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Campaigns, Political Mobility, and Communication

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Abstract

We present a model of elections in which interest group donations allow candidates to shift policy positions. We show that if donations were prohibited, then a unique equilibrium regarding the position choices of candidates would exist. With unrestricted financing of political campaigns two equilibria emerge, depending on whether a majority of interest groups runs to support the leftist or rightist candidate. The equilibria generate a variety of new features of campaign games and may help identify the objective functions of candidates empirically.

Keywords: elections; campaign contributions; interest groups

JEL Classification: C72; D72.

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1 Introduction

Competitive political campaigns are still a very controversial issue. Discussions on this subject relate both to the influence of campaigns on political outcomes and to their impact on welfare.

In this paper we propose a model of political campaigns that allows us to study the interdependence between campaign expenditures, candidates' positions, and electoral outcomes. We focus on the following often-observed political races. At the beginning of a political race for office, two candidates try to obtain campaign support from interest groups. They announce positions in a policy space that are more risky the more they differ from positions announced in the past. One candidate has a firmly established position on the left of the political spectrum and the same holds for the other candidate, who has a firmly established position on the right side. Moreover, an incumbent may have a clearer position than a challenger because he has been in office for a long time, and thus has been able to build up reputation. Voters are risk-averse and the candidates will try to improve communication with them during campaigns in order to reduce location uncertainty which, in turn, allows them to move their political positions towards the current median position. Fund-raising is a necessary condition for getting messages across, so candidates will attempt to obtain campaign contributions at the beginning of the political race to gain mobility within the political spectrum. Candidates maximize their vote shares.

We study the equilibria of this game and shed light on the role of political campaigns. Our main results are as follows: We first show that there is a unique equilibrium regarding the position choices of candidates if interest group donations are prohibited. The game with interest group donations essentially brings forth two equilibria. Each candidate's chance of winning the election depends on the equilibrium that is realized. The winning candidate, uniquely determined in one equilibrium, is usually located closer to the median position and receives contributions from a majority of donors. An important feature of our equilibria is the presence of a certain run on donors' contributions. A donor¹ may contribute money to one candidate in one equilibrium and support the other candidate in the other equilibrium. As a consequence, even if candidates' initial positions and the ideal points of interest groups are symmetrically distributed around the median, the political positions chosen in equilibrium will be asymmetric.

¹E.g. a donor located close to the median voter.

Moreover, we demonstrate that donors may support a candidate whose position is not very close to their own ideal point in order to draw the position of the winning candidate towards their own ideal points. Suppose, for example, that the rightist candidate wins the election. Then, in our model, donors to the right of the winning rightist candidate give money to the leftist candidate, as this pushes the equilibrium position of the rightist candidate towards the right. Donors located around the median, however, will support the winning candidate. Constellations in which interest groups support the candidate on the other side of the political spectrum are observed in political races. For instance, in 1994 in Germany, industry organizations contributed a large amount of campaign money to the left-wing Social Democrats (see Gersbach and Liessem (2002)). Further, the candidates do not adopt the median position in the equilibria. However, campaigns lead to a partial convergence of positions towards the preferred position by the median voter, in comparison with the corresponding equilibrium without political advertising. Campaigns thus induce the winning position to move closer to the median ideal position.

Our analysis also enriches the incumbent/challenger discussion. A traditional argument suggests that incumbents are perceived with lower uncertainty than a challenger, which implies a disadvantage for challengers if voters are risk-averse (see e.g. Bernhardt and Ingberman (1985)). In our model, a risky challenger may defeat an incumbent if he is able to organize donors appropriately, because if donors believe that the challenger will win, a majority of donors will support him, thus confirming their expectations.

Finally, our results in comparison with other theoretical results could be used to draw inferences about whether candidates for public offices are more interested in policies or in winning elections. This will be developed in the concluding section.

While we perform our analysis in the framework with risk-averse voters where campaigns reduce uncertainty, it is important that the same results could be obtained in a variant of the framework suggested by Baron (1994), where voters are either informed about intentions of parties and candidates or not, and advertising is persuasive. The closer the ideal point of an uninformed voter is to the historical position of the candidate, the more such a voter reacts to campaigns and a higher amount of money enables candidates to increase the share of voters for a given position.

The paper is organized as follows: In the next section, we review the literature. In section 3 we outline the model. In section 4, we characterize the equilibrium when campaigns are absent. In section 5 we analyze the effects of campaigns. In section 6, we examine the candidate and donor equilibria and we illustrate the multiplicity by

an example. Subsequently, we discuss extensions of the model and propose some final conclusions.

2 Relation to the Literature

Three types of models have been proposed for political campaigns. First, Austen-Smith (1987) developed a model of *directly informative advertising*. Voters observe candidates' positions with noise and campaign expenditures reduce the variance of that noise. Building on this assumption, Gersbach (1998) has developed a model of campaigns in which the contributions help candidates to get elected because risk-averse voters prefer candidates with a more precise policy position. Informative campaigning in the sense of truthful revelation about policy platforms is important when redistributive policies are considered as shown by Schultz (2007). He develops an intriguing model in which parties target campaigns on groups where most votes are gained by informing about policies. As a consequence, targeted groups will become more informed and benefit most from redistribution.

Second, Gerber (1996), Potters, Sloof, and van Winden (1997), Gersbach (2004), and Prat (2002) use *non-directly informative advertising*. Each candidate is characterized by a non-policy dimension (valence) that lobbies can observe more precisely than voters. The amount of campaign money a candidate collects signals his valence to voters. Hence the role of campaign advertising is not to convey a direct message but to credibly “burn” campaign money.² Coate (2004 a,b) and Ashworth (2006) have further developed the signaling approach and assume that candidates send messages to voters. These costly messages may be equivalent to money burning but may also consist of verifiable information about the characteristics of candidates. This approach has been generalized by Vanberg (2008) to two-dimensional candidate types.

Third, Baron (1994), McKelvey and Ordeshook (1987), Grossman and Helpman (1996), and Ortuno Ortin and Schultz (2005) distinguish between “informed” and “uninformed” or “impressionable” voters. The informed electorate votes according to the policies proposed by the different political parties (or candidates). Impressionable vot-

²A different way of modeling campaign expenditures is found in Austen-Smith and Wright (1994) and Austen-Smith (1995). Here lobbies make contributions in exchange for access to politicians. Politicians care about the information that lobbies can provide them with. The extent of truthful information transmission increases in the preference congruence between a lobby and the politician (see Crawford and Sobel (1982)). Campaign contributions signal preference congruence and induce candidates to grant access to the lobbies.

ers are, however, poorly informed about the policies of the different parties, and their vote is directly influenced by campaign spending.³ This type of campaign is therefore *persuasive advertising*.

We assume that the candidates can use funds to increase the share of voters supporting them. This can be interpreted as persuasive advertising or as informative advertising, where candidates use money to reduce (risk-averse) voters' uncertainty about candidates' policy positions. We will give a precise meaning of these approaches in section 5.1. We allow for the fact that candidates' ability to affect voting by campaign expenditures will differ. In contrast to Gersbach (1998), who focuses on candidates with policy preferences, we assume that candidates maximize their votes. The results thus contrast with Gersbach (1998). In the concluding section, we discuss how this could help to test different theories of candidates' and electorate's behavior empirically.

One of our central results is that interest group donations move the political outcome towards the median voter. The reason is that donors behave strategically. If a majority of interest groups expect that a candidate will win, he obtains the majority of interest group donations allowing him to move towards the center, fulfilling the expectations of interest groups. This, in turn, makes the candidate attractive for a majority of voters, which confirms the assumptions of interest groups. This insight is complementary to the work of Wittman (2007 and 2008). Wittman (2008), for instance, has highlighted the importance of allowing uninformed voters to have counterstrategies when advertising is directed towards other voters. When those uninformed voters who do not receive targeted campaign advertising respond optimally, any negative effect of pressure groups and political advertising is mitigated and the political outcome moves towards the median voter.

³This type of campaign is similar to the persuasive advertising analyzed in economic literature, for example Shy (1995).

3 The Model

Electoral processes exhibit many features, but they can be essentially broken down into four stages, which include political advertising. The time pattern can be described as follows:

Stage 1: Candidates attempt to obtain campaign support from politically active groups.

Donors spend their money to enhance the expected utilities arising for them from election.

Stage 2: In the political strategy space, candidates choose positions that will remain fixed during the whole electoral contest. The positions are determined so as to maximize the share of voters. The voters are only imperfectly aware of the position choice of the candidates.

Stage 3: Candidates use their financial support to reduce the uncertainty concerning their position.

Stage 4: Individuals cast their votes, and the electoral outcome is determined by majority voting.

This sequential election procedure can be observed in many countries. Consider, for example, the primary elections in the U.S., where interest groups spend money to influence the choice of candidates or representatives in one party and hence the final party position for the general election. Moreover, potential candidates for congressional elections in the U.S. receive money and engage in fund-raising even before they have announced their candidacy or have defined a political position.

We assume that voters view two candidates (or parties) b and c as being located somewhere on a one-dimensional political space $X = [-A, A]$ with $A > 0$.

For tractability, the single-peaked utility function of voter i is given by

$$u_i(w) = d_i - (w - x_i)^2 \tag{1}$$

$d_i > 0$ represents the maximum utility obtainable by i and x_i his own most-preferred point on the policy space X . The variable w denotes the policy a candidate pursues in office and is either w_b or w_c . There is a continuum of voters represented by the

continuous density function $g(x_i)$ and distribution function $G(x_i)$. The median voter is normalized to $x_m = 0$ ⁴.

The position choices of the candidates in stage 2 are denoted by x_b and x_c . Voters perceive the announcements of positions by candidates as a noisy signal about the true position and hence about the policies a winning candidate would pursue in office. These signals are denoted by w_b and w_c , and differ, from the voters' point of view, from the initially announced positions x_b and x_c by random variables z_b and z_c , $w_b = x_b + z_b$ and $w_c = x_c + z_c$ with $E(z_b) = E(z_c) = 0$.

We allow the variance of the signal to depend on the position of the candidate. Parties or candidates are often perceived via some form of ideological label. Accordingly, we assume that there exists one location for each candidate where he has an absolute advantage concerning the certainty of his position as perceived by voters. If candidates move away from their established position, they will progressively lose the advantage based on voter perceptions, and voters will have much greater difficulty in predicting what candidates will do in office.

We use V^b and V^c to denote the variances of w_b and w_c , respectively. The dependence on the effective position of the candidates is given by

$$\begin{aligned} V^b &= f_b + k_b(|x_b - \hat{x}_b|) \\ V^c &= f_c + k_c(|x_c - \hat{x}_c|) \\ f_b, f_c, k_b, k_c &> 0 \end{aligned} \tag{2}$$

x_b and x_c are the positions chosen by the candidates. \hat{x}_b and \hat{x}_c denote the most firmly established position of the candidates, that is, the location they are perceived to occupy with the lowest uncertainty. The variables f_b and f_c represent irreducible uncertainty, which we will call henceforth "floor uncertainty". k_b and k_c represent the mobility costs. Thus, if a candidate diverges from his established point, he will generate greater uncertainty, the higher values k_b or k_c are, respectively. We allow that the variables f_b, f_c and k_b, k_c differ across candidates.⁵ Since voters are risk-averse, this makes spatial movements costly to vote-maximizing candidates.

We assume that $\hat{x}_b < x_m = 0 < \hat{x}_c$, which implies that we have a leftist and a rightist candidate as in most two-candidate elections. x_m is the ideal point of the median voter. Given position choices x_b and x_c and associated signals w_a and w_b , voters derive the

⁴No assumption is needed regarding the mean position of voters

⁵For instance, if candidate b was in office in the last term, f_b will typically be smaller than f_c .

expected utility. The expected policies are x_b and x_c . From (1) we obtain

$$\begin{aligned} E[u_i(w_b)] &= d_i - (w_b - x_i)^2 - V^b \\ E[u_i(w_c)] &= d_i - (w_c - x_i)^2 - V^c \end{aligned} \quad (3)$$

Voter i will prefer b to c if and only if $E[u_i(x_b)] > E[u_i(x_c)]$, which implies

$$x_i < \frac{w_c + w_b}{2} + \frac{V^c - V^b}{2(w_c - w_b)} \quad (4)$$

We will outline in section 5.1 two different approaches regarding voter rationality that are consistent with this model set-up. From the candidate's perspective they recognize that w_b and w_c will be unbiased signals of the platform choices x_b and x_c , as $\mathbb{E}[z_b] = \mathbb{E}[z_c] = 0$, and thus expect that a voter i will support candidate b if and only if

$$x_i < \frac{x_c + x_b}{2} + \frac{V^c - V^b}{2(x_c - x_b)} \quad (5)$$

4 Candidate Equilibrium Without Campaigns

We here deduce the equilibrium without advertising which is called a candidate equilibrium. The candidates maximize their votes. We define the position of the voter who is indifferent to the two candidates' positions as

$$x_i^{ind} = \frac{x_c + x_b}{2} + \frac{V^c - V^b}{2(x_c - x_b)} \quad (6)$$

All voters with $x_i < x_i^{ind}$ will support candidate b and voters with $x_i > x_i^{ind}$ cast their vote for candidate c . Vote share maximization requires that the goals of the candidates be $\max x_i^{ind}$ (candidate b) and $\min x_i^{ind}$ (candidate c).

In order to derive a candidate equilibrium as a Nash equilibrium of the candidates' platform choices, we assume interior solutions, i.e. the platform choices satisfy $\hat{x}_b < x_b$ and $\hat{x}_c > x_c$. Precise conditions for interior solutions will be given at the end of this section.

The first-order condition for the choice x_c , given some position x_b , requires that

$$\frac{\partial x_i^{ind}}{\partial x_c} = 0 \quad (7)$$

By calculation of the corresponding first-order condition for candidate b , we obtain (see Appendix 1)

Proposition 1

In a candidate equilibrium with interior solutions, candidates choose the following platforms.

$$x_c = \frac{f_c - f_b + k_b \hat{x}_b + k_c \hat{x}_c + \frac{1}{4}(k_b + k_c)^2}{k_b + k_c} \quad (8)$$

$$x_b = \frac{f_c - f_b + k_b \hat{x}_b + k_c \hat{x}_c - \frac{1}{4}(k_b + k_c)^2}{k_b + k_c} \quad (9)$$

and

$$x_c = \frac{1}{2}(k_c + k_b) + x_b \quad (10)$$

We note that the candidates choose different positions despite the single-peakedness utility function of the voters. This result is caused by the fact that there is an incentive to deviate from a common position, e.g. the median position. It is true that a spatial movement toward more extreme positions will attract fewer voters by reason of the distance effect. But by approaching his established position a candidate reduces uncertainty and gains in reputation. This will overrule the distance effect if the candidates are very close.

If the candidates quickly forfeit clarity by leaving established positions (i.e. if k_c and k_b are high), the candidates will be very separately located in equilibrium. If $f_b = f_c$, $\hat{x}_b = -\hat{x}_c$ and $k_c = k_b$, we will arrive at $x_c = \frac{1}{4}(k_b + k_c)$ and $x_b = -\frac{1}{4}(k_b + k_c)$ and thus candidates are located symmetrically around the median. Moreover, we obtain:

Corollary 1

Suppose $f_b = f_c$, $\hat{x}_b = -\hat{x}_c$. Then

$$\lim_{k_b \rightarrow 0, k_c \rightarrow 0} x_b = \lim_{k_b \rightarrow 0, k_c \rightarrow 0} x_c = 0$$

Hence, for very small values of k_b and k_c and symmetric locations with identical floor uncertainty, we approach the classical median voter result.

Finally we spell out the conditions under which this equilibrium holds. We have assumed interior solutions, i.e. $\hat{x}_b < x_b$ and $x_c < \hat{x}_c$. From equation (9), the condition

$\hat{x}_b < x_b$ yields⁶

$$f_c - f_b + k_c(\hat{x}_c - \hat{x}_b) - \frac{1}{4}(k_b + k_c)^2 > 0 \quad (11)$$

Analogously, using equation (8) the condition $x_c < \hat{x}_c$ can be rewritten as

$$f_c - f_b + k_b(\hat{x}_b - \hat{x}_c) + \frac{1}{4}(k_b + k_c)^2 < 0 \quad (12)$$

Next we turn to the investigation of campaigns. We assume throughout this paper that (11) and (12) hold. Essentially, this requires some minimal political polarization in comparison to mobility costs. That is, $\hat{x}_c - \hat{x}_b$ must be sufficiently large relative to $k_b + k_c$ and $|f_c - f_b|$.

5 The Effects of Campaigns

5.1 The impact of campaigns

As discussed in Section 3, our main assumption is that campaign expenditures affect voting behavior. In our model this occurs as campaigns can reduce the mobility costs and thus can lower the variances V^b and V^c . This affects voting behavior and induces candidates to adjust their platforms. We can justify the assumption that campaigns reduce location uncertainty in two ways. First, campaigns can be interpreted as informative advertising in the sense of Austen-Smith (1987). In this approach, candidates send repeated messages regarding their position. These messages are noisy as candidates have limited control over informational intermediaries and public discussion in general. Voters make correct assessments regarding the expected position and update their beliefs about positions after each message. Hence, voters are Bayesian learners. For instance, when a candidate, say b , chooses a position, he chooses an a-priori distribution with mean x_b and a given variance. Campaigns are sequences of draws for a given distribution with a known mean and unknown variance. At the end of the campaign, voters form a-posteriori beliefs (see e.g. DeGroot (1970)) which essentially leads to lower variance regarding the position of candidates.

One could argue that voters could derive the position of candidates with certainty if they calculated the equilibria of the entire game. This would require an enormous amount of knowledge as patterns of campaign contributions, distributions of ideal

⁶We note that it is possible that $x_b > 0$ or $x_c < 0$ and thus both parties may be located on the same side of the political spectrum. As shown in Proposition 1 it is always guaranteed that $x_c > x_b$.

points of voters, etc. need to be known. We assume that voters are not able to calculate equilibria and vote accordingly. They vote sincerely and behave according to expected utility comparisons as expressed in equations (3) and (4). We could allow that a subset of voters are Bayesian learners and a subset of voters are strategic players knowing the entire game. This would reinforce our results as convergence to the median would be more forceful.

Second, we could interpret campaigns as persuasive advertising (see Baron (1994) or Grossman and Helpman (1996)), where voters are either informed about intentions of candidates or only about historical positions. The closer uninformed voters are located to the historical position of the candidate, the more effective campaigns become and the easier voters can be persuaded to support a candidate. This would produce qualitatively the same result as the first approach, which we are using in this paper.

5.2 Campaigns and political outcomes

To define the contributions of donors, we first have to investigate how exogenous changes in mobility costs affect the candidate equilibrium. Accordingly, we focus on the political outcome arising from a reduction of mobility costs.⁷

We begin by examining how a reduction of k_c affects the candidate equilibrium. If candidate c can reduce the uncertainty surrounding his position, k_c will be lowered in the third stage. Thus, we obtain a new candidate equilibrium with the same characteristics as in equations (8), (9), and (10), but now featuring new parameters.

From the candidate equilibrium derived in the last section we deduce in the second appendix:

$$\frac{\partial x_b}{\partial k_c} = \frac{k_b(\hat{x}_c - \hat{x}_b) - f_c + f_b - \frac{1}{4}(k_b + k_c)^2}{(k_b + k_c)^2} \quad (13)$$

Using condition (12) we obtain⁸ from equation (9) in Proposition 1

$$\frac{\partial x_b}{\partial k_c} \geq 0 \quad (14)$$

⁷We note that the reduction of uncertainty can occur in two ways. First, the floor uncertainty represented by the constants f_b and f_c can be reduced. Second, the direct mobility costs can be diminished if a candidate leaves his established position. Both possibilities lead to greater mobility for the candidates and produce qualitatively the same result.

⁸We also note that $\frac{\partial x_c}{\partial f_c} = \frac{\partial x_b}{\partial f_c} > 0$.

From equation (10) we obtain

$$\frac{\partial x_c}{\partial k_c} = \frac{1}{2} + \frac{\partial x_b}{\partial k_c} > 0 \quad (15)$$

Moreover, it will also be shown in the second appendix that

$$\frac{\partial x^{ind}}{\partial k_c} \geq 0 \quad (16)$$

Thus, if candidate c can reduce mobility costs, we will have a new candidate equilibrium in which c will be closer to the median because his increased mobility allows him to gain more voters by approaching the median voter position. In general, candidate b will be forced to take a more extreme position.

Similarly, we will obtain symmetrical results if candidate b is able to inform the electorate more efficiently. Now we need to investigate the candidate equilibrium in the case of a reduction of k_b . Again, the formal details are found in the second appendix:

$$\frac{\partial x_c}{\partial k_b} = \frac{k_c(\hat{x}_b - \hat{x}_c) - f_c + f_b + \frac{1}{4}(k_b + k_c)^2}{(k_b + k_c)^2} \quad (17)$$

Using condition (11) we obtain from equation (8) in Proposition 1

$$\frac{\partial x_c}{\partial k_b} \leq 0 \quad (18)$$

Additionally, we obtain⁹

$$\frac{\partial x_b}{\partial k_b} = \frac{\partial x_c}{\partial k_b} - \frac{1}{2} < 0 \quad \text{and} \quad \frac{\partial x^{ind}}{\partial k_b} \leq 0 \quad (19)$$

Hence, if candidate b can improve communication, his position will be drawn toward the center, and he will win more votes. Thus every candidate has a strong incentive to reduce the uncertainty of his position as perceived by the voters.¹⁰

⁹Similarly, $\frac{\partial x_b}{\partial f_b} = \frac{\partial x_c}{\partial f_b} < 0$

¹⁰This incentive contrasts with insights in other political competition models in which there may be a preference for ambiguity when candidates are uncertain about the policy positions preferred by the median voter. This argument has been developed in an intriguing model by Glazer (1990).

6 Donor and Candidate Equilibrium

6.1 The donor game

We now turn our attention to the incentives faced by political donor groups in the first stage of the electoral game. We assume that there is a finite number $N(N > 2)$ of donor groups and that the ideal point of each group can be characterized by the preferred point of a typical group member equated with the donor. We use x_j ($j = 1, \dots, N$) to denote the corresponding ideal points. We assume that interest groups are ordered according to their ideal points, i.e. $x_1 \leq x_2 \leq \dots \leq x_N$.

The level of support provided by a donor is determined by the contributions of the politically active members and is represented as E_j . E_j is the budget the interest group j has to support candidate j . We use E_{jb} (E_{jc}) to denote the support that candidate b (c) receives from group j . We have $E_{jb} + E_{jc} = E_j$. A donor will spend money on the candidate who is more likely to improve the donor's wealth than the other competitor. Thus we obtain two campaign functions that depend solely on the aggregate support levels received by each candidate:

$$k_c \left(\sum E_{jc} \right) \quad \text{and} \quad k_b \left(\sum E_{jb} \right) \quad (20)$$

The first derivatives k'_c and k'_b are negative because more campaign support enables the candidates to reduce more uncertainty.

We follow a standard assumption that contributors or interest groups are better informed than voters. For simplicity, we assume that donors are fully informed about the policies candidates will pursue in office. Hence, contributors observe x_b and x_c . Accordingly, the donor group will support b if and only if the contribution of candidate b leads to a political outcome that is closer to the preferred point than the one arising from support for candidate c .

6.2 The value of campaign contributions

We determine the value of campaign contributions for an individual donor. For this purpose, we consider four cases. First we assume that candidate b wins the election with or without the contribution of a donor j , given the contributions of the other donor. The value of campaigns for an individual donor j in this case is denoted by

$\Delta U_j(b)$ ¹¹ and calculated as the difference between the utility arising from support b and c , given the decision of the other donors. Thus

$$\begin{aligned}
\Delta U_j(b) &= u_j(x'_b) - u_j(x_b) \\
&= d_j - (x'_b - x_j)^2 - (d_j - (x_b - x_j)^2) \\
&= x_b^2 - x'_b{}^2 + 2x_j(x'_b - x_b) \\
&= (x'_b - x_b)(-x_b - x'_b + 2x_j)
\end{aligned} \tag{21}$$

If donor j supports candidate b or c , x'_b or x_b will be the political outcome, respectively. From the last section we know that $x'_b > x_b$. Thus $\Delta U_j(b)$ is monotonically increasing with x_j , and $\Delta U_j(b)$ becomes zero for $x_j = \frac{x'_b + x_b}{2}$. Hence we conclude that all donors with an ideal point greater than $\frac{x'_b + x_b}{2}$ will support candidate b in such cases.

Second, the situation is completely analogous if given the contributions of the other donors, candidate c wins the election with support (position x'_c) and without support of donor j (position x_c). The value of campaigns for donor j is then given by

$$\begin{aligned}
\Delta U_j(c) &= u_j(x'_c) - u_j(x_c) \\
&= d_j - (x'_c - x_j)^2 - (d_j - (x_c - x_j)^2) \\
&= x_c^2 - x'_c{}^2 + 2x_j(x'_c - x_c) \\
&= (x_c - x'_c)(x_c + x'_c - 2x_j)
\end{aligned} \tag{22}$$

From equation (15) we know that x'_c will be smaller than x_c . All donors with most-preferred points less than $\frac{x'_c + x_c}{2}$ will select candidate c over b for campaign support.

The third and fourth cases concern scenarios where a single donor can affect the political outcome. These cases will be discussed later.

¹¹The variable b indicates that candidate b wins the election in every case.

6.3 Existence of equilibria

We finally establish the existence of candidate and donor equilibria, which we call in the remainder of the paper CD -equilibrium. Such an equilibrium is defined as follows.

Definition 1

A CD -equilibrium are positions $\{x_b, x_c\}$, donor decisions $\{E_{jc}\}_{j=1}^N$ and $\{E_{jb}\}_{j=1}^N$ and voter decisions such that these strategies constitute a subgame perfect equilibrium of the four-stage game.

We will focus on two types of CD -equilibria. In the first CD -equilibrium candidate b wins and in the CD -equilibrium candidate c wins.

6.3.1 Candidate b wins

We start with the circumstances in which candidate b wins the election. We define two critical candidate positions that will characterize the CD -equilibrium.

$$x_b^* = \frac{f_c - f_b + k_b^* \hat{x}_b + k_c^* \hat{x}_c - \frac{(k_b^* + k_c^*)^2}{4}}{k_b^* + k_c^*} \quad (23)$$

$$x_c^* = \frac{f_c - f_b + k_b^* \hat{x}_b + k_c^* \hat{x}_c + \frac{(k_b^* + k_c^*)^2}{4}}{k_b^* + k_c^*} \quad (24)$$

with

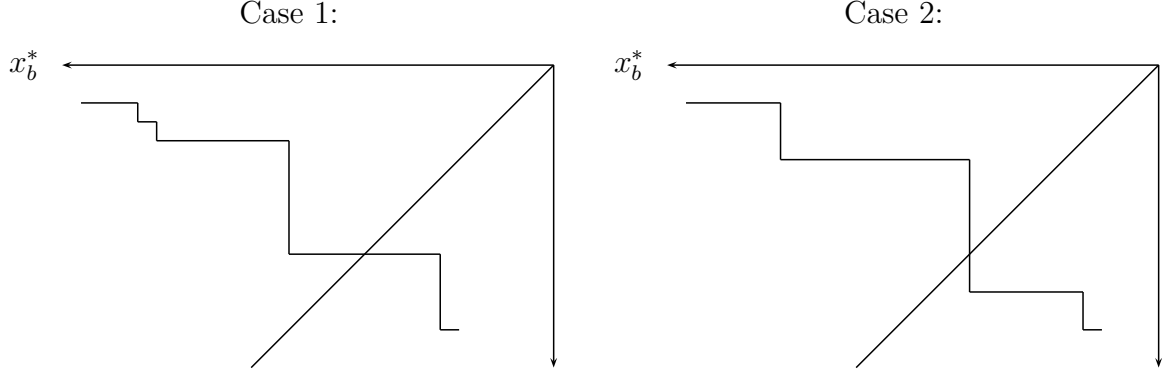
$$k_b^* := k_b^*(x_b^*) := k_b \left(\sum_{j \in \{j | x_j > x_b^*\}} E_j \right), \quad k_c^* := k_c^*(x_b^*) := k_c \left(\sum_{j \in \{j | x_j < x_b^*\}} E_j \right) \quad (25)$$

Equation (25) defines two values for k_b^* and k_c^* that realize if all donors to the right of x_b^* support candidate b and all donors to the left of x_b^* support candidate c . Formally, equation (25) defines two step-functions $k_b^*(x_b^*)$ and $k_c^*(x_b^*)$, where $k_b^*(x_b^*)$ is weakly monotonically increasing in x_b^* while $k_c^*(x_b^*)$ is monotonically decreasing in x_b^* .

The left side of (23) is strictly increasing with x_b^* . The right side is monotonically decreasing with x_b^* , since we know that the lower k_c is (or the higher k_b), the lower any equilibrium position of candidate b will be, which is represented by the right side of formula (23). Moreover, for $x_b^* = -A$, the left-hand side is smaller than the right-hand

side as all contributors support candidate b . For $x_b^* = 0$ we assume that the right-hand side is smaller than the left-hand side.¹² Then, the value x_b^* that solves (23) exists and is uniquely determined. The arguments are similar for x_c^* .

We obtain two different cases for the intersection of the left-hand side of equation (23) with the right-hand side, represented by the following figure:



In the second case, x_b^* does not coincide with any ideal point of a donor. Thus, by our definition of x_b^* and k_c^* , every donor supports one candidate only. In the first case, x_b^* is exactly the ideal point of a donor whose contributions are not yet included in the campaign functions k_b and k_c . As this donor is totally satisfied with the CD -equilibrium, we assume that he will refrain from providing any support or he will have to split his contributions among the candidates in order to ensure that the CD -equilibrium is not disrupted by his contribution.

x_b^* and x_c^* characterize a situation in which candidate b receives campaign contributions from all donors with an ideal point greater than x_b^* , whereas candidate c will only be supported by the rest of the donors.

We next establish

Proposition 2

Suppose that $x^{ind} = \frac{x_c^* + x_b^*}{2} + \frac{V^{c*} - V^{b*}}{2(x_c^* - x_b^*)} > 0$ and that x^{ind} remains positive ($x^{ind} > x_m = 0$) if one donor changes his contribution decision. Then x_b^* and x_c^* constitute a CD -equilibrium. Candidate b wins the election, and the political outcome is x_b^*

The assumptions of Proposition 2 can be expressed by the exogenous parameters of the model. We provide a specific example in subsection 6.4.

¹²The formal condition is $\frac{f_c - f_b + k_b^*(0)\hat{x}_b + k_c^*(0)\hat{x}_c - \frac{(k_b^*(0) + k_c^*(0))^2}{4}}{k_b^*(0) + k_c^*(0)} < 0$.

Proof of Proposition 2:

For x_b^* and x_c^* to be equilibrium values, we have to show that no donor has an incentive to deviate. If a donor with $x_j < x_b^*$ changes his support to candidate b , candidate b still wins the election and the political outcome would be greater than x_b^* and hence further away from his own preferred point. For the same reason, a donor with $x_j > x_b^*$ will not want to switch his support from b to c as candidate b continues to win and would move further away from his preferred position. Therefore, given the contributions of the other donors, each donor will be worse off if he deviates. By construction $\{x_b^*, x_c^*\}$ is also a candidate equilibrium. Hence x_b^* and x_c^* constitute a CD -equilibrium. The political outcome is x_b^* . ■

The intuition for the equilibrium behavior of donors runs as follows: Suppose donors expect the leftist candidate b to win the election. Then donors to the left of the winning leftist candidate will give money to the rightist candidate, as this pushes the equilibrium position of the leftist candidate towards the left. Donors located to the right of the winning position will support the winner, as this draws his position to the right.

6.3.2 Candidate c wins

In this section we construct a CD -equilibrium in which candidate c wins. We define

$$x_b^{**} = \frac{f_c - f_b + k_b^{**} \hat{x}_b + k_c^{**} \hat{x}_c - \frac{(k_b^{**} + k_c^{**})^2}{4}}{k_b^{**} + k_c^{**}} \quad (26)$$

$$x_c^{**} = \frac{f_c - f_b + k_b^{**} \hat{x}_b + k_c^{**} \hat{x}_c + \frac{(k_b^{**} + k_c^{**})^2}{4}}{k_b^{**} + k_c^{**}} \quad (27)$$

$$k_b^{**} := k_b^{**}(x_c^{**}) = k_b \left(\sum_{j \in \{j | x_j > x_c^{**}\}} E_j \right), \quad k_c^{**} := k_c^{**}(x_b^{**}) = k_c \left(\sum_{j \in \{j | x_j < x_b^{**}\}} E_j \right)$$

Again, like in the last subsection, the construction ensures that x_c^{**} and x_b^{**} exist and

are unique. We obtain:

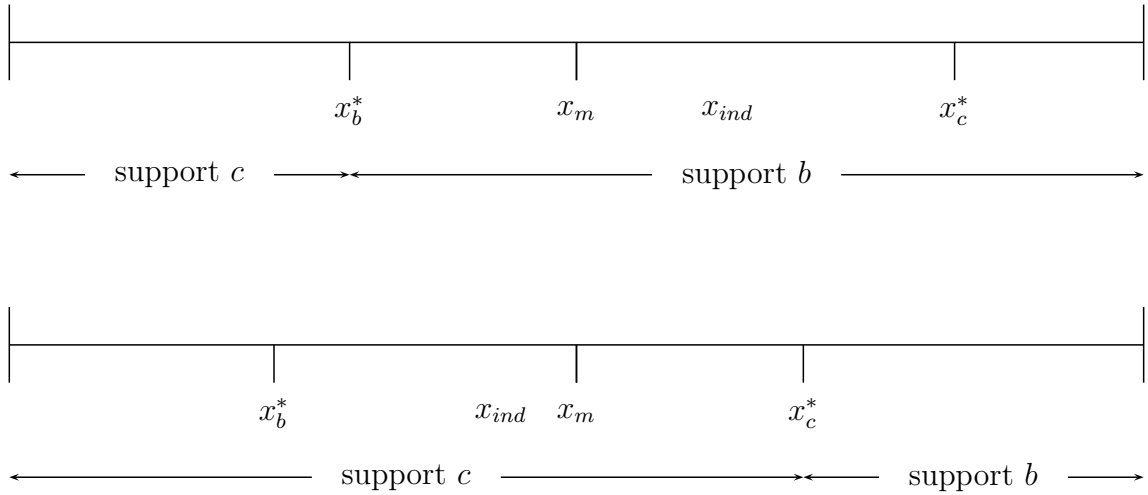
Proposition 3

Suppose that $x^{ind} = \frac{x_c^{**} + x_b^{**}}{2} + \frac{V^{c**} - V^{b**}}{2(x_c^{**} - x_b^{**})} > 0$ and that x^{ind} remains positive if one donor changes his contribution decision. Then x_b^{**} and x_c^{**} constitute a CD -equilibrium. Candidate c wins the election, and the political outcome is x_c^{**} .

The proof of Proposition 3 follows the same lines as Proposition 2.

6.3.3 Summary

The characteristics of the equilibria are summarized in the following figure, which represents the donors' ideal points, the median voter and the choices of candidates and donors in the CD -equilibria.



6.4 An Example

We illustrate the multiplicity of equilibria by an example. Suppose ideal points of voters are uniformly distributed on $[-A, A]$. Candidates established positions \hat{x}^b and \hat{x}^c are located symmetrically around the median voter $x_m = 0$ with $\hat{x}^b = x_m - \Delta$ and $\hat{x}^c = x_m + \Delta$ for some $\Delta > 0$. Candidates are associated with the same floor level of uncertainty if they depart from the established position, i.e. $f_b = f_c = f$. Moreover, they have the same campaign functions

$$k_c \left(\sum E_{jc} \right) = \bar{k} - \lambda \sum E_{jc} \tag{28}$$

$$k_b \left(\sum E_{jb} \right) = \bar{k} - \lambda \sum E_{jb}, \tag{29}$$

with some parameter $\lambda(\lambda > 0)$. For simplicity, all contributors are located at the median position, i.e. $x_j = x_m, \forall j \in \{1, \dots, N\}$. The aggregate amount of campaign expenditures is denoted by $\bar{E} = \sum_{j=1}^N E_j$. We assume $\bar{k} - \lambda\bar{E} > 0$. Then, we obtain

Proposition 4

There exist two CD–equilibria.

- (i) *In one CD–equilibrium all donors support candidate b. Candidate b wins and the platforms are*

$$x_b^* = \frac{\lambda\bar{E}\Delta - \frac{(2\bar{k}-\lambda\bar{E})^2}{4}}{2\bar{k} - \lambda\bar{E}} \quad (30)$$

$$x_c^* = \frac{\lambda\bar{E}\Delta + \frac{(2\bar{k}-\lambda\bar{E})^2}{4}}{2\bar{k} - \lambda\bar{E}} \quad (31)$$

- (ii) *In the other CD–equilibrium, all donors support candidate c. Candidate c wins and the platforms are*

$$x_b^{**} = \frac{-\lambda\bar{E}\Delta - \frac{(2\bar{k}-\lambda\bar{E})^2}{4}}{2\bar{k} - \lambda\bar{E}} \quad (32)$$

$$x_c^{**} = \frac{-\lambda\bar{E}\Delta + \frac{(2\bar{k}-\lambda\bar{E})^2}{4}}{2\bar{k} - \lambda\bar{E}} \quad (33)$$

The example illustrates how two CD–equilibria emerge. Either donors run to the support of candidate b ensuring that he wins or they jointly secure the win of candidate c . In both cases, the support decisions of donors are best responses.

6.5 Discussion of the assumptions and uniqueness

Before we consider further features of these equilibria, we shall first discuss the assumptions and the uniqueness issue. It is easy to demonstrate that, under the assumptions of the last section, the derived equilibria are unique. Let us consider, for instance, a potential CD–equilibrium, say x_b and x_c , in which candidate b wins the election. If any donor with an ideal point less than x_b supports candidate b , he can increase his utility by supporting c , which drives the political outcome toward his ideal point. Similarly, a donor with $x_j > x_b$ can do no better than to support candidate b in order to reduce the distance between the political outcome and his preferred point. Thus under the two assumptions the derived equilibria are unique.

Next we discuss what happens if one assumption does not hold.

First, we have assumed that the positions x_b^* and x_c^{**} will gain a majority of voters, respectively. If this condition is not fulfilled, we will have only one CD -equilibrium. The reason is as follows: suppose, for instance, candidate b gains no majority with x_b^* as $x_b^{**} < x_b^*$ and $x_c^{**} < x_c^*$. Candidate c is sure of winning the election in the situation (x_b^{**}, x_c^{**}) , as he gains even more votes. Therefore we have at least one CD -equilibrium.

The second condition assumed in the last section states that given the constellation (x_b^*, x_c^*) or (x_b^{**}, x_c^{**}) , no donor can change the political outcome by changing his decision. Suppose e.g. in a CD -equilibrium characterized by x_b^* and x_c^* , a donor with $x_j > x_c^*$ can ensure that candidate c will win the election with his donations. Then, he will, of course, select candidate c over b . Hence, in this case (x_b^*, x_c^*) cannot be a candidate equilibrium. Thus, in general, if a donor is pivotal in a potential equilibrium, it will not be a donor equilibrium. But again, if for instance, in (x_b^*, x_c^*) the majority of voters in favor of candidate b is very small, which will enable one donor to change the political outcome, the CD -equilibria with (x_b^{**}, x_c^{**}) , will in general imply a substantial majority for candidate c . So, as a rule we expect in this case again one CD -equilibrium to hold if we have enough donors.¹³

6.6 Implications

The derived CD -equilibria have some remarkable consequences. We now discuss several important features of the case when all assumptions hold and both CD -equilibria exist.

Both candidates have a chance of winning the election that depends on the realization of the CD -equilibrium. Members of the donor group will support a candidate whose position is not closest to their own ideal point. In a CD -equilibrium with (x_b^*, x_c^*) on the other hand, donors with $x_j < x_b^*$ will support candidate c , whereas a donor with $x_j = x_c^*$ will contribute to funding of candidate b 's campaign. In any case, however, donors located around the median will support the winning candidate. If he coincides with the median voter, the median donor will always contribute to the candidate whose position is closest to his.

Campaign support increasing the mobility of both candidates leads to a convergence

¹³Precise conditions can be given when distributions of voters and donors are specified.

of the candidates' positions in the CD -equilibrium since

$$x_c = \frac{k_c + k_b}{2} + x_b$$

and k_c and k_b decrease due to advertising.¹⁴

This convergence does not end at the median or in equal locations, but the positions with campaigns are closer than those without campaigns.

Moreover, symmetrical political and support constellations yield asymmetrical outcomes. Suppose prospective campaign funds are symmetrically distributed around the median position and $\hat{x}_c = -\hat{x}_b$, $f_c = f_b$, and $k_c = k_b$ without advertising. Then, in a CD -equilibrium, the candidates do not take up symmetrical positions. By contrast, in equilibrium one candidate c will win and attract the majority of donors despite the fact that both candidates are equally attractive at the outset.

A property of the equilibria is that small differences in candidate positions without campaigns do not destroy the incentives for donors to contribute, because a reduction of uncertainty affects the equilibrium positions. Political controversy is not a necessary condition for fundraising, which gives an important twist to the literature (e.g. Congleton 1989).

The increase of mobility by campaigns does not necessarily imply that voters perceive lower uncertainty in equilibrium. Let us consider a constellation in which candidate b is located in his established point \hat{x}_b without campaigns and wins the election. In the CD -equilibrium in which b wins, voters will perceive higher uncertainty, since b is drawn toward the center, which is associated with higher uncertainty compared to the outcome without campaigns. Thus campaigns that reduce uncertainty can heighten uncertainty in a CD -equilibrium.

It has been argued that consistent incumbents are perceived as a lottery with smaller variance than any challenger (e.g. Bernhardt and Ingberman (1985) and Anderson and Glomm (1992)). This fact can be easily incorporated into our framework. Suppose candidate c is the incumbent. We assume that $\hat{x}_c = -\hat{x}_b$, $f_c < f_b$, and $k_c < k_b$ without any campaign support. Then the incumbent will win the election without campaigns, since equations (6), (8), and (9) imply that $x_i^{ind} < 0 = x_m$. But our model shows that despite this initial advantage there may be a CD -equilibrium in which the challenger will win the election if he wins over the major part of the donors. This

¹⁴This will not be true if the uncertainty floors of b and c are lowered by campaigns, because in this case the distance between candidate b and c remains unchanged.

suggests another way of looking at incumbent/challenger competition characterized by the difficulty of defeating the incumbent. If and only if the challenger is able to organize donor support much better than the incumbent, will he be able to defeat the incumbent. Hence the electoral advantage for the incumbent can be suddenly outweighed by a new organization of donors by the challenger.

7 Concluding Remarks

We have examined a simple model of campaigns in which contributors support candidates who can then engage in costly campaigning. We have argued that campaigns may induce a run by a number of interest groups to support one candidate.

The results in this paper constitute a set of testable propositions pertaining to the relationships among a set of endogenous variables (candidates' policies, contribution decisions, amount of contributions, electoral outcomes, etc.) and a set of exogenous variables (incumbency advantage, distribution of voters and donors). Moreover, the model presented in this paper can be extended in several directions. The model could be complemented by other aspects of campaigns. For instance, interest groups may contribute money because they receive services or get access to politicians when a candidate takes office. This would tend to increase the incentives of interest groups to support the winning candidate and would reinforce the run phenomenon. Finally, we have assumed that candidates only care about winning the election. Suppose we assumed instead that candidates have policy preferences. As shown by Gersbach (1998), this produces a very different distribution of campaign expenditures across winners and losers. Comparing both models with empirical data could be used to test the objective functions of candidates, i.e. which objective functions of candidates are consistent with empirical campaign patterns.

Appendix 1

First we deduce the candidate equilibrium from equation (6)

$$x_i^{ind} = \frac{x_c + x_b}{2} + \frac{V^c - V^b}{2(x_c - x_b)}$$

and from the candidate goals $\max x_i^{ind}$ (candidate b) and $\min x_i^{ind}$ (candidate c).

Given some position x_b , the first order condition for the choice x_c is given by

$$\frac{\partial x_i^{ind}}{\partial x_c} = \frac{1}{2} \left(1 - \frac{f_c - f_b - k_c x_c + k_c \hat{x}_c - k_b x_b + k_b \hat{x}_b}{(x_c - x_b)^2} - \frac{k_c}{x_c - x_b} \right) = 0$$

Similarly, the first-order condition for x_b is

$$\frac{\partial x_i^{ind}}{\partial x_b} = \frac{1}{2} \left(1 + \frac{f_c - f_b - k_c x_c + k_c \hat{x}_c - k_b x_b + k_b \hat{x}_b}{(x_c - x_b)^2} - \frac{k_b}{x_c - x_b} \right) = 0$$

By adding these two equations we obtain

$$1 - \frac{k_c + k_b}{2(x_c - x_b)} = 0$$

which leads to

$$x_c = \frac{1}{2}(k_c + k_b) + x_b$$

Thus the candidates take different positions in equilibrium, depending on the mobility costs.

We insert $x_c - x_b = \frac{1}{2}(k_c + k_b)$ into the first first-order condition and obtain

$$1 - \frac{f_c - f_b + k_c \frac{1}{2}(k_b + k_c) + k_c (\hat{x}_c - x_b - \frac{1}{2}(k_b + k_c)) - k_b (x_b - \hat{x}_b)}{\frac{1}{4}(k_c + k_b)^2} = 0,$$

which implies

$$\frac{1}{4}(k_c + k_b)^2 = f_c - f_b - x_b(k_b + k_c) + k_c \hat{x}_c + k_b \hat{x}_b.$$

Thus we find that

$$x_b = \frac{f_c - f_b + k_b \hat{x}_b + k_c \hat{x}_c - \frac{1}{4}(k_b + k_c)^2}{k_b + k_c}$$

Because of $x_c = \frac{1}{2}(k_c + k_b) + x_b$ we obtain

$$x_c = \frac{f_c - f_b + k_b \hat{x}_b + k_c \hat{x}_c + \frac{1}{4}(k_b + k_c)^2}{k_b + k_c}$$

Appendix 2

Here we calculate the derivative of x_b with respect to k_c :

$$\begin{aligned} \frac{\partial x_b}{\partial k_c} &= \frac{(k_b + k_c)\hat{x}_c - \frac{1}{2}(k_b + k_c)^2 - f_c + f_b - k_b \hat{x}_b - k_c \hat{x}_c + \frac{1}{4}(k_b + k_c)^2}{(k_b + k_c)^2} \\ &= \frac{k_b(\hat{x}_c - \hat{x}_b) + f_b - f_c - \frac{1}{4}(k_b + k_c)^2}{(k_b + k_c)^2} \end{aligned}$$

By using $\frac{\partial x_c}{\partial k_c} = \frac{1}{2} + \frac{\partial x_b}{\partial k_c}$ we derive

$$\begin{aligned} \frac{\partial x^{ind}}{\partial k_c} &= \frac{\partial}{\partial k_c} \left(\frac{1}{2}(x_c + x_b) + \frac{V^c - V^b}{2(x_c - x_b)} \right) \\ &= \frac{1}{2} \left\{ \frac{\partial x_b}{\partial k_c} + \frac{1}{2} + \frac{\partial x_b}{\partial k_c} + \frac{\partial}{\partial k_c} \left(\frac{f_c + k_c(\hat{x}_c - x_c) - f_b - k_b(x_b - \hat{x}_b)}{x_c - x_b} \right) \right\} \\ &= \frac{\partial x_b}{\partial k_c} + \frac{1}{4} + \frac{f_b - f_c + \frac{\partial x_b}{\partial k_c}(-k_c - k_b)(k_b + k_c) - x_b(k_b + k_c - k_b - k_c)}{(k_b + k_c)^2} \\ &\quad + \frac{\hat{x}_c(k_c + k_b - k_c) - k_b \hat{x}_b - \frac{1}{2}k_c(k_c + k_b) + \frac{1}{2}k_c(k_c + k_b) - \frac{1}{2}(k_c + k_b)^2}{(k_b + k_c)^2} \\ &= \frac{f_b - f_c + k_b(\hat{x}_c - \hat{x}_b) - \frac{1}{4}(k_c + k_b)^2}{(k_b + k_c)^2} \end{aligned}$$

The last expression coincides exactly with $\frac{\partial x_b}{\partial k_c}$.

Thus $\frac{\partial x^{ind}}{\partial k_c} = \frac{\partial x_b}{\partial k_c} \geq 0$.

Similarly, we obtain

$$\begin{aligned} \frac{\partial x_c}{\partial k_b} &= \frac{(k_b + k_c)\hat{x}_b + \frac{1}{2}(k_b + k_c)^2 - f_c + f_b - k_b \hat{x}_b - k_c \hat{x}_c - \frac{1}{4}(k_b + k_c)^2}{(k_b + k_c)^2} \\ &= \frac{k_c(\hat{x}_b - \hat{x}_c) + f_b - f_c + \frac{1}{4}(k_b + k_c)^2}{(k_b + k_c)^2} \end{aligned}$$

$$\frac{\partial x^{ind}}{\partial k_b} = \frac{\partial x_c}{\partial k_b} \leq 0$$

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