Campaign Contributions and Political Polarization

Tarhan, Simge

Colby College

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Simge Tarhan†

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Abstract

Political candidates raise campaign funds from a variety of sources. Whether contributions from certain sources should be restricted has been the subject of debate in the U.S. since the Federal Election Campaign Act of 1971. I contribute to this debate by showing that the source of contributions affects the policy choice of candidates. When lobby contributions are limited, and candidates need to choose between costly fundraising activities or self-financing of the campaign, two types of candidates emerge: "rich" candidates with non-partisan positions and "poor" candidates choosing policies along party lines. An implication of the model is that restricting self-finance causes policy platforms to diverge under certain conditions. For instance, the Millionaires' Amendment in McCain-Feingold, which raised limits on contributions for candidates whose opponent is relying heavily on personal funds, could increase political polarization in the United States.

Keywords: Campaign finance, contribution limits, PACs, partisan voters, self-financing.

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†Visiting Assistant Professor, Department of Economics, Colby College, Waterville, Maine 04901, USA. Email: *Simge.Tarhan@colby.edu*.

1 Introduction

Elections are expensive. According to the Campaign Finance Institute, more than $389 million was spent for the U.S. Senate elections in 2008, with the average expenditure of a candidate being $5.9 million. Another $808 million of campaign expenditure is recorded for the U.S. House elections the same year, with an average candidate spending $1.07 million.[1]

Where does this money come from? There are basically four sources of campaign finance in federal elections in the U.S.: individuals, political action committees (PACs), political parties, and personal funds of candidates. Table 1 summarizes the percentage contribution of each source in the U.S. congressional elections in 2008.

Table 1: **Campaign Funding Sources for House and Senate Candidates, 2008**

	Percentage of Contributions					
	House			Senate		
	Incumbents	Challengers	Open Seats	Incumbents	Challengers	Open Seats
Individuals	50	66	55	57	70	72
PACs	45	14	23	25	7	18
Parties	0	2	2	2	3	2
Candidates	0	16	19	1	6	2
Other	4	2	2	13	13	8

Source: Federal Election Commission.

According to Table 1, the biggest portion of contributions comes from individuals, followed by contributions by PACs. Incumbents do not spend a lot of their own money, whereas challengers and those that run in open-seat elections contribute up to 19% in the U.S. House elections. These numbers are similar in earlier elections.

There is an extensive literature on PAC contributions, explaining why PACs would want to contribute to campaigns. According to Morton and Cameron (1992), which is a critical survey of the earlier literature, there are two types of models explaining why PACs would want to contribute to political campaigns. One assumes PACs support candidates who are expected to return quid pro quo favors if elected. The other type of model assumes PACs contribute to the campaigns of politicians they favor, so as to help them win the election. More recent models assume that interest groups value informational lobbying of elected politicians and contribute to a candidate's campaign in order to gain access to him if he is elected (examples of such models include Austen-Smith (1998) and Cotton (2009)).

These three motives have different implications on the behavior of contributors and the

[1]See Ornstein et al. (2008).

policy decisions of politicians. While models assuming explicit favors produce divergence of policy positions by opposing candidates, Austen-Smith (1987) shows such a result does not hold if PACs are assumed to donate to increase the election chances of their favorite candidate. Later, Baron (1994) generalizes Austen-Smith (1987)'s results, illustrating that divergence may be an equilibrium outcome for particularistic policies benefiting certain groups while the cost being widely distributed among other groups, and convergence may be an equilibrium outcome for collective policies whose benefit and cost are distributed across larger groups. In a recent paper, Livshits and Wright (2009) argue that divergence could also be a result of collective policies if free-riding of lobbies is taken into account.

Despite accounting for most of campaign finance, not much research is done to understand individual contributions. One exception is the book by Francia et al. (2003) documenting who finances U.S. congressional campaigns, what their motives are, and fundraising techniques politicians use to attract contributions. In a recent paper, Ensley (2009) investigates whether contributions from individuals are related to the policy position of a candidate. He concludes that while the ideological standing of a candidate matters for fundraising, the relative ideological distance between candidates is not related to the amount of contributions raised from individuals. So, for example, the more conservative a Republican candidate, the more money she raises from individuals, and how liberal her Democratic opponent is does not matter for her fundraising success. I use this result to motivate an assumption I make in the model.

Research on self-finance is not common either. However, a detailed empirical analysis of self-financed congressional candidates can be found in Steen (2006). One of the questions the author is interested in answering is how self-financing affects competitiveness in elections. Her conclusion is that self-financing is not as productive in converting dollars into votes as fundraising. Yet, it reduces the quality of opponents a self-financer faces, thereby giving the wealthy candidate an advantage in elections.

While empirical research on individual contributions and self-finance provides us with important stylized facts, there is, to the best of my knowledge, no theoretical work that puts together these different sources of contributions. A complete model of campaign contributions and policy choices of candidates would require a general equilibrium analysis of demand and supply.[2] Demand for campaign contributions would depend on a number of parameters including policy preferences of candidates, policy positions of their opponents, cost of fundraising activities, and other variables. Supply of campaign contributions, on the other hand, would depend on the number and policy stance of PACs and partisan individual donors; candidates' personal wealth and access to loans; legal, institutional, and economic

[2] See Silberman and Yochum (1980) for a similar remark.

limits to contributions; and other variables. In equilibrium, demand and supply would need to be equal for each candidate's campaign. The probability of election for each candidate, as well as their policy choice would be determined according to the dynamics of the market for campaign contributions.

In this paper, I propose a model that would constitute a first step towards building such a comprehensive model of campaign contributions. I consider a two-candidate election with two types of voters: partisan and independent. Candidates need to persuade independent voters in order to win the election and need to raise funds to run a campaign targeted at these voters. There are three possible sources of contributions: partisan individuals, PACs, and candidates themselves.[3] Candidates decide how much to rely on each source. Raising funds from PACs is costless for the candidates. I show that PAC contributions are sufficient in equilibrium as long as there are PACs that hold more extreme policy positions than the candidates and there are no limits on how much they PACs can contribute. In this case, candidates do not engage in any costly fundraising activities or contribute to their own campaigns. Moreover, there are no incentives for candidates to converge or diverge their policies in equilibrium. However, if there are limits on PAC contributions, then the candidates need to consider other sources of funds and adjust their policy choices accordingly. Without self-financing, if the median partisan voters are closer to the two extremes, then candidates would diverge; and if the median partisan voters are moderate, candidates would converge. However, these convergence/divergence tendencies need not be realized if there are wealthy candidates, who would self-finance their campaigns rather than rely on fundraising. Candidates, whose policy stance is not aligned with the preferences of partisan voters can use their personal funds as a tool to sustain their own policy choices. This implies that when we expect policy convergence (divergence) in equilibrium when there is no self-financing, we could observe divergent (convergent) policies once we allow candidates to spend their own money.

One of the contributions of this paper is to demonstrate that convergence or divergence of policies in equilibrium depends on the sources of contributions and limits on these sources. The mechanism for convergence and divergence I offer in this paper is distinct from the explanations provided by other authors, such as Livshits and Wright (2009) and Alesina and Holden (2008). For example, Alesina and Holden (2008) argue candidates may resort to ambiguity in their campaigns, so as to guarantee contributions from extremist contributors while attracting the votes of moderates. According to my model, candidates can still be

[3]I ignore party contributions candidates receive. These contributions are quite small (see Table 1), and explaining why parties support some candidates more than others would require an analysis of party inner workings, which I do not focus on in this paper.

clear about their policy preferences in public and support their position with their personal wealth rather than rely on outside funding.

The model provides a framework in which the effects of changes in campaign finance regulations on candidates' policy choices can be evaluated. Political polarization has been an increasing concern for many politicians and citizens, and the polarization index by McCarty et al. (2006) shows that polarization in the U.S. has been increasing since the 1970s. I argue in this paper that campaign finance laws might have to do with that increase.

In what follows, I first lay down the basics of the model and define a political equilibrium. I solve for the equilibrium first in the benchmark case when there are no limits on PAC contributions and then show how the equilibrium changes after a cap on lobby contributions is introduced.

2 Model

Consider a one-dimensional issue a society will decide on through a two-candidate election. The issue space is a compact subset of positive real numbers. There are two types of citizens: partisans and independents. Partisan citizens are distributed across the issue space, each with single-peaked preferences with an ideal policy point. Those with an ideal point to the left of the middle point of the issue space belong to Party A, and those to the right of the middle point belong to Party B. In the election, each partisan voter casts her vote for the party she supports.

Independent citizens do not have preferences over the issue; their vote depends on which candidate persuades them. Candidates use campaign spending to persuade the independent voters. The more a candidate spends on the campaign, the higher her chances of getting elected. Candidates can raise campaign funds through three sources: contributions from lobbies, contributions from partisan voter, and personal resources. Whoever receives the majority of the votes wins.

There are a large number of lobbies, which are positioned uniformly on the issue space, each with single-peaked preferences. They make contributions to candidates' campaign but they do not vote. The amount of their contributions depend on how close a candidate's announced policy is to their ideal policy. A partisan voter's contribution also depends on the distance between the candidate's policy point and the voter's ideal policy.

The timing of the game is as follows:

1. Candidates announce their policy stance and how much they are willing to contribute to their own campaign.

2. Partisan voters and lobbies contribute to the candidate they support.

3. Election is held.

4. The policy of the elected is implemented.

2.1 Candidates

There are two candidates running in the election, one for each party. Party A's candidate has an ideal policy π_A on the issue space, and Party B's ideal point is π_B. If candidate $i \in \{A, B\}$ is elected for office in the general election, she would receive returns equal to

$$R - c_i^i - f(e_i)$$

where R is the returns from holding office regardless of the policy implemented, which can be thought of as ego rents associated with the position, c_i^i is the contributions the candidate makes to her own campaign, and $f(e_i)$ is the cost of exerting effort e_i to attract partisan voters' contributions, with $f'(e_i), f''(e_i) > 0, \forall e_i \in [0, 1]$. Let P_i be the probability of winning the election. Then, any candidate solves the following problem in the first stage of the game:

$$\max_{c_i^i, e_i} P_i R - c_i^i - f(e_i) \tag{1}$$

subject to

$$\begin{aligned} 0 \leq \quad & c_i^i \quad \leq y_i \\ 0 \leq \quad & e_i \quad \leq 1 \end{aligned}$$

Here y_i represents the income or borrowing constraint of the candidate, and this constraint is allowed to be different across candidates. Some candidates may have access to bigger personal funds than others. This constraint would be binding for "poorer" candidates.

2.2 Voters

There are N voters, where N is a large but finite number. A fraction α of these voters are partisan, with α_A belonging to Party A and α_B belonging to Party B, where $\alpha_A + \alpha_B = \alpha$. Let x_A^P denote the ideal policy position of the median partisan voter supporting

Party A. Each partisan voter contributes to Party A's campaign by the same amount,[4] and following the empirical findings of Ensley (2009) mentioned in the introduction, total individual contributions are assumed to take the following form:

$$c_A^P = \alpha_A \, N \, e_A \, (\Psi_A - |x_A^P - \pi_A|) \tag{2}$$

where Ψ_A is the maximum amount a partisan voter would contribute to A's campaign. Note that the more effort, e_A, the candidate exerts, and the closer her policy stance is to the ideal point of the median partisan voter, the more contributions she raises from partisan voters. The largest amount of total partisan contributions is $\alpha_A N \Psi_A$, raised when $e_A = 1$ and $x_A^P = \pi_A$.

The rest of the citizens are independent voters, and their vote depends on how much is spent to convince them by each candidate. It is assumed that candidates engage in persuasive rather than informational campaigning. Independent voters have full information about the policy stances of the candidates; however, they do not have a clear preference as in the case of partisan voters. Hence, candidates need to persuade them of their quality and valence characteristics. As explained by Mueller and Stratmann (1994), modeling campaigning efforts as persuasive rather than informational fits better with rational motivations of PACs and partisan voters to contribute.

The more candidates spend on their campaign, the higher the probability of persuading independent voters. The probability of Party A's candidate being elected to office, then, would be:

$$P_A = \alpha_A + (1 - \alpha) \frac{C_A}{C_A + C_B} \tag{3}$$

where $C_A = c_A^L + c_A^P + c_A^A$ is the total contributions made to A's campaign, and similarly for C_B. See below for total contributions by lobbies, c_A^L.

Note that this "vote production function" assumes the productivity of all contributions to be the same, regardless of the source. One could argue that fundraising activities, and hence contributions raised from individuals are better than self-financed funds in producing votes. Indeed, this view finds support from Steen (2006). Alexander (2005) reports that PAC contributions in U.S. House elections are positively correlated with probability of winning, whereas self-financing is negatively correlated. Depken (1998) finds similar results for the 1996 U.S. congressional elections. One way to incorporate these findings into equation (3) is

[4] Another way to model partisan voters' contributions is to let each voter contribute according to the distance between the candidate's policy and the voter's ideal point. However, this requires additional notation, and complicates the model without providing a much better intuition.

to assign an exogenous weight to each source of contributions. However, exogenous weights different than 1 would not affect the implications of the model, and hence are ignored. Vote production functions with endogenous weights are left to future research.

2.3 Lobbies

There are M lobbies[5], where M is a large but finite number. Let x_ℓ^L denote the ideal policy of lobby ℓ, and $c_{\ell,A}^L$ and $c_{\ell,B}^L$ denote the contributions made by this lobby to each party's campaign. Lobby ℓ maximizes its expected benefits from the election:

$$\max_{c_{\ell,A}^L, c_{\ell,B}^L} -P_A \left|x_\ell^L - \pi_A\right| - (1 - P_A) \left|x_\ell^L - \pi_B\right| - c_{\ell,A}^L - c_{\ell,B}^L \tag{4}$$

subject to

$$c_{\ell,A}^L, c_{\ell,B}^L \geq 0$$

It is important to note that lobbies do not get any direct benefits from the candidate(s) they support. They realize their effect on the probability of election of each candidate through their contributions. They make contributions to increase the chances that the candidate closer to their ideal wins the election. Any deviation from their ideal policy causes a loss for the lobbies, so they want the policy to be implemented after the election to be as close to their ideal point as possible.

Total contributions made by lobby ℓ to A's campaign can then be found as:

$$c_A^L = \sum_\ell c_{\ell,A}^L \tag{5}$$

3 Political Equilibrium

The equilibrium concept used is subgame perfect Nash equilibrium, which requires all players to act rationally at every stage of the game given what has happened in previous stages and what is expected to happen in the coming stages. Given ideal policy positions π_A and π_B of candidates; x_A^P and x_B^P of partisan median voters; $x_\ell^L, \forall \ell$ of lobbies; partisan citizen distributions α, α_A, and α_B; number of lobbies, M, and number of voters, N, a subgame perfect Nash equilibrium consists of effort levels e_i and personal campaign contributions c_i^i of each candidate i, lobby contributions $c_{\ell,A}^L$ and $c_{\ell,B}^L$ by each lobby ℓ, individual contributions c_A^P and c_B^P by partisan voters, and probabilities of getting elected P_A and P_B, such that each

[5] Throughout the model, I will use the term "lobby" instead of "PAC" to keep the notation clear and simple.

candidate, lobby, and partisan voter acts optimally, i.e. solve their respective optimization problems.

The equilibrium of this game is found by backwards induction, starting at the last stage of the game: the election.

3.1 Election

Since there is no uncertainty in the model regarding who will be elected once all players make their decisions, the equilibrium in the election stage would be determined by which party has the partisan voter advantage. If $\alpha_A > 0.5$, Party A would win. If $\alpha_A < 0.5$, Party B would win. The more interesting case is when $\alpha_A = 0.5$, and the candidate who raises the most money, and hence convinces most of the independent voters, would win. In this case, both candidates would try to raise equal amounts of contributions so as to neutralize the effect of the independent voters on the election outcome, and sustain the equilibrium with 50% probability of winning for both candidates. It is assumed that a coin is tossed to determine the winner in this case. In the remainder of the paper, I will assume $\alpha_A = 0.5$.

3.2 Contributions

3.2.1 Lobby Contributions

Given partisan contributions c_i^P and self-finance of candidates c_i^i, each lobby solves the maximization problem summarized by (4). Substituting (3) in (4), we get:

$$\max_{c_{\ell,A}^L, c_{\ell,B}^L} -(\alpha_A+(1-\alpha)\frac{C_A}{C_A+C_B})|x_\ell^L-\pi_A|-(1-\alpha_A-(1-\alpha)\frac{C_A}{C_A+C_B})|x_\ell^L-\pi_B|-c_{\ell,A}^L-c_{\ell,B}^L \quad (6)$$

subject to

$$c_{\ell,A}^L, c_{\ell,B}^L \geq 0$$

The solution to this problem renders the propositions below. Proofs of the propositions can be found in the appendix.

Proposition 1 *Each lobby contributes to at most one candidate's campaign.*

This is to be expected, because each lobby would try to maximize the election probability of the candidate positioned closer to their ideal point, and contributing to the other candidate's campaign would decrease that probability.

Proposition 2 *If a lobby contributes to a campaign, it contributes to the one offering the policy closest to its ideal position. If two candidates are at equal distance from a lobby, neither receives a contribution from that lobby.*

This is due to symmetric preferences lobbies have. They do not have any partisan tendencies, and only care about the distance between their ideal point and the policies of the candidates. Hence, contributing to either campaign when candidates are equally far away is wasteful.

Proposition 3 *Let M_A be the number of lobbies ℓ that contribute to A's campaign and M_B the number of lobbies ℓ' contributing to B's campaign. Then the aggregate contribution supply functions can be obtained as:*

$$C_A = \left[\frac{\frac{\sqrt{1-\alpha}}{M_B} \sum_{\ell'} \sqrt{|x_{\ell'}^L - \pi_A| - |x_{\ell'}^L - \pi_B|}}{\left\{ \frac{M_A}{M_B} \frac{\sum_{\ell'} \sqrt{|x_{\ell'}^L - \pi_A| - |x_{\ell'}^L - \pi_B|}}{\sum_{\ell} \sqrt{|x_{\ell}^L - \pi_B| - |x_{\ell}^L - \pi_A|}} \right\}^2 + 1} \right]^2 \tag{7}$$

$$C_B = \left[\frac{\frac{\sqrt{1-\alpha}}{M_A} \sum_{\ell} \sqrt{|x_{\ell}^L - \pi_B| - |x_{\ell}^L - \pi_A|}}{\left\{ \frac{M_B}{M_A} \frac{\sum_{\ell} \sqrt{|x_{\ell}^L - \pi_B| - |x_{\ell}^L - \pi_A|}}{\sum_{\ell'} \sqrt{|x_{\ell'}^L - \pi_A| - |x_{\ell'}^L - \pi_B|}} \right\}^2 + 1} \right]^2 \tag{8}$$

Proposition 4 *If there are no restrictions on how much each lobby can contribute, then it is only those lobbies that are more extreme than the candidates that end up contributing.*

That is, lobbies positioned on either side of π_A and π_B make contributions, and the lobbies in between the two candidates do not make any contributions. This proposition is due to moderate lobbies free riding on the contributions of extremist lobbies. Extremist lobbies act collectively, and each contributes the same amount. However, as with any collective action problem, there is a tendency to free ride within the extremist lobbies. I do not address the collective action problem, and assume the extremist lobbies solve this problem within themselves. For an explicit treatment of free riding in a similar environment, see Livshits and Wright (2009).

Proposition 5 *Regardless of c_A^P, c_B^P, c_A^A, and c_B^B, total contributions in equilibrium are:*

$$C_A = C_B = (1-\alpha)\frac{(\pi_B - \pi_A)}{4} \tag{9}$$

Consistent with what was expected at the general election stage of the game, lobbies work so as to neutralize the effect of independent voters in the election. More importantly, lobbies equalize total contributions regardless of what partisan voters and candidates themselves contribute. This makes these sources unimportant, and we would expect partisan contributions and self-financing to be 0 in equilibrium when there is no limit on how much lobbies can contribute.

Also note that total contributions depend on the fraction $(1-\alpha)$ of independent voters in the society, and the policy difference $(\pi_B - \pi_A)$ of the two candidates. As the fraction of independent voters increase, more contributions are needed to persuade these voters. In addition, lobbies would be willing to contribute more when the policy positions of the candidates are further away from one another. So, in communities where partisan voters dominate and moderate candidates emerge, campaigns would be less costly.

3.2.2 Partisan Contributions

Given policy and effort selections of each candidate, partisan contributions can be found by using equation (2), and the symmetric function for candidate B. Note that partisan voters do not take into account how much lobbies or the candidates contribute to each campaign. As long as a candidate exerts positive effort, they provide financing to the campaign. As argued above, candidates do not exert any effort when lobby contributions are unlimited. Hence, in equilibrium $e_A = e_B = 0$ and $c_A^P = c_B^P = 0$.

3.2.3 Candidates' Own Contributions

Since any contributions by candidates decrease the amount contributed by lobbies, $c_A^A = c_B^B = 0$ in equilibrium.

3.3 Candidate Emergence

While the decision whether to run in the election is not explicitly modeled, it is implicit that a candidate would emerge if and only if she can support her ideal policy through raising at least as much as her potential opponent. The ideal policies of candidates do not matter in that the probability of election depends only on campaign contributions, as long as there are equally many partisan voters supporting each party. Hence, according to the model, any policy position can be sustained as part of an equilibrium, and candidates need not converge towards or diverge from the median voter to win the election when lobby contributions are unlimited. Any change in contributions when a more moderate or extremist candidate emerges in one party is offset by an equal increase in the opponent's contributions, rendering all policy positions equally likely to win the election. This result holds as long as there are sufficiently many lobbies with more extremist policy preferences than the candidates running for office. If there are not sufficiently many extremist lobbies, or if they are income-constrained or in any other way limited in their contributions, candidate emergence would be affected. This idea is explored more in detail in the rest of the paper.

4 Limits on Lobby Contributions

Suppose a cap $\bar{c}^L$ is put into effect that limits how much each lobby can contribute to a candidate's campaign, so that $c^L_{\ell,i} \leq \bar{c}^L, \forall \ell, i \in \{A, B\}$. This limit could be due to legal changes in the campaign finance law or other changes, such as a decrease in earnings of lobbying groups, that make it costly/less profitable for lobbies to make large contributions to political campaigns.

While total contributions are the same for the two candidates, per lobby contributions depend on how extreme the candidates are. Because it is those lobbies that are more extremist than the candidates that provide funding, per lobby contributions increase as the candidate becomes more extremist. Figure 1 shows how per lobby contributions change as the policy choice of candidate A changes. The lobby contributions on the graph are calculated when the policy space is limited to $[0, 10]$, lobbies are uniformly distributed along the policy space, and the policy choice of candidate B is fixed at $\pi_B = 7$. Note that the per lobby contributions are equal when $M_A = M_B$, that is when the candidates are symmetrically located around the median lobby (when $\pi_A = 3$, hence $\pi_B - \pi_A = 4$ in the figure). Per lobby contributions for A increase exponentially once A becomes more extremist than B, that is when A is further away from the median lobby than B. This is because the number of lobbies M_A that are more extreme than candidate A is decreasing.

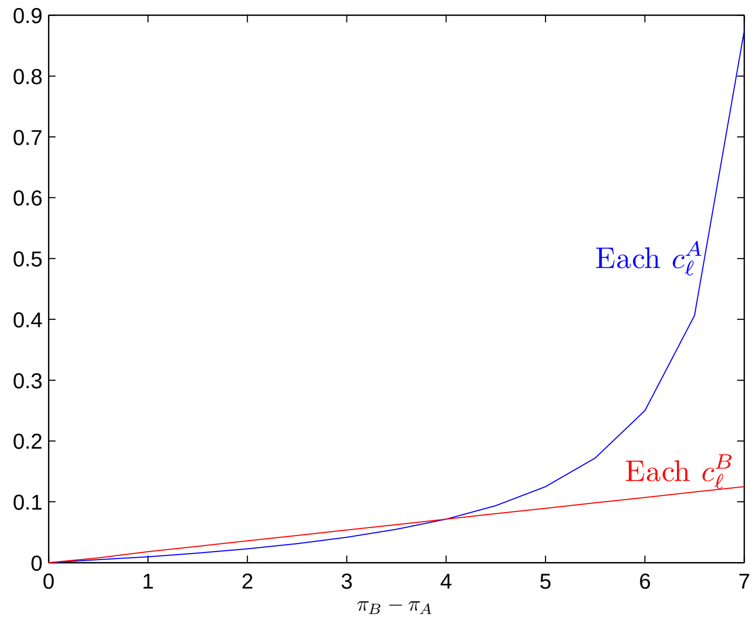
This observation has important implications for extremist candidates. A limit on individual lobby contributions would affect extremist candidates more severely than it does moderate candidates, provided that lobbies do not change their contributions. The following proposition explains how lobbies behave when their an upper limit to their contributions is introduced.

4.1 Lobby Contributions

Conjecture 1 *If there is an upper bound to how much each lobby can contribute, then it is only those lobbies for which the limit is binding that end up contributing.*

According to this conjecture, when lobby contributions are limited, lobbies more moderate than the candidates start contributing to campaigns. All contributing lobbies pay the

Figure 1: Per Lobby Contributions as a Function of Policy Divergence.



same amount, which is equal to the cap on contributions, $\bar{c}^L$. This result has important implications for campaign contributions and political polarization.

One implication of this conjecture is as long as there are moderate lobbies willing to contribute to political campaigns, caps on lobby contributions do not matter. Candidates have no incentive to converge or diverge their policy positions, and they do not need to exert effort to raise partisan contributions or spend their own money. However, if there are not many moderate lobbies and the lobbies are concentrated at extreme positions instead, as argued by McCarty et al. (2006) to be the case for the U.S., then limits on lobby contributions cause candidates to look for alternative sources of campaign finance.

Consider the case when no alternative sources of contributions exist, and the candidates have to rely on lobby contributions. In this case, putting a cap on contributions gives an advantage to the party that has more moderate lobbies on its side than the opponent. Suppose two candidates, A_1 and B_1, emerge for the two parties. Assume Party A has many moderate lobbies that are closer to A_1's policy than B_1's, and Party B does not have moderate lobbies close to its candidate's policy.[6] Under such circumstances, a more extreme candidate for Party A would beat B's candidate. With a more extreme candidate, the policy difference $(\pi_B - \pi_A)$ increases, and with a binding cap on lobby contributions, moderate lobbies start contributing. Since Party B does not have supporting moderate

[6]Even if moderate lobbies exist on Party B's side, they might lack resources compared to the lobbies supporting Party A. In this case Party A still has advantage over B.

lobbies, it would not be able to raise as much money as Party A, and therefore lose the election. When Party B clearly has no chance of election, no lobby would contribute unless the party's candidate could resort to partisan contributions or self-financing.

4.2 Partisan Contributions and Self-Financing

Suppose that candidates are allowed to raise funds from partisan voters and contribute to their own campaigns. Assume there are not sufficiently many moderate lobbies or the existing ones are income-constrained. As argued above, whether lobbies contribute to a campaign would depend on the policy of the candidate, other contributions she raises, and the campaign contributions of her opponent. Let M_i be the number of lobbies contributing to candidate i's campaign. Then, $M_i = M_i(\pi_i, c_i^P + c_i^i, C_j)$, $i, j = 1, 2$. Note that because lobby contributions are costless, candidates would try to raise as much as they can from lobbies before looking for other sources. Therefore, each candidate would adjust her fundraising activities and self-finance so that all contributing lobbies pay the maximum amount $\bar{c}^L$. Candidate i's optimization problem can then be written as:

$$\max_{\pi_i, c_i^i, e_i} (\alpha_i + \frac{M_i(\pi_i, c_i^P + c_i^i)\, \bar{c}^L + c_i^P + c_i^i}{M_i\, \bar{c}^L + c_i^P + c_i^i + C_{-i}})R - c_i^i - f(e_i) \tag{10}$$

subject to

$$\begin{aligned} c_i^P &= \alpha_i N e_i(\Psi_i - |x_i^P - \pi_i|) \\ 0 &\leq c_i^i \leq y_i \\ 0 &\leq e_i \leq 1 \end{aligned}$$

For a candidate, partisan voters' contributions and self contributions are perfect substitutes in that any additional contribution increases the probability of election equally independent of its source. However, the cost of raising partisan contributions may be different than the cost of self-financing for a candidate, and this difference would affect the candidate's choice over the source of contributions.

There are a number of variables that play important roles in a candidate's choice over the source of contributions. One is the maximum individual contributions, Ψ_i, candidate i can raise when she exerts maximum effort and her policy stance matches her party's median voter's ideal point. This limit can be interpreted as the legal cap on individual contributions, or it could reflect the income constraint of the partisan voters. If income is not symmetrically distributed across the political spectrum, and one candidate has a richer constituency than the other, that candidate would have a fundraising advantage over his opponent, and hence would not need to use his own funds as much. This is also true when the size of partisan constituencies, α_A and α_B, are different. The candidate with a bigger support group can rely more heavily on individual contributions.

The closer a candidate's policy stance is to the median partisan voter's ideal point, the larger contributions that candidate can raise for any effort level. Assuming the median partisan voter to have moderate policy preferences, moderate candidates would be at an advantage. Extremist candidates either need to exert more effort, e, to raise the same amount as the moderate candidates, or they need to use personal funds to pay for campaign expenditure. Obviously, this decision depends on how costly fundraising is to the candidate. This cost can be thought of as reflecting quality differences across candidates. A candidate can be better in fundraising than the other, perhaps because he is a better public speaker, utilizes technology and innovations in mass communication in a better way[7], has more political experience[8], or is an incumbent[9]. Hence, the returns to fundraising efforts could differ from one candidate to the other.

Finally, the decision over the source of campaign financing also depends on the income or borrowing constraints of a candidate. A rich candidate could donate or lend huge amounts of money to her own campaign. Indeed, Steen (2006) finds that the average wealth of candidates that contribute heavily to their own campaigns is three times that of candidates that do not self-finance their campaigns.

I do not provide the explicit solution to this optimization problem since the solution is intuitive. A candidate would raise funds through either of these methods if the marginal utility, which is the additional probability of election, of the contribution exceeds its marginal cost. At an interior solution, where fundraising efforts and personal contributions are both positive, marginal utility is equated to marginal cost for both sources. When the upper limit of a source is binding, marginal utility of contributions from that source is greater than the marginal cost.

4.3 Candidate Emergence

When lobby contributions are limited, whether a citizen emerges as a candidate in the election depends on if his income constraint is binding, and how costly fundraising is for

[7]Popular media claims Howard Dean's 2004 campaign and Barack Obama's 2008 campaign have revolutionized the way candidates organize their supporters and communicate with their constituents. Many articles attribute Obama's successful campaign to the internet. See several relevant articles in the New York Times, The Huffington Post, and Time magazine, among others.

[8]According to Steen (2006), there is a strong negative relationship between political experience and self-financing for the U.S. congressional candidates.

[9]See Francia et al. (2003) for a discussion on incumbency advantages to fundraising in the U.S. congressional elections.

him. A "poor" candidate, whose income constraint is binding, would need to raise funds from partisan individuals, and therefore need to appeal to the median partisan voter. This means that a poor candidate cannot choose a policy position too far away from the partisan ideal. On the other hand, a rich candidate can sustain her non-partisan policy choice through self-financing her campaign. So, a rich candidate has more freedom in choosing her policy stance.

Steen (2006) finds that wealthy candidates deter high-quality opponents from entering the political race. This observation is consistent with the implications of the model. When faced with a wealthy candidate, a high-quality opponent (whose marginal cost of fundraising is low) would drop out of the race if the limit on individual contributions Ψ is binding and she lacks personal funds to support her campaign.

If the degree of political polarization is high in a society, and the two parties are located on the two extremes of political spectrum, moderate candidates would emerge only if they have sufficient personal funds. If the degree of polarization is low, then extremist candidates are also the wealthy ones. Campaign finance laws play a role to reinforce the existing polarization, or the lack of it, in a society. For example, if self-financing is restricted by implementing a cap on how much candidates can contribute to their own campaigns, this would reduce the wealthy candidates' freedom of policy choice. In a polarized society, this would suggest moderate candidates that rely on personal funds would drop put of the race. In a non-polarized society, this policy would reduce the emergence of extremist candidates on both sides of the political spectrum.

Restricting the use of personal funds in political campaigns in the U.S. has been found unconstitutional in 1976 (*Buckley v. Valeo*) on the grounds that it restricts the candidates' freedom of speech.[10] However, legislators designed a mechanism that reduces the incentives of self-financing indirectly. The *Millionaires' Amendment* in the McCain-Feingold Law that was passed in 2002 increases the cap on individual contributions for candidates whose opponent is relying heavily on personal funds. The effect of this amendment on the emergence of moderate/extremist candidates would be similar but less pronounced to that of a cap on self-financing. While a cap affects the ability of wealthy candidates to spend their own money on campaigning, the amendment makes it more costly to support one's position through self-financing. Wealthy candidates may still run for office, but they would have to spend more to be competitive against their partisan opponents. This would change the polarization of the society to a lesser extent, but cause an increase in the cost of winning an election.

[10] See Corrado et al. (2005) for a detailed history of campaign finance regulations in the U.S..

5 Conclusion

The existing theoretical literature focuses on analyzing the effects of lobby contributions on policy choices of candidates, while ignoring other sources of campaign finance. In this paper, I show the availability of individual contributions and self-financing has non-trivial effects on the equilibrium outcomes of an election game. The model I propose is suitable to evaluate the impact of changes in campaign finance laws on the degree of political polarization in a society.

This model can be made richer in a number of ways. First, I assumed that all sources of contributions affect the probability of election in the same way, and that the productivity of each source is the same at all levels. However, one could argue there is decreasing marginal productivity of each source, making diversification of contributions a better option for candidates. Also, there might be complementarities across the sources of contributions, rendering the composition of contributions important in addition to the total quantity of funds available.

Second, candidate emergence can be explicitly modeled through introducing a primary election for each party. Such a setup would also allow the introduction of party contributions candidates receive. It is likely that parties view their contributions as complements to other sources. Steen (2006) claims party spending responds to self-financing differently for each party, and argues the Democratic Party is less likely than the Republican Party to support self-financers in the U.S. House elections. Modeling party contributions could help us understand why this is the case.

Appendix

Solving for Lobby Contributions

Let λ_A and λ_B the Lagrange multipliers to the non-negativity constraints on contributions. The Kuhn-Tucker conditions to problem (6) then are:

$$-\frac{\partial P_A}{\partial c^L_{\ell,A}}|x^L_\ell - \pi_A| + \frac{\partial P_A}{\partial c^L_{\ell,A}}|x^L_\ell - \pi_B| - 1 + \lambda_A = 0 \quad (11)$$

$$-\frac{\partial P_A}{\partial c^L_{\ell,B}}|x^L_\ell - \pi_A| + \frac{\partial P_A}{\partial c^L_{\ell,B}}|x^L_\ell - \pi_B| - 1 + \lambda_B = 0 \quad (12)$$

$$\lambda_A c^L_{\ell,A} = 0, \qquad \lambda_A \geq 0, \qquad c^L_{\ell,A} \geq 0 \quad (13)$$

$$\lambda_B c^L_{\ell,B} = 0, \qquad \lambda_B \geq 0, \qquad c^L_{\ell,B} \geq 0 \quad (14)$$

From (3), we derive the partial derivatives:

$$\frac{\partial P_A}{\partial c^L_{\ell,A}} = (1-\alpha)\frac{C_B}{(C_A + C_B)^2} \quad (15)$$

$$\frac{\partial P_A}{\partial c^L_{\ell,B}} = (1-\alpha)\frac{-C_A}{(C_A + C_B)^2} \quad (16)$$

Substituting (15) and (16) into (11) and (12), we get:

$$-(1-\alpha)\frac{C_B}{(C_A + C_B)^2}(|x^L_\ell - \pi_A| - |x^L_\ell - \pi_B|) - 1 + \lambda_A = 0 \quad (17)$$

$$-(1-\alpha)\frac{-C_A}{(C_A + C_B)^2}(|x^L_\ell - \pi_A| - |x^L_\ell - \pi_B|) - 1 + \lambda_B = 0 \quad (18)$$

Proof of Proposition 1. Suppose lobby ℓ contributes to both campaign, i.e. $c^L_{\ell,A} > 0$ and $c^L_{\ell,B} > 0$. According to Kuhn-Tucker conditions, $\lambda_A = \lambda_B = 0$ and (17) and (18) become:

$$-(1-\alpha)\frac{C_B}{(C_A + C_B)^2}(|x^L_\ell - \pi_A| - |x^L_\ell - \pi_B|) = 1 \quad (19)$$

$$-(1-\alpha)\frac{-C_A}{(C_A + C_B)^2}(|x^L_\ell - \pi_A| - |x^L_\ell - \pi_B|) = 1 \quad (20)$$

which imply $C_A = -C_B$. Since $C_A \geq 0$ and $C_B \geq 0$, this implies $C_A = C_B = 0$, which would be a contradiction to $c^L_{\ell,A} > 0$ and $c^L_{\ell,A} > 0$. Hence, a lobby would not contribute to both campaigns at the same time. ■

Proof of Proposition 2. Suppose that a lobby ℓ contributes to A's campaign. This suggests $c^L_{\ell,A} > 0$ and $c^L_{\ell,B} = 0$. Then $\lambda_A = 0$ and $\lambda_B > 0$ and:

$$-(1-\alpha)\frac{C_B}{(C_A+C_B)^2}(|x^L_\ell - \pi_A| - |x^L_\ell - \pi_B|) = 1 \tag{21}$$

$$-(1-\alpha)\frac{-C_A}{(C_A+C_B)^2}(|x^L_\ell - \pi_A| - |x^L_\ell - \pi_B|) < 1 \tag{22}$$

Equation (21) implies $|x^L_\ell - \pi_A| - |x^L_\ell - \pi_B| < 0$, which means that the ideal policy of lobby ℓ is closer to π_A than π_B. Inequality (22) implies that if the two candidates are equally away from a lobby's ideal position, so that $|x^L_\ell - \pi_A| - |x^L_\ell - \pi_B| = 0$, neither receives contributions from that lobby. ■

Proof of Proposition 3. Let ℓ^* be a lobby contributing to candidate A's campaign. Rearranging (19), we get:

$$C_A = \sqrt{C_B(1-\alpha)}\sqrt{|x^L_{\ell^*} - \pi_B| - |x^L_{\ell^*} - \pi_A|} - C_B \tag{23}$$

Since total contributions can be decomposed as $C_A = c^L_{\ell^*,A} + \sum_{\ell \neq \ell^*} c^L_{\ell,A} + c^P_A + c^A_A$, equation (23) can be written as:

$$c^L_{\ell^*,A} = \sqrt{C_B(1-\alpha)}\sqrt{|x^L_{\ell^*} - \pi_B| - |x^L_{\ell^*} - \pi_A|} - C_B - \sum_{\ell \neq \ell^*} c^L_{\ell,A} - c^P_A - c^A_A \tag{24}$$

Adding contributions of all M_A lobbies, we get:

$$\sum_\ell c^L_{\ell,A} = c^L_A = \frac{\sqrt{C_B(1-\alpha)}}{M_A}\sum_\ell \sqrt{|x^L_\ell - \pi_B| - |x^L_\ell - \pi_A)} - C_B - c^P_A - c^A_A \tag{25}$$

Similarly for candidate B:

$$c^L_B = \frac{\sqrt{C_B(1-\alpha)}}{M_B}\sum_{\ell'} \sqrt{(|x^L_{\ell'} - \pi_A| - |x^L_{\ell'} - \pi_B|)} - C_A - c^P_B - c^B_B \tag{26}$$

Equations (25) and (26) can then be rearranged to give:

$$C_A = \frac{\sqrt{C_B(1-\alpha)}}{M_A}\sum_\ell \sqrt{|x^L_\ell - \pi_B| - |x^L_\ell - \pi_A)} - C_B \tag{27}$$

$$C_B = \frac{\sqrt{C_A(1-\alpha)}}{M_B}\sum_{\ell'} \sqrt{|x^L_{\ell'} - \pi_A| - |x^L_{\ell'} - \pi_B|} - C_A \tag{28}$$

These imply:

$$\frac{\sqrt{C_B(1-\alpha)}}{M_A}\sum_{\ell}\sqrt{|x_\ell^L-\pi_B|-|x_\ell^L-\pi_A|}=\frac{\sqrt{C_A(1-\alpha)}}{M_B}\sum_{\ell'}\sqrt{|x_{\ell'}^L-\pi_A|-|x_{\ell'}^L-\pi_B}$$

Rearranging gives:

$$\frac{C_A}{C_B}=\left\{\frac{M_B}{M_A}\frac{\sum_\ell\sqrt{|x_\ell^L-\pi_B|-|x_\ell^L-\pi_A|}}{\sum_{\ell'}\sqrt{|x_{\ell'}^L-\pi_A|-|x_{\ell'}^L-\pi_B|}}\right\}^2 \tag{29}$$

Inserting equation (29) in (27) gives:

$$\left\{\frac{M_B}{M_A}\frac{\sum_\ell\sqrt{|x_\ell^L-\pi_B|-|x_\ell^L-\pi_A|}}{\sum_{\ell'}\sqrt{|x_{\ell'}^L-\pi_A|-|x_{\ell'}^L-\pi_B|}}\right\}^2 C_B=\frac{\sqrt{C_B(1-\alpha)}}{M_A}\sum_{\ell}\sqrt{(|x_\ell^L-\pi_B|-|x_\ell^L-\pi_A|)}-C_B \tag{30}$$

Rearranging (30) gives equation (8). Similarly, inserting equation (29) in (28) gives equation (7). ■

Proof of Proposition 4. Any lobby, whose marginal benefit is above its marginal cost of contributing would contribute. Let ℓ be any lobby contributing to A's campaign. Then, it must be that:

$$(1-\alpha)\frac{C_B}{(C_A+C_B)^2}(|x_\ell^L-\pi_B|-|x_\ell^L-\pi_A|)\geq 1 \tag{31}$$

Plugging in the aggregate contribution supply functions (7) and (8) and with some patience, condition (31) simplifies to:

$$|x_\ell^L-\pi_B|-|x_\ell^L-\pi_A|\geq\left(\frac{\sum_\ell\sqrt{|x_\ell^L-\pi_B|-|x_\ell^L-\pi_A|}}{M_A}\right)^2 \tag{32}$$

If ℓ's ideal policy is more extreme than candidate A's, then the difference becomes $|x_\ell^L-\pi_B|-|x_\ell^L-\pi_A|=\pi_B-\pi_A$. This is the maximum value that difference can get. Hence, for all ℓ' such that $\pi_A<x_{\ell'}^L<\pi_B$:

$$|x_{\ell'}^L-\pi_B|-|x_{\ell'}^L-\pi_A|<\pi_B-\pi_A \tag{33}$$

Note that if one extremist lobby finds it worthwhile to contribute to A's campaign, then all the other extremist lobbies also contribute. If there are initially M_A extremist lobbies that contribute, a moderate lobby ℓ' would contribute if:

$$|x_{\ell'}^L - \pi_B| - |x_{\ell'}^L - \pi_A| \geq \left(\frac{\sum_\ell \sqrt{|x_\ell^L - \pi_B| - |x_\ell^L - \pi_A|}}{M_A + 1} \right)^2 \tag{34}$$

which can be written as:

$$\sqrt{|x_{\ell'}^L - \pi_B| - |x_{\ell'}^L - \pi_A|} \geq \frac{M_A \sqrt{\pi_B - \pi_A} + \sqrt{|x_{\ell'}^L - \pi_B| - |x_{\ell'}^L - \pi_A|}}{M_A + 1} \tag{35}$$

Rearranging:

$$\sqrt{|x_{\ell'}^L - \pi_B| - |x_{\ell'}^L - \pi_A|} \geq \sqrt{\pi_B - \pi_A} \tag{36}$$

which contradicts with (33). Hence, no moderate lobby contributes. ■

Proof of Proposition 5. Following Proposition (4):

$$\sum_\ell \sqrt{|x_\ell^L - \pi_B| - |x_\ell^L - \pi_A|} = M_A \sqrt{\pi_B - \pi_A} \tag{37}$$

$$\sum_{\ell'} \sqrt{|x_{\ell'}^L - \pi_B| - |x_{\ell'}^L - \pi_A|} = M_B \sqrt{\pi_B - \pi_A} \tag{38}$$

Plugging (37) and (38) into (7) and (8) renders (9). ■

References

Alesina, Alberto and Richard Holden, "Ambiguity and Extremism in Elections," Harvard Institute of Economic Research Discussion Paper No. 2157, July 2008.

Alexander, Brad, "Good Money and Bad Money: Do Funding Sources Affect Electoral Outcomes?," *Political Research Quarterly*, 2005, *58* (2), 353–358.

Austen-Smith, David, "Interest Groups, Campaign Contributions, and Probabilistic Voting," *Public Choice*, 1987, *54* (2), 123–139.

_ , "Allocating Access for Information and Contributions," *Journal of Law, Economics, and Organization*, 1998, *14* (2), 277–303.

Baron, David P., "Electoral Competition with Informed and Uniformed Voters," *The American Political Science Review*, March 1994, *88* (1), 33–47.

Corrado, Anthony, Thomas E. Mann, Daniel R. Ortiz, and Trevor Potter, *The New Campaign Finance Sourcebook*, Washington, D.C.: Brookings Institution Press, 2005.

Cotton, Christopher, "Should We Tax or Cap Political Contributions? A Lobbying Model with Policy Favors and Access," *Journal of Public Economics*, 2009, *93* (7-8), 831–842.

Depken, Craig A., "The Effects of Campaign Contribution Sources on the Congressional Elections of 1996," *Economics Letters*, 1998, *58* (2), 211–215.

Ensley, Michael J., "Individual Campaign Contributions and Candidate Ideology," *Public Choice*, 2009, *138* (1), 221–238.

Francia, Peter L., John C. Green, Paul S. Herrnson, Lynda W. Powell, and Clyde Wilcox, *The Financiers of Congressional Elections: Investors, Ideologues, and Intimates*, New York: Columbia University Press, 2003.

Livshits, Igor and Mark Wright, "Greed as a Source of Polarization," Working Paper, November 2009.

McCarty, Nolan M., Keith T. Poole, and Howard Rosenthal, *Polarized America: The Dance of Ideology and Unequal Riches*, Cambridge: MIT Press, 2006.

Morton, Rebecca and Charles Cameron, "Elections and the Theory of Campaign Contributions: A Survey and Critical Analysis," *Economics and Politics*, 1992, *4* (1), 79–108.

Mueller, Dennis C. and Thomas Stratmann, "Informative and Persuasive Campaigning," *Public Choice*, 1994, *81* (1-2), 55–77.

Ornstein, Norman J., Thomas E. Mann, and Michael J. Malbin, *Vital Statistics on Congress 2008*, Washington D.C.: Brookings Institution Press, 2008.

Silberman, Jonathan and Gilbert Yochum, "The Market for Special Interest Campaign Funds: An Exploratory Approach," *Public Choice*, 1980, *35* (1), 75–83.

Steen, Jennifer A., *Self-Financed Candidates in Congressional Elections*, Ann Arbor: The University of Michigan Press, 2006.