incumbent is very high on both dimensions, the challenger can choose a position appealing to voters on both issues and the incumbent will have very little to spend the money on since few or even no voters will be favorable toward him or her. In equilibrium, the bigger threat is from raising money on the issue voters care less about, so the incumbent will be more responsive to voters on the salient policy and more responsive to potential donors on the less salient policy.

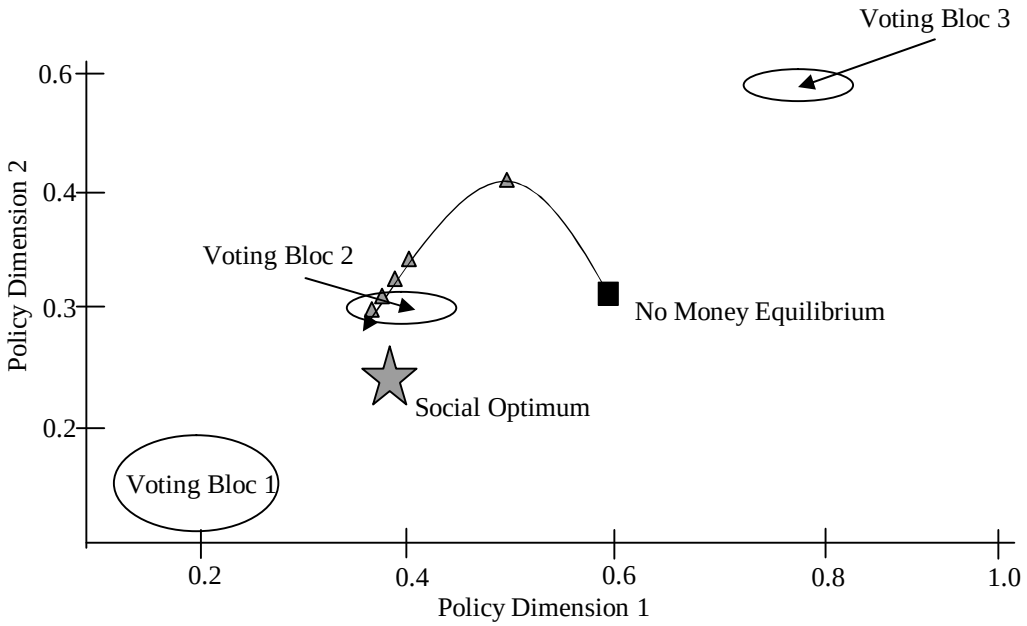

Figure 4: Incumbent Policy Choice with Multiple Societally Unrepresentative Groups

Table 4 in the appendix reveals a similar pattern across an array of parameter settings. The exceptions are similar to those we saw in Table 2: money does not improve welfare when the well-informed voters constitute a majority (line 1.e) or when blocs have equal *ex ante* uncertainty (lines 2.d and 2.f), although in the latter two cases the marginal effect of increasing contributor intensity is positive. When the uninformed voting bloc is the large bloc in the middle (line 1.d.ii for Configuration A) the marginal effect of increasing contributor ability to pay is welfare increasing, although the outcome is not better than the no money equilibrium. In this case, the well-informed groups on the left and right balance each other out in the no-money equilibrium, creating an outcome that is hard to improve upon (a similar result occurs for Claim 1).

4.3.4 Small, but Representative Interest Groups

While the reality of contributor distinctiveness relative to the voting population is hard to deny – even as the exact nature of the distinctiveness is open to dispute – it is unrealistic to think that uninformed voters have *no* interest groups or contributors on their side. Therefore, consider a case in which uninformed voters have a relatively weak (low γ) interest group on their side while

highly informed voters have a stronger interest group on their side. Let us make it more difficult for the uninformed voters by making their interest group only interested in the second, less salient issue dimension. The informed voters' interest group is interested only in the first dimension. One might expect policy on the first dimension to be quite unrepresentative of the uninformed voters as the only special interest with a direct interest on it opposes them.

However, even in this case, campaign contributions improve responsiveness. Specifically, consider a case in which group 1's γ parameters are {10, 0} and group 2's γ parameters are {0, -1}. In the working example, if no contributions are allowed, the equilibrium is $x^I = x^C = \{0.51, 0.37\}$. If contributions are allowed, however, the equilibrium for the incumbent is $\{0.49, 0.23\}$. Not only is this point an improvement over the no money case, it is also noteworthy how strong the impact the second interest group is on policy. If only the first special interest group had a non-zero γ, the equilibrium is $\{0.78, 0.44\}$.

In this case, the smaller group constrains the ability of the incumbent to locate at positions that favor the dominant interest group. If the incumbent were to locate at $\{0.78, 0.44\}$ – the equilibria when there is no smaller group – the challenger could choose a policy that is low on both dimensions. This would allow him or her to raise a relatively small amount of money from the small interest group and use the money to inform the large bloc of voters who would be displeased to hear about what the incumbent is doing on dimension one. The incumbent anticipates such a challenge and moves lower on dimension two to limit the challenger's ability to raise money.

There are two points here. First, even though financial advantages translate into policy advantages, the contributor on the side of the uninformed voters exerts an effect out of proportion to its size because there are more voters responsive to the message it funds. Second, direct competition among financial contributors is not necessary for reasonably responsive outcomes. *Even relatively small interest groups interested in low-salience issues can discipline the process substantially.*

4.4 Summary of Results

The general point to take away from the results is that the theoretical connection between money and responsiveness depends critically on assumptions about the process. The existing literature makes one set of assumptions and typically concludes that contributions undermine representation. I make a different set of (equally or more plausible) assumptions and get mixed results. If voting blocs are not asymmetrically informed or if the large bloc of voters is best informed, privately financed campaigns exert a negative effect. If,

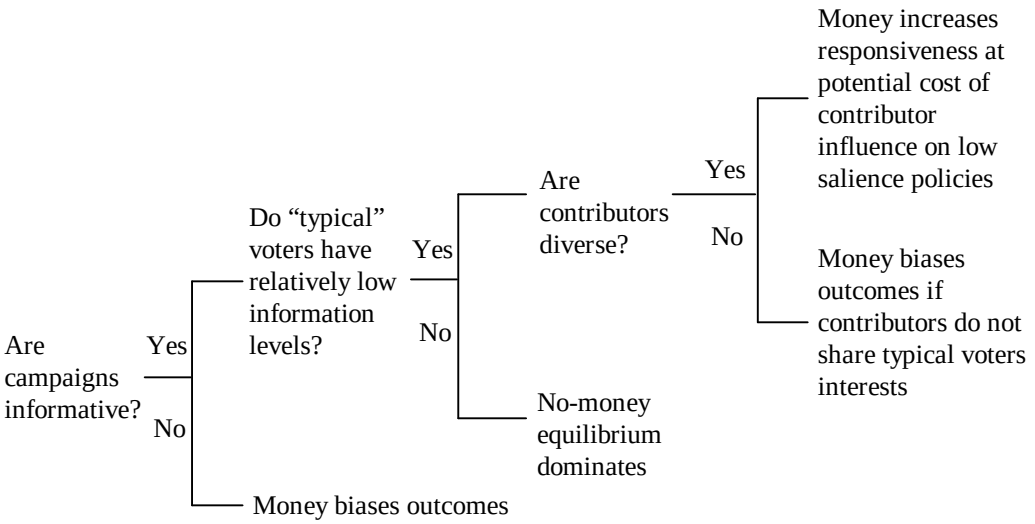

Figure 5: Summary of Results

however, voting blocs are asymmetrically informed and the majority bloc (if there is one) is not the best informed, private contributions can enhance representation even when the contributors themselves are quite unrepresentative of the voting population. This refutes by counterexample the conventional view that private contributions necessarily undermine political responsiveness and it does so in the more empirically plausible conditions.

Figure 5 summarizes the results. If campaign spending "buys votes" (in the sense that more money increases the number of votes irrespective of policy positions) existing work in the literature shows that private financing of campaigns decreases democratic responsiveness and increases contributor influence. If campaign spending informs voters, however, the next question is whether "typical" voters are relatively uninformed. If not, the no-money equilibrium is quite good and allowing private contributions often makes things worse. If typical voters are relatively uninformed, we next need to ask whether contributions come from diverse sources or not. If they come from sources that are unified, Claim 2 shows the effect of private contributions depends on the congruence (or lack thereof) between the contributor and typical voters. If contributors are diverse (which does not, of course, necessarily imply they are societally representative), then Claims 1 and 3 demonstrate that increased money in the system can increase overall responsiveness, even as it provides some advantage to those who contribute. The greater the diversity, the greater the impact on responsiveness and the less the advantage garnered by contributors. This is especially true when there are more groups that are

representative of typical voters - even if these groups are small, they may exert an effect disproportionate to their size.

5 Conclusion

The results show that conventional views about the harmful effects of private contributions on representation are not robust. In particular, if we follow considerable empirical evidence and assume that campaigns provide information and that there are multiple contributors with diverse policy preferences, then increasing campaign contributions increases social welfare in the model in many of the most reasonable cases.

The starting point for the analysis is the result that the political equilibrium without campaign spending is biased toward well-informed voters. Even though private contributions create incentives for candidates to appeal to contributors in order to raise money, increasing fund-raising capacities also makes it easier for candidates to raise the money necessary to inform the public about opponents who ignore uninformed voters. When there are informational asymmetries among voters and the well-informed voting bloc is not the largest bloc in the electorate, the results indicate that private contributions counteract biases towards well-informed voters and make for more responsive policy choices by the incumbent. That this occurs even though contributors are self-interested and unrepresentative of the electorate indicates that campaign contributions are a complex and often counterintuitive part of the political landscape.

Multidimensionality of policy space plays a central role for the most interesting and empirically relevant scenario. In this scenario, contributors do not reflect societal preferences very well, but do not agree amongst themselves. In this case, the ability of politicians to use fundraising based on one dimension to publicize popular policies in another is crucial to providing the electoral incentive for incumbent responsiveness.

While the computational models were limited to two dimensions, one may reasonably hypothesize that the results would extend to multiple dimensions as long as the additional dimensions had potential contributors from whom politicians could raise funds. If for example, increasing the number of dimensions increased the number of low salience issues, one might expect politicians to have more alternatives for building coalitions consisting of typical voters and groups who could bankroll appeals to such voters.

The theoretical results are consistent with much of the empirical literature on money and representation. The theory predicts that money will not be a major determinant of legislator positions on major policies; if anything,

the more money, the more public opinion will be a major determinant of legislations positions on salient issues. This is consistent with Ansolabehere, de Figueiredo and Snyder (2003) who summarize the literature and present original analysis to show that there is relatively little evidence that campaign contributions influence congressional roll call voting, especially on major issues as captured by an index such as the Chamber of Commerce ratings. But the theoretical results here also imply that contributors can influence legislators on less salient issues, a result consistent with findings by Hall (1996) that legislators participate more on issues that involve contributors and by Stratmann (2002) that contributors influenced legislation on specific financial regulations. In short, the theory here is consistent with Sorauf's (1992, 170) conclusion that the influence of interest group contributions "tends to be strongest on the narrower, less visible issues before the Congress."

These results point toward two next steps. First, they point to the ongoing need for research on how money affects voters. While a substantial empirical literature justifies a focus on informative campaigns, it is doubtful that informative campaigns are inevitable or universal. Since our conclusions about the effect of money in politics hinge so importantly on this question, a better understanding of how money affects voters could provide a foundation for new theoretical approaches. Second, the results point to the importance of developing a solid theoretical foundation for reform efforts. For reform to work, we need to know under what conditions privately financed campaigns inhibit responsiveness and under what conditions they enhance it. Expanding the range of assumptions that we model is one step toward achieving this goal.

Appendix A: CDF for Linear Probability Distribution

Using a linear probability distribution (sometimes referred to as a "tent distribution" for its tent-like density) vastly simplifies the mathematics while approximating the bell shape of many common densities. The density of the distribution is

$$\mathrm{f}(x) = \begin{cases} 0 & x < -w \\ (\frac{1}{w})(\frac{1}{w}x + 1) & -w < x \leq 0 \\ (\frac{1}{w})(\frac{-1}{w}x + 1) & 0 \leq x < w \\ 0 & x > w \end{cases}$$

and the CDF is

$$\mathrm{F}(x) = \begin{cases} 0 & x < -w \\ \frac{(w+x)^2}{2w^2} & -w < x \leq 0 \\ 1 - \frac{(w-x)^2}{2w^2} & 0 \leq x < w \\ 0 & x > w. \end{cases}$$

To calculate the CDF in terms of the parameters in the model, let $w = v_b = \frac{v_{0b}}{1+R_b}$ and $x_b = d_b$, yielding

$$\mathrm{F}[d_b, v_{0b}, R_b] = \begin{cases} 0 & d_b \leq \frac{-v_{0b}}{1+R_b} \\ \frac{1}{2}(\frac{v_{0b}+d_b+d_bR_b}{v_{0b}})^2 & \frac{-v_{0b}}{1+R_b} < d_b \leq 0 \\ 1 - \frac{1}{2}(\frac{v_{0b}-d_b-d_bR_b}{v_{0b}})^2 & 0 < d_b \leq \frac{v_{0b}}{1+R_b} \\ 1 & d_b > \frac{v_{0b}}{1+R_b}. \end{cases} \tag{8}$$

Appendix B: Proofs

Proof of Proposition 1

This proposition modifies results from Enelow and Hinich (1989) to account for variation in information across voting blocs. The first order conditions for the challenger are

$$\begin{aligned} \frac{\partial V^C}{\partial x_m^C} &= \sum_{-v_{0b}<d_b<0} \frac{n_b}{v_{0b}}(1 + \frac{d_b}{v_{0b}})2\gamma_{bm}(x_{bm} - x_m^C) \\ &\quad + \sum_{0<d_b<v_{0b}} \frac{n_b}{v_{0b}}(1 - \frac{d_b}{v_{0b}})2\gamma_{bm}(x_{bm} - x_m^C) = 0 \end{aligned}$$

In the no contribution equilibrium, candidates must receive the same number of votes. If one candidate had less than half the

votes, he or she could move to the position of the other candidate and get half the votes. Following Enelow and Hinich, I limit consideration to equilibria in which candidates converge to the same position. (Non-convergent equilibria cannot be ruled out, although they would be highly contingent on very specific conditions on voters preference and intensity distributions. A non-convergent equilibrium requires the candidates to be located at different policy positions and that each candidate receives half the votes and that moves in all directions by either candidate result in gains among one bloc of voters that are exactly offset by losses from another bloc of voters. I have not been able to generate an example of such an equilibrium.) A convergent outcome implies $d_b = 0 \; \forall b$, implying

$$\frac{\partial V^C}{\partial x_m^C} = \sum_{b=1}^{B} \frac{n_b}{v_{0b}} \gamma_{bm}(x_{bm} - x_m^C) = 0 \tag{9}$$

$$\Rightarrow \quad x_m^{I*} = x_m^{C*} = \frac{\sum_{b=1}^{B} \frac{n_b \gamma_b x_{bm}}{v_{0b}}}{\sum_{b=1}^{B} \frac{n_b \gamma_b}{v_{0b}}}. \tag{10}$$

Existence of an equilibrium requires that v_{0b} is not too small relative to γ (see Enelow and Hinich 1989). The intuition is that if uncertainty is too small, the game resembles a deterministic model in which there is generally no equilibrium in multiple dimensions.

The socially optimal policy is found by maximizing Equation 6, yielding

$$x_m^* = \frac{\sum n_b \gamma_b x_{bm}}{\sum n_b \gamma_b}. \tag{11}$$

Equation 10 is equivalent to Equation 11 only when v_{0b} is constant for all b. Bias exists when the political equilibrium is less responsive to one group relative to another ($\frac{\partial x^{C*}}{\partial x_b'} < \frac{\partial x^{C*}}{\partial x_b}$). From Equation 10 $\frac{\partial x^{C*}}{\partial x_b} = \frac{\frac{n_b \gamma_b}{v_{0b}}}{\sum_{b=1}^{B} \frac{n_b \gamma_b}{v_{0b}}}$. This is decreasing in v_{0b} implying that blocs with high v_{0b} have less influence.

Proof of Lemma 1

$\frac{\partial V^C}{\partial R_b} = n_b \frac{v_{0b} + d_b + d_b R_b}{v_{0b}} \frac{d_b}{v_{0b}}$. When a group is unfavorable to the challenger $d_b < 0$, implying $\frac{n_b d_b}{v_{0b}} < 0$. For $\frac{-v_{0b}}{1+R_b} < d_b$, rearrange the inequality to show $v_{0b} + d_b + d_b R_b > 0$ implying that $\frac{\partial V^C}{\partial R_b} < 0$.

This means a challenger's votes go down the more he spends on informing group b; in this case, then, the challenger is better off not spending anything on a group with d_b in that range. For $d_b \leq \frac{-v_{0b}}{1+R_b}$, $\frac{\partial V^C}{\partial R_b} = 0$ by Equation 8. Showing that the challenger benefits from spending on favorable groups and that the incumbent faces similar incentives follows the same logic.

Proof of Lemma 2

By Lemma 1 candidates will spend only on favorable blocs. If there is only one favorable bloc, the candidate will spend all money on that bloc. When the challenger has more than one favorable voting bloc, the optimal allocation of campaign spending subject to the condition of not spending more than one has is found using the following Lagrangian:

$$\begin{aligned}\mathcal{L}^C &= \sum^{b\in B^C} n_b \mathrm{F}[d_b, v_{0b}, R_b] + \lambda^C(R^C - \sum^{b\in B^C} R_b) \\ &= \sum^{b\in B^C} n_b\{1 - \frac{1}{2}(\frac{v_{0b} - d_b - d_b R_b}{v_{0b}})^2\} + \lambda^C(R^C - \sum^{b\in B^C} R_b)\end{aligned}$$

where $b \in B^C$ if $d_b > 0$. The first order conditions are

$$\begin{aligned}\frac{\partial \mathcal{L}^C}{\partial R_b} &= 0 \Rightarrow n_b \frac{v_{0b} - d_b - d_b R_b}{v_{0b}} \frac{d_b}{v_{0b}} = \lambda^C \text{ for } \forall b \in B^C \\ \frac{\partial \mathcal{L}^{\mathcal{C}}}{\partial \lambda^C} &= 0 \Rightarrow R^C = \sum^{b\in B^C} R_b.\end{aligned}$$

These conditions imply that candidate equalizes the marginal vote gain across all favorable voting blocs subject to limits on resources available.

The proof is similar for the incumbent where $b \in B^I$ if $d_b < 0$ and

$$\mathcal{L}^I = \sum^{b\in B^I} n_b\{1 - \frac{1}{2}(\frac{v_{0b} + d_b + d_b R_b}{v_{0b}})^2\} + \lambda^I(R^I - \sum^{b\in B^I} R_b).$$

To determine that the equations characterize a maximum, the Hessians need be negative definite. Note that $\frac{\partial^2 \mathcal{L}^{\mathcal{C}}}{\partial R_b^2} = \frac{\partial^2 \mathcal{L}^I}{\partial R_b^2} = -n_b \frac{d_b^2}{v_{0b}^2} < 0$.

Proof of Lemma 3

$\frac{\partial U_g}{\partial R_g^C} = \sum_{m=1}^{M} \gamma_{gm}\{x_m^C \frac{\partial V^C}{\partial R^C} + x_m^I \frac{\partial V^I}{\partial R^C})\} - 1$. Because the game is a zero sum game between the two candidates $\frac{\partial V^C}{\partial R_g^C} = -\frac{\partial V^I}{\partial R_g^C}$, implying that $\frac{\partial U_g}{\partial R_g^C} = \frac{\partial V^C}{\partial R^C} \sum_{m=1}^{M} \gamma_{gm}(x_m^C - x_m^I) - 1$. By Lemma 2 we know $\frac{\partial V^C}{\partial R^C} \geq 0$, so a necessary (but not sufficient) condition for $\frac{\partial U_g}{\partial R_g^C} > 0$ is $\sum_{m=1}^{M} \gamma_{gm}(x_m^C - x_m^I) > 0$. Using the same reasoning, the marginal utility for the group of giving to the incumbent is $\frac{\partial U_g}{\partial R_g^I} = \frac{\partial V^I}{\partial R^I} \sum_{m=1}^{M} \gamma_{gm}(-x_m^C + x_m^I) - 1$. A necessary (but not sufficient) condition for the group to contribute to the incumbent is $\sum_{m=1}^{M} \gamma_{gm}(-x_m^C + x_m^I)$. If $\sum_{m=1}^{M} \gamma_{gm}(x_m^C - x_m^I) > 0$ then $\sum_{m=1}^{M} \gamma_{gm}(-x_m^C + x_m^I) < 0$, implying that a positive utility of contributing to the challenger implies a negative utility of contributing to the incumbent and vice versa.

Proof of Lemma 4

Using Equations 3 and 4 and substituting for V^I and V^C, re-write group utility as

$$\begin{aligned} \mathrm{U}_g &= \sum_{m=1}^{M} \gamma_{gm}\{x_m^C \sum_{b=1}^{B} n_b \mathrm{F}[d_b, v_{0b}, R_b^*] + x_m^I \sum_{b=1}^{B} n_b (1 - \mathrm{F}[d_b, v_{0b}, R_b^*])\} - R_g \\ &= \sum_{m=1}^{M} \gamma_{gm}\{(x_m^C - x_m^I)(\sum_{b=1}^{B} n_b \mathrm{F}[d_b, v_{0b}, R_b^*]) - x_m^I \sum_{b=1}^{B} n_b\} - R_g. \end{aligned}$$

Assume for the moment that that we are dealing with a group favorable to the challenger (and for which $0 < d_b < \frac{v_{0b}}{1+R_b}$) and that only one group contributes to the challenger. This implies that at most one group is responsible for the funding of each voting bloc in the challenger's favorable coalition. For any given level of contributions, both the groups and the challenger maximize utility by maximizing votes of the challenger. This implies the group can directly calculate how much it wants spent on blocs favorable to the challenger. Let $\sum_{b=1}^{B} n_b = N$ and use Equation 8 to re-write group utility as

$$\mathrm{U}_g = \sum_{m=1}^{M} \gamma_{gm}\{(x_m^C - x_m^I) \sum_{b=1}^{B} n_b (1 - \frac{1}{2}(\frac{v_{0b} - d_b - d_b R_{gb}}{v_{0b}})^2) - x_m^I N\} - \sum_{b=1}^{B} R_{gb}$$

where R_{gb} is the amount group g contributes toward informing bloc b. Utility maximization by the group implies

$$\begin{aligned}
\frac{\partial U_g}{\partial R_{gb}} &= \sum_{m=1}^{M} \gamma_{gm}(x_m^C - x_m^I) n_b \frac{v_{0b} - d_b - d_b R_{gb}^*}{v_{0b}} \frac{d_b}{v_{0b}} - 1 = 0 \\
\Rightarrow \quad & \frac{n_b d_b}{v_{0b}^2}(v_{0b} - d_b - d_b R_{gb}^*) = \frac{1}{\sum_{m=1}^{M} \gamma_{gm}(x_m^C - x_m^I)} \\
\Rightarrow R_{gb}^* &= \frac{v_{0b}}{d_b} - \frac{v_{0b}^2}{d_b^2 n_b \sum_{m=1}^{M} \gamma_{gm}(x^C - x^I)} - 1 \qquad (12)
\end{aligned}$$

subject to $R_{gb}^* \geq 0$.

The density of the tent distribution goes to zero when $R_b > \frac{v_{0b}}{d_b} - 1$; R_b will never reach this level because the middle term of Equation 12 ($-\frac{v_{0b}^2}{d_b^2 n_b \sum_{m=1}^{M} \gamma_{gm}(x^C - x^I)}$) is always less than zero for groups favorable to the challenger (see the proof of Lemma 3) so the value of R_b^* is bounded below $\frac{v_{0b}}{d_b} - 1$.

If groups are on opposite sides of an issue (as in Claim 1) or if there is only one group (as in Claim 2), then at most one group will contribute to the challenger and the above completely characterizes contributions to the challenger.

If there are two groups that favor the same candidate, I assume (as discussed in the text) that the total contributions toward each bloc equal the maximum amount that any single group would wish to contribute. At this amount, the marginal benefit to the larger group has been set to the marginal cost. If contributions were less than this amount, at least one group (the larger group) would be better off contributing more. If contributions were more than this amount, both groups would be better off contributing less. I do not model how groups allocate costs in order to reach this level.

The proof for the incumbent is analogous, yielding

$$R_{gb}^* = -\frac{v_{0b}}{d_b} + \frac{v_{0b}^2}{d_b^2 n_b \sum \gamma_{gm}(x_m^C - x_m^I)} - 1$$

for $b \in B^I$ and subject to $R_{gb}^* \geq 0$. Use the facts that $d_b > 0$ for blocs favorable to the challenger and $d_b < 0$ for blocs favorable to the incumbent to get the equation in the Lemma.

Appendix C: Programming Details

The computational results are generated by MATLAB code (available from www.georgetown.edu /faculty/ baileyma/) that has three steps.

1. Pick a starting value for x^I.
2. Find the x^C that is the best response by the challenger to that x^I. This entails three steps:
   (a) Perform a grid search over x^C to identify ridges associated with local minima. This grid search has two steps:
      i. For each value of x^C use analytical results for campaign spending allocations.
      ii. Use backward induction and campaign allocations to determine group behavior which in turn determines outcomes and payoffs.
   (b) Run a Nelder-Mead simplex direct search algorithm starting from each ridge. Due to the roughness of the objective functions, a polytope method such as the Nelder-Mead method is advised (Judd 1998, 143).
   (c) From the multiple local peaks, pick the x^C that yields the best outcome for the challenger.
3. Use a Nelder-Mead search algorithm to search for the x^I that yields the best outcome for the incumbent, given optimizing behavior by the challenger.

Appendix D: Robustness Analysis

The following three tables provide additional analysis for the claims discussed in the paper. Each table presents the social welfare for the incumbent's optimal policy choice across a variety of cases. The baseline parameter settings are those in the working example in the paper. Each row indicates which parameters have been changed. The columns present social optima, no money political equilibria and results for various parameter values for interest groups. Configuration A has preferences in a roughly linear alignment as in the working example. Configuration B has preferences in a triangular alignment, an alignment achieved by setting Bloc 3's ideal point on dimension two to 0.2.

Claim 1 Social welfare generally increases when going from the no money equilibria to the private contribution equilibria. The exceptions are either when the well-informed group is dominant (Case 1e) or when all groups are equally well informed (Cases 2d and 2e). For each of these cases, social welfare declines as interest group propensity to contribute increases.

Claim 2b Social welfare decreases in all cases when there is a single group on the side of well-informed voters. A similar table for the case when there is a single group on the side of uninformed voters indicates that increasing propensity to contribute initially increases social utility, but eventually overshoots the mark, leading to decreases in social utility. The results for Claim 2a are omitted for reasons of space, but available from the author.

Claim 3 Social welfare is initially lower for low levels of group propensities to contribute. In all cases (except 1e where the well informed group is the largest) increasing propensity to contribute eventually leads to increasing responsiveness.

Table 2. Robustness Analysis for Claim 1

		Social Welfare for Configuration A					Social Welfare for Configuration B				
	Modified Variable	At Optimum	No Money	γ_1 and γ_2 = (1, 0), (-1, 0)	(5, 0), (-5, 0)	(20, 0), (-20, 0)	At Optimum	No Money	γ_1 and γ_2 = (1, 0) (-1, 0)	(5, 0), (-5, 0)	(20, 0), (-20, 0)
1)	Bloc Size										
	a. 800, 100, 100	-30.8	-43.9	-33.3	-30.8	-31.5	-24.8	-35.1	-26.3	-24.8	-25.2
	b. 400, 400, 200	-43.7	-56.8	-46.9	-44.3	-43.8	-36.0	-46.2	-39.4	-36.6	-36.1
	c. 333, 334, 333	-56.2	-72.2	-65.6	-58.4	-56.4	-45.5	-58.0	-54.6	-47.5	-45.5
	d. 200, 600, 200										
	i. v= 2.0, 1.0, 0.5	-34.6	-41.4	-40.6	-35.6	-34.6	-28.8	-34.1	-34.1	-30.3	-29.5
	ii. v=0.5, 2.0, .05	-34.6	-35.4	-35.4	-35.9	-34.8	-28.1	-30.3	-30.3	-30.3	-30.1
	e. 200, 200, 600	-57.5	-67.7	-67.7	-74.2	-80.0	-46.0	-54.0	-54.0	-58.1	-63.1
2)	Bloc uncertainty										
	a. 5, 3, 1	-49.6	-80.5	-53.3	-49.6	-50.5	-40.0	-64.1	-44.8	-40.1	-40.6
	b. 4.0, 3.5, 3.0	-49.6	-50.3	-50.3	-50.7	-53.5	-40.0	-40.6	-40.6	-40.7	-42.8
	c. 0.8, 0.6, 0.4	-49.6	-54.3	-50.2	-53.2	-56.7	-40.0	-43.6	-40.3	-42.4	-45.2
	d. 1, 1, 1	-49.6	-49.6	-50.7	-54.4	-58.1	-40.0	-40.0	-40.4	-43.5	-46.4
	e. 0.5, 0.5, 0.5	-49.6	-49.6	-52.3	-56.3	-59.9	-40.0	-40.0	-41.6	-44.9	-47.8
3) 3)	Bloc intensities (γ_1 is listed for each bloc; $\gamma_2 = 1 - \gamma_1$)										
	a. 0.7, 0.7, 0.3	-40.3	-54.9	-42.0	-40.3	-41.9	-22.6	-30.3	-26.1	-22.9	-22.8
	b. 0.7, 0.3, 0.7	-49.7	-71.8	-50.2	-50.7	-52.5	-41.1	-59.8	-41.8	-42.0	-43.9
	c. 0.3, 0.7, 0.7	-42.9	-58.2	-43.0	-44.0	-46.9	-31.1	-40.7	-31.3	-32.0	-34.2
	d. 0.3, 0.3, 0.3	-43.2	-61.3	-43.7	-43.6	-45.8	-20.8	-28.2	-22.5	-20.9	-21.3
	e. 0.8, 0.6, 0.4	-41.1	-56.4	-42.6	-41.2	-42.5	-27.9	-38.6	-30.8	-28.3	-28.3

Table 3. Robustness Analysis for Claim 2b

		Social Welfare for Configuration A					Social Welfare for Configuration B				
	Modified Variable	At Optimum	No Money	γ_1 and γ_2 = (1, 0), (0, 0)	(5, 0), (0, 0)	(20, 0), (0, 0)	At Optimum	No Money	γ_1 and γ_2 = (1, 0) (0, 0)	(5, 0), (0, 0)	(20, 0), (0, 0)
1)	Bloc size										
	a. 800, 100, 100	-30.8	-43.9	-59.4	-118.7	-156.5	-24.8	-35.1	-48.5	-98.7	-140.3
	b. 400, 400, 200	-43.7	-56.8	-88.2	-128.2	-178.0	-36.0	-46.2	-70.2	-100.6	-118.2
	c. 333, 334, 333	-56.2	-72.2	-96.5	-118.6	-161.9	-45.5	-58.0	-74.6	-92.5	-103.4
	d. 200, 600, 200										
	i. v= 2.0, 1.0, 0.5	-34.6	-41.4	-63.4	-97.0	-121.3	-28.8	-34.1	-51.2	-77.3	-93.1
	ii. v=0.5, 2.0, .05	-34.6	-35.4	-56.2	-93.4	-137.6	-28.8	-30.3	-47.2	-75.5	-92.6
	e. 200, 200, 600	-57.5	-67.7	-67.8	-76.5	-85.3	-46.0	-54.0	-54.0	-59.9	-64.6
2)	Bloc uncertainty										
	a. 5, 3, 1	-49.6	-80.5	-110.8	-152.0	-191.6	-40.0	-64.1	-82.8	-116.1	-136.7
	b. 4.0, 3.5, 3.0	-49.6	-50.3	-73.7	-123.0	-165.3	-40.0	-40.6	-55.3	-92.8	-120.4
	c. 0.8, 0.6, 0.4	-49.6	-54.3	-78.8	-125.0	-154.4	-40.0	-43.6	-65.1	-109.2	-130.5
	d. 1, 1, 1	-49.6	-49.6	-63.5	-113.6	-167.8	-40.0	-40.0	-51.9	-92.9	-128.8
	e. 0.5, 0.5, 0.5	-49.6	-49.6	-56.9	-89.3	-106.6	-40.0	-40.0	-46.7	-79.2	-95.2
3)	Bloc intensities (γ_1 is listed for each bloc; $\gamma_2 = 1 - \gamma_1$)										
	a. 0.7, 0.7, 0.3	-40.3	-54.9	-95.3	-161.6	-222.8	-22.6	-30.3	-59.7	-104.4	-132.1
	b. 0.7, 0.3, 0.7	-49.7	-71.8	-113.0	-156.0	-221.0	-41.1	-59.8	-89.0	-118.4	-135.0
	c. 0.3, 0.7, 0.7	-42.9	-58.2	-84.2	-127.4	-172.0	-31.1	-40.7	-50.1	-65.1	-74.3
	d. 0.3, 0.3, 0.3	-43.2	-61.3	-99.7	-167.4	-192.4	-20.8	-28.2	-37.8	-52.7	-62.2
	e. 0.8, 0.6, 0.4	-41.1	-56.4	-100.7	-154.3	-237.0	-27.9	-38.6	-75.0	-122.5	-149.9

Table 4. Robustness Analysis for Claim 3

		Social Welfare for Configuration A						Social Welfare for Configuration B					
	Modified Variable	At Optimum	No Money	γ_1 and γ_2 = (1, 0), (0, 1)	(5, 0), (0, 5)	(20, 0), (0, 20)	(50, 0), (0, 50)	At Optimum	No Money	γ_1 and γ_2 = (1, 0) (0, 1)	(5, 0), (0, 5)	(20, 0), (0, 20)	(50, 0), (0, 50)
1)	Bloc size												
	a. 800, 100, 100	-30.8	-43.9	-64.3	-44.6	-35.6	-32.3	-24.8	-35.1	-57.4	-40.7	-31.2	-28.1
	b. 400, 400, 200	-43.7	-56.8	-116.5	-78.5	-59.6	-51.9	-36.0	-46.2	-54.5	-61.5	-51.2	-46.3
	c. 333, 334, 333	-56.2	-72.2	-99.4	-105.7	-76.5	-66.3	-45.5	-58.0	-106.4	-79.0	-65.0	-58.1
	d. 200, 600, 200												
	i. v= 2.0, 1.0, 0.5	-34.6	-41.4	-65.0	-62.8	-44.2	-38.7	-28.8	-34.1	-63.8	-49.2	-38.3	-34.8
	ii. v=0.5, 2.0, .05	-34.6	-35.4	-58.1	-68.2	-47.8	-40.2	-28.8	-30.3	-47.4	-48.1	-35.9	-32.5
	e. 200, 200, 600	-57.5	-67.7	-67.9	-76.6	-82.5	-88.2	-46.0	-54.0	-54.0	-61.4	-74.8	-75.6
2)	Bloc uncertainty												
	a. 5, 3, 1	-49.6	-80.5	-120.9	-102.1	-63.8	-55.3	-40.0	-64.1	-125.5	-71.8	-53.7	-48.3
	b. 4.0, 3.5, 3.0	-49.6	-50.3	-75.1	-86.4	-59.0	-53.0	-40.0	-40.6	-56.0	-79.3	-54.9	-46.9
	c. 0.8, 0.6, 0.4	-49.6	-54.3	-84.0	-57.1	-51.3	-50.6	-40.0	-43.6	-60.7	-46.6	-43.5	-42.3
	d. 1, 1, 1	-49.6	-49.6	-79.4	-57.6	-51.3	-50.5	-40.0	-40.0	-69.3	-51.1	-44.7	-42.8
	e. 0.5, 0.5, 0.5	-49.6	-49.6	-68.0	-52.9	-50.7	-50.2	-40.0	-40.0	-54.5	-45.3	-43.1	-41.7
3)	Bloc intensities (γ_1 is listed for each bloc; $\gamma_2 = 1 - \gamma_1$)												
	a. 0.7, 0.7, 0.3	-40.3	-54.9	-103.0	-62.5	-44.8	-41.5	-22.6	-30.3	-47.7	-42.2	-31.9	-28.1
	b. 0.7, 0.3, 0.7	-49.7	-71.8	-135.1	-77.3	-57.1	-52.3	-41.1	-59.8	-92.7	-53.7	-44.8	-43.7
	c. 0.3, 0.7, 0.7	-42.9	-58.2	-97.4	-64.6	-43.7	-44.1	-31.1	-40.7	-51.0	-50.2	-36.1	-33.7
	d. 0.3, 0.3, 0.3	-43.2	-61.3	-102.9	-65.3	-49.3	-45.0	-20.8	-28.2	-37.7	-33.7	-24.5	-24.1
	e. 0.8, 0.6, 0.4	-41.1	-56.4	-111.3	-62.5	-46.5	-42.5	-27.9	-38.6	-63.9	-45.4	-35.2	-34.3

References

Ansolabehere, Stephen, John de Figueiredo and James Snyder. 2003. Why is There so Little Money in U.S. Politics? *Journal of Economic Perspectives* 17, 1: 105-130.

Ashworth, Scott. 2003. Campaign Finance and Voter Welfare with Entrenched Incumbents. Manuscript, Princeton University.

Austen-Smith, David. 1987. Interest Groups, Campaign Contributions, and Probabilistic Voting. *Public Choice* 54: 123-139.

Bailey, Michael. 2004. The Two Sides of Money in Politics: A Synthesis and Framework. *Election Law Journal* 3, 4: 653-669.

Bailey, Michael. 2003. The Other Side of the Coin: A Computational Analysis of Publicly Financed Campaigns. in Kollman, Ken, John Miller and Scott Page, ed. *Computational Political Economy* Cambridge: MIT University Press.

Banks, Jeff. 1990. A Model of Electoral Competition with Incomplete Information. *Journal of Economic Theory* 50: 309-325.

Baron, David. 1994. Electoral Competition with Informed and Uninformed Voters. *American Political Science Review* 88: 33-47.

Clawson, Dan, Alan Neustadtl and Mark Weller. 1998. *Dollars and Votes: How Business Campaign Contributions Subvert Democracy.* Philadelphia: Temple University Press.

Coate, Stephen. 2001. Political Competition with Campaign Contributions and Informative Advertising. Manuscript, Cornell University.

Coleman, John and Paul Manna. 2000. Congressional Campaign Spending and the Quality of Democracy. *Journal of Politics* 62, 3: 757-789.

Denzau, Arthur and Michael Munger. 1986. Legislators and Interest Groups: How Unorganized Interests Get Represented. *American Political Science Review* 80: 89-106.

Drew, Elizabeth. 1999. *The Corruption of American Politics: What Went Wrong and Why* Secaucus, N.J.: Carol Publishing Group.

Enelow, James and Melvin Hinich. 1989. A General Probabilistic Spatial Theory of Elections. *Public Choice* 61: 101-113.

Francia, Peter, John C. Green, Paul S. Herrnson, Wesley Joe, Lynda W. Powell and Clyde Wilcox. 2000. Donor Dissent: Congressional Contributors Rethink Giving, *Public Perspective* 11: 29-32.

Grossman, Gene and Elhanan Helpman. 2001. *Special Interest Politics.* Cambridge: MIT Press.

Hall, Richard. 1996. *Participation in Congress.* Ann Arbor: University of Michigan Press.

Heinz, John, Edward Laumann, Robert Nelson and Robert Salisbury. 1993. *The Hollow Core: Private Interests in National Policy Making.* Cambridge, MA: Harvard University Press.

Hinich, Melvin and Michael Munger. 1994. *Ideology and the Theory of Political Choice.* Ann Arbor: University of Michigan Press.

Judd, Kenneth. 1998. *Numerical Methods in Economics.* Cambridge, Mass.: MIT Press.

Lohmann, Susanne. 1998. An Information Rationale for the Power of Special Interests. *American Political Science Review* 92, 4: 809 - 827.

Lupia, Arthur and Mathew McCubbins. 1998. *The Democratic Dilemma: Can Citizens Learn What They Need to Know?* Cambridge: Cambridge University Press.

Morton, Rebecca and Charles Cameron. 1992. Elections and the Theory of Campaign Contributions: A Survey and Critical Analysis. *Economics and Politics* 4: 79-108.

Mueller, Dennis and Thomas Stratmann. 1994. Informative and Persuasive Campaigning. *Public Choice* 81: 55-77.

Popkin, Samuel. 1991. *The Reasoning Voter: Communication and Persuasion in Presidential Campaigns.* Chicago: University of Chicago Press.

Prat, Andrea. 2000. Campaign Spending with Office-Seeking Politicians, Rational Voters, and Multiple Lobbies. *Journal of Economic Theory* 103(1): 162-189.

Prat, Andrea. 2002. Campaign Advertising and Voter Welfare. *Review of Economic Studies* 69: 997-1017.

Snyder, James. 1989. Election Goals and the Allocation of Campaign Resources. *Econometrica* 57, 3: 637-660.

Sorauf, Frank. 1992. *Inside Campaign Finance: Myths and Realities.* New Haven: Yale University Press.

Stratmann, Thomas. 2002. Can Special Interests Buy Congressional Votes? Evidence from Financial Services Legislation. *Journal of Law and Economics* 45: 345-374.