

Campaign Spending Limits and Political Advertising

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Traditionally, research on political campaigns has focused on the positioning of parties and not on how parties communicate with the electorate. We construct a model where two parties fund both the “creative” and “media” elements of political advertising and examine how campaign budgets affect advertising strategies in the context of a political campaign. Our key finding is that tight campaign limits stimulate aggressive advertising on the part of competing parties, while generous budgets often lead to parties acting defensively. The analysis also provides an explanation for the increasingly partisan campaigns that the Republicans and Democrats have taken in recent elections. When there is significant polarization amongst noncommitted voters and campaign spending limits are higher, we find that parties “retrench” toward traditional constituencies.

Key words: advertising; spending limits; political campaigns; marketing; competitive strategy; media

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1. Introduction

Recently, journalists and academics have reported seemingly higher levels of polarization in American politics (Ansolabehere and Iyengar 1995; Hill 2005; *The Economist* 2002, 2005).¹ Polarization refers to the notion that mainstream parties have adopted positions that are less targeted to the average citizen and more targeted to partisan supporters. In addition, reports show that the voting public has shifted to sources that present the news from a more partisan perspective (*Columbia Journalism Review* 2004, Xiang 2006).

A popular explanation for this phenomenon is reduced participation in voting by independent or nonpartisan voters due to the impact of negative political advertising (Ansolabehere and Iyengar 1995, Kahn and Kenney 1999). Despite the popularity of this explanation, there is little evidence to support it (Che et al. 2007). In a meta-study on the effect of negative campaign advertising, Lau et al. (1999) find no significant support for the assertion that negative political ads substantially undermine public support for and participation in the electoral process. They state that while “Participatory democracy may be on the wane in the United States, the evidence... suggests that negative political advertising has relatively little to do with it” (p. 858). In addition, a review of

presidential election data since 1959 shows that non-partisans have become more important not just as “registered” voters, but also as a fraction of the voters that actually complete ballots on election day (see Figure 1).² Regardless of the controversy about negative advertising, it appears that the increased polarization of political campaigns cannot be explained by reduced importance of nonpartisan voters.

This leaves us with the observation that campaigns in America have become increasingly partisan and no suitable explanation exists. In this paper, we propose a new explanation for the phenomenon that relies on two facts.

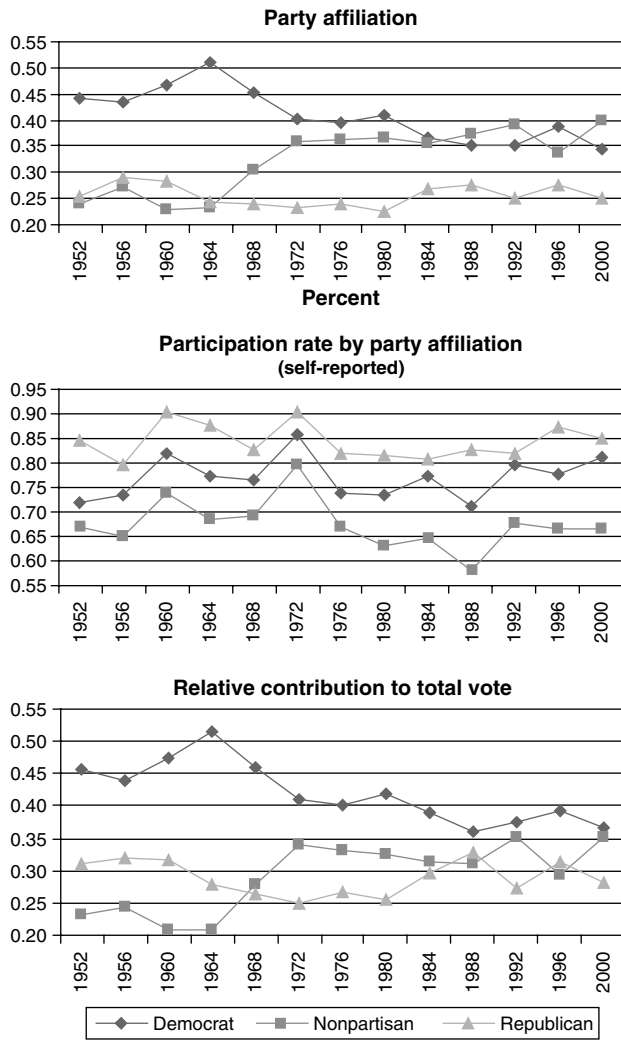
First, the spending on political campaigns (specifically on campaign advertising) has increased at rates that significantly exceed inflation. In the 2004 U.S. presidential election, the parties spent close to four billion dollars. Most Western countries have legislation that fixes maximum limits on campaign spending for political parties.³ However, parties have increasingly succeeded in circumventing the limits by

² The National Election Studies (NES) data is well known to grossly overestimate voter turnout rates due to the difficulty to sample abstainers and misreporting (Martinez 2002). However, the huge increase in the number of nonpartisan voters offsets their larger relative decrease in participation rates, which entails an increase in their relative importance as a percentage of the votes cast.

³ The United States goes so far as to provide public funding to ensure that all major candidates have access to equal federal funds (see the Federal Election Commission Comprehensive Examination of the Presidential Public Funding Program 1997). Candidates,

¹ Polarization has also affected the political landscape in countries such as Hungary and Switzerland (*The Economist Intelligence Unit* 2005, Prothero and Jenkins 2005).

Figure 1 Increase in Nonpartisans' Influence in Elections



Source. Authors' calculation using NES data.

turning to indirect unregulated contributions such as “soft money,” political action committees (PACs) in the United States, or targeted spending by interest groups for specific candidates in Great Britain (*The Economist* 1999, UK Government 1998).⁴

Second, in many countries, there appears to have been a hardening of views on a number of political issues. These include the position of voters on abortion, gay marriage, socialized medical care, and the value of military intervention in countries that have unsavory political regimes (e.g., Chechnya, Iraq,

and the former Yugoslavia). It may be that voters are better informed today. As a result, voters may be unwilling to accept the wishy-washy positions on controversial issues that are so often articulated by politicians.⁵ We postulate that this apparent hardening may have increased the degree of polarization in the electorate even amongst noncommitted voters. In other words, prior to election campaigns, the fraction of voters who are noncommitted may not have changed, but within this population, voters may have stronger leanings than in the past.

In this paper, we develop a model to understand how the advertising of political parties is affected by campaign spending limits. Building on the work of Palda and Palda (1985), Pattie et al. (1995), and Gerber (1998), we assume that advertising has a significant effect on how the electorate casts their vote. Using the model, we examine how parties will allocate their campaign budgets across the electorate.

We find that parties “retrench” toward traditional constituencies when campaign spending increases in an environment with significant polarization amongst noncommitted voters. Higher spending allows higher media intensities. These induce each party to reduce the intensity of spending targeted toward the opposition’s traditional constituency to ramp up media spending targeted toward its segment of traditional support (each party is assumed to have a segment of uncommitted voters that typically vote for it). This allows each party to defend its traditional voters more aggressively.

In the next section, we provide a review of the relevant literature. In §3, we present a model to investigate the interaction between campaign spending and advertising strategies. In §4, we present the results of our analysis. In the concluding section, we discuss the implications of our findings, limitations, and extensions.

2. Literature Review

The vast majority of research on campaign strategies of political parties focuses on “positioning” and the tendency of parties to fight for the middle ground during campaigns. The models are based on an adaptation of Hotelling’s (1929) linear city model: The left side of the spectrum is associated with left-wing parties (that have preferences for strong state intervention), and the right side with right-wing parties (that have preferences for minimal state intervention). These models yield useful insight about why parties gravitate toward the center of the political spectrum during campaigns (Downs 1957, Black 1958, Hinich

however, can opt out of the federal funding program, so it does not guarantee that all candidates have equal funds.

⁴ These facts have led to calls for stronger campaign finance legislation so that parties backed by wealthy contributors and big business do not obtain an unfair and unrepresentative advantage in political campaigns. The need for, and effectiveness of, campaign spending limits is also a recent topic of interest for academics (Coupé 2000, Palda 1996).

⁵ The authors thank an anonymous reviewer for pointing out this alternative explanation for seemingly increased levels of polarization in political discourse.

1977, Hinich et al. 1973). The key insight in these papers is the “median voter theorem,” by which parties are observed to adjust their policies to the median voter; this results in a “convergence” of party platforms during election campaigns (Downs 1957, Black 1958, Hinich 1977, Hinich et al. 1973).

Other research demonstrates why parties sometimes diverge from the middle ground (Alesina and Rosenthal 1995, Castanheira 2003). Certain parties take extreme positions during election campaigns that offer a negligible chance of winning. Nevertheless, these parties frequently obtain significant voter support during elections (e.g., the National Front in France). This raises the question of why supporters of extreme parties make the effort to vote when the party they support has little chance of winning. Castanheira (2003) suggests that the rationale for this phenomena lies in the informational content of support for extreme parties (i.e., the support conveys information to mainstream parties about the location of the median voter). Such information is important for allowing mainstream parties to adjust their positions over time.

The Hotelling model has also been extended to multiple dimensions to capture the fact that political campaigns are invariably fought across a number of issues. Multiple dimensions allow for greater heterogeneity in the policy spaces that can be chosen by candidates (Hinich et al. 1973, Besley and Coate 1997).

Positioning is without doubt a critical issue for party strategists, yet there are clearly limitations to how flexible a party can be with its positioning. Indeed, the positioning of a party is constrained by the traditions and policies that it has supported over time and by the preferences of the party staff and representatives. In sum, parties generally have well-ingrained differences that require years to shift (or at least longer than the typical length of an election campaign). Thus, “political baggage” is carried forth from one election to the next and can only be changed over the long term at significant cost (Alesina 1988). For example, early in the “Tony Blair era,” the Labour Party of Britain wished to project a “new” image despite its traditional position as the advocate and spokesperson for trade unions. Labour’s attempt to move away from its traditional base in the 2000 London mayoral elections proved to be costly (*The Economist* 2000a, b).

In spite of having well-known positions, political parties engage in massive advertising during election campaigns. Candidates, through radio, television, printed advertisements, and billboards, try to appeal to different sections of the electorate and advertising campaigns are costly (Strömberg 2004). In the 1992 U.S. presidential election, Clinton and Bush spent $\frac{2}{3}$ and $\frac{3}{4}$ of their campaign budgets on televisions

ads, respectively (Kaid and Holtz-Bacha 1995). Oddly, there is little research on the role that communication strategies play in the context of a political campaign where parties have well-known positions. The aim of this paper is to analyze these strategies and understand how they are affected by campaign spending limits.

When a political party develops a campaign advertising strategy, a key decision is how broad and how intense its advertising effort should be. Many segments can be reached with a broad campaign, but the creative cost of broad campaigns are proportionally higher due to greater heterogeneity in the target for advertising.⁶ Each party’s objective is to choose an advertising strategy that maximizes voter support, subject to competing parties’ strategies and budgetary limitations. In addition, because of the winner-takes-all character of many political campaigns, it would seem natural for political parties to spend all available funds.⁷ An interesting question is whether there are conditions where parties will choose not to spend all available funds.

Our analysis distinguishes itself from the existing literature in three ways. First, in contrast to most research on the campaign strategies of political parties, we assume that political positioning is not a freely chosen variable. As discussed above, a party is constrained by its traditional constituency and therefore does not depart drastically from its traditional positioning. Second, we assume that campaign funds are primarily directed toward advertising or mass media exposure. The objective of this spending is to gain the support of uncommitted voters and deliver a plurality of the total vote.⁸ As a result, we focus our attention on uncommitted voters and recognize that amongst these voters, there are differences in the predisposition to support different parties. A key question is how parties will target their advertising based on the predisposition of segments of voters to support different parties. Third, our analysis emphasizes the marketing nature of political campaigns. Parties choose advertising strategies—the target and the media intensity—to maximize their expected

⁶ The more heterogeneous the target for an advertising campaign is, the higher are the creative costs. This is driven by the need for multiple creative executions due to differences across segments in terms of needs and media habits.

⁷ A significant literature examines the benefits of winner-takes-all democracy versus proportional representation (Hamlin and Hjortland 2000). However, even in countries where proportional representation is used, a number of key positions are determined by winner-takes-all elections (e.g., the position of Prime Minister in Israel).

⁸ Note that the vast majority of advertising effort during the 2004 U.S. presidential election was directed toward swing states such as Pennsylvania, Ohio, Wisconsin, and Florida.

vote. In particular, we model the link between campaign budgets and the creative and media strategies employed by each party.

In contrast to the literature on lobbying, we assume that parties implement their platform after the election, i.e., candidates care about the actual implementation of their platform as well as winning the election. There is, therefore, no role for lobbies to influence policy choices as is the case in the lobbying literature (e.g., Prat 2002). The literature also considers the policy implications of spending limits or guaranteed funding when parties start from different positions during a political campaign. For example, budgetary limitations can hurt trailing parties' ability to "catch up" leading to anticompetitive effects (Palda and Palda 1985, Sahuguet and Persico 2006). We abstract away from the advantages certain parties can have over their rivals. Accordingly, we consider a political landscape in which the parties are ex-ante symmetric and equal.

3. The Model

3.1. Model Overview

The model represents an election in which there are two candidates, one for each of two political parties, *L* and *R*. The election is determined by a simple majority rule: the candidate that receives the highest proportion of the vote wins.

The model focuses on the fraction of the voting public that is uncommitted, i.e., voters for whom there is a degree of uncertainty in who they will support.⁹ The voters make decisions of who to support based on a lexicographic decision rule which we describe in the following section.

The parties invest in advertising during the political campaign and the advertising provides information to voters that affects how they vote. The parties can target different segments of uncommitted voters and must finance the creative (the cost of producing messages) and media (the cost of sending the messages) elements of advertising. In the following section, we present the fundamental assumptions that underlie the model.

3.2. Key Modelling Assumptions

The model is based on the following set of assumptions regarding both the voters and the political parties. In §3.3, we elaborate on the implications of these assumptions.

⁹We assume that committed voters are equally split between the two parties. We recognize that different strategies might be optimal when a party has significantly more committed voters than its opponent. For example, it might employ a strategy that guarantees support (such as advertising to its high-preference segment) even were this to reduce its expected vote from noncommitted voters.

ASSUMPTION 1. *All voters are active.*

This assumption allows us to abstract away from issues of voter turnout which can be important in some contexts.

ASSUMPTION 2. *Uncommitted voters are split into two equal segments: one with a predisposition to vote for the *L* party and the other for the *R* party, i.e., each segment is predisposed to vote Left or Right reflected by an exogenous factor called $q \in (\frac{1}{2}, 1)$.*

This assumption implies that q is the degree of ex ante polarization that exists across uncommitted voters (when $q = \frac{1}{2}$, the two segments are identical and all voters are equally likely to vote for either party). In the absence of political advertising, a voter in the *L*(*R*) segment will vote for the *L*(*R*) with probability q .

ASSUMPTION 3. *Voters are noncommitted because they are influenced by issues other than the traditional positions of the parties.*

The political science literature indicates that non-committed voters are significantly influenced by factors such as the candidate's background, personality, political experience, and appearance. We adopt the terminology of political science and posit a single construct called *valence* that summarizes the attractiveness of a candidate based on her personal characteristics.¹⁰ Cain et al. (1987) note that it is important for a political candidate to build a personal following to be successful.

ASSUMPTION 4. *Voters' decisions are represented by a lexicographic rule with two attributes, valence and party position. Valence is the first (and most important) attribute.*

Lexicographic preferences imply that the first attribute determines the voter's decision when there is a difference along it between the choices. Following Assumption 3, issues other than the traditional positions of the parties are more important for non-committed voters. As noted earlier, the first attribute, valence, is based on the personal characteristics of the candidate. The valence of a candidate is unrelated to the position of her party and is communicated through each party's advertising.

The second attribute is based on how the traditional position of the candidate's party appeals to the voter's preferences. As discussed earlier, the policy positions of parties are relatively stable over time so uncertainty in each voter's decision comes from preferences that do not lead to a dominant choice in terms of policy.

¹⁰In the political science literature, "valence" is a summary construct that relates to a combination of characteristics that are candidate and not party specific (Stokes 1963; Persson and Tabellini 2000, Chap. 3).

In fact, the predisposition that voters have to vote for either the L party or the R party (the ex ante polarization, q , introduced in Assumption 2) is based on the party positions.

Following Bhadury et al. (1998), there is strong evidence that lexicographic decision rules are well suited to representing the decision-making process of voters.¹¹ They allow the political scientist to parsimoniously represent the fact that voters find one attribute more important than another. This is useful because in a wide range of electoral situations, Dutter (1981) finds that voters have factors in their decision rules that are more important than others.

An alternate interpretation of the lexicographic rule is that the first attribute is the candidate's positioning and the second attribute is the party's positioning. Similar to the valence interpretation, it follows that the party's positioning is better known but less important than the candidate's positioning.

ASSUMPTION 5. *The candidates of each party are equal in terms of valence, but because candidates change from one election to the next, parties advertise to inform voters about their candidate's valence.*

Our objective is to better understand the fundamental drivers of political advertising strategy, so we abstract away from issues of incumbency where the personality of the incumbent is better known than that of the challenger.

ASSUMPTION 6. *Advertising is assumed to provide positive information to voters about the first attribute in the lexicographic voting rule.*

When a voter sees advertising from a candidate, that candidate is rated higher on the first attribute (valence). As noted above, voters are uninformed about the first attribute because the candidates running for each party change more frequently than do the fundamental policies of each party.

ASSUMPTION 7. *Advertising is discrete: a voter either sees advertising from zero, one, or both parties. The likelihood that a voter sees advertising from a party is a function of the media intensity directed toward the voter.*

The first attribute in the lexicographic rule affects the voting decision if and only if a voter sees advertising from one party but not the other. (A party does not receive support from a voter who has only seen advertising from the opposing party.) If a voter observes advertising messages from both candidates,

the second attribute in the lexicographic rule is deterministic (so the voter votes according to her prior). Advertising, while important for providing information on the first attribute, is nullified when a voter is exposed to ads from both parties. This reflects the significant effect that political advertising has when voters are only exposed to advertising from one party and the almost negligible effect it has in empirical and experimental settings when voters are exposed to advertising from both parties (Ansolabehere and Iyengar 1995).¹²

To clarify this process, consider a representative noncommitted voter who belongs to the segment that has a preference for party i . This implies that if she does not see advertising from either party during the election campaign, she will vote for party i on election day with probability q . Suppose she only sees advertising from party i but not party j . Then, she will vote for party i with 100% probability. In contrast, if she only sees advertising from party j but not party i , then she will vote for party j with 100% probability. If the voter happens to see advertising from both parties, then the effect of each party's advertising is cancelled and she reverts to supporting party i with probability q .

ASSUMPTION 8. *Each party chooses whether to target the Left segment, the Right segment, or both segments. Once a segment has been targeted, the party chooses the media intensity for that segment.*

We denote by ϕ_i ($i = L$ or R) the media intensity for the Left party in the left and right segments, respectively. Similarly, f_i ($i = L$ or R) are the corresponding decisions for the Right party. These intensities are between zero and one and represent the fraction of the segment that sees the party's advertising.¹³ When a party chooses a media intensity for a segment, this translates to the probability a voter in the segment sees the party's advertising.

ASSUMPTION 9. *For each party, the fixed cost to target a segment is x and the cost of media intensity ϕ_i (or f_i) for a given segment is ϕ_i^2 (or f_i^2).*

To advertise to a segment, a party will produce messages that are appropriate for the segment at a

¹¹ Lexicographic decision rules are also convenient to represent menu-dependent preferences. Sen (1997) argues that menu-dependent preferences are common in conditions of incomplete information, i.e., conditions that characterize the context of political decisions (Ferejohn and Kuklinski 1990, Levine 2002).

¹² The idea that the advertising of one party neutralizes the other figures prominently in the literature. For example, parties use advertising to swamp an opponent's a priori advantage in Sahuguet and Persico (2006).

¹³ In our model, we assume that advertising can be perfectly targeted to each of the two segments, i.e., that cross-segment spill does not occur. A model with spill would be significantly more complex. However, similar to Iyer et al. (2004), as long as the spill is symmetric across segments, the essence of the findings would be identical.

fixed cost of x (messages produced for one segment are assumed to be inappropriate for the other).¹⁴

Similar to Butters (1977) and Grossman and Shapiro (1984), the cost to obtain higher reach levels is convex. Assumption 9 implies that the advertising cost for the Left party is

$$\begin{cases} x + \phi_i^2 & \text{if } L \text{ advertises in one segment,} \\ 2x + \phi_L^2 + \phi_R^2 & \text{if } L \text{ advertises in both segments,} \\ 0 & \text{if } L \text{ does not advertise in either} \\ & \text{segment,} \end{cases} \quad (1)$$

and for the Right party is

$$\begin{cases} x + f_i^2 & \text{if } R \text{ advertises in one segment,} \\ 2x + f_L^2 + f_R^2 & \text{if } R \text{ advertises in both segments,} \\ 0 & \text{if } R \text{ does not advertise in either} \\ & \text{segment.} \end{cases} \quad (2)$$

ASSUMPTION 10. Each party chooses its advertising targets and media intensities to maximize its expected vote subject to a campaign spending limit B .

In a two-party election, the objective of a party is to obtain more than 50% of the vote (a plurality). However, when the number of voters is large, this is analogous to maximizing the expected vote. As a result, there is a tradition of maximizing the expected vote in political science even when the objective of each party is to obtain a plurality (Dixit and Londregan 1995, Sahuguet and Persico 2006).¹⁵

3.3. Implications of the Modelling Assumptions

Section 3.2 implies that uncommitted voters have an a priori preferred candidate. This means that without advertising, each party would obtain support from a fraction q of the segment of voters leaning toward it and a fraction $(1 - q)$ from the other segment. The lexicographic rule implies that the expected vote depends on the advertising intensities of the parties in the two

¹⁴ To develop executions that appeal to a distinct segment of voters, an appropriate context must be chosen to deliver the message. Previous research highlights the importance of “context” as a factor, which determines the effectiveness of advertising (Lynch et al. 1991, Adaval and Monroe 2002).

¹⁵ The expected vote in many political science models is the mean proportion of a large number of Bernoulli draws. The Central Limit Theorem implies that the mean proportion of a set of Bernoulli draws is approximately normal when the number of draws (voters) is large (Wonnacott and Wonnacott 1990). In this situation, moving the mean proportion to the right also maximizes the likelihood of a plurality (the probability of a plurality for a given party is equal to the area under the distribution that is greater than 0.5; this is maximized by moving the mean to the right).

Table 1 Expected Vote for L Party When R Party Does Not Advertise

Left party strategy	Right party no adv.
No adv.	$\frac{1}{2}(q) + \frac{1}{2}(1 - q)$
Adv. left	$\frac{1}{2}(\phi_L(1) + (1 - \phi_L)q) + \frac{1}{2}(1 - q)$
Adv. right	$\frac{1}{2}(q) + \frac{1}{2}(\phi_R(1) + (1 - \phi_R)(1 - q))$
Adv. both	$\frac{1}{2}(\phi_L(1) + (1 - \phi_L)q) + \frac{1}{2}(\phi_R(1) + (1 - \phi_R)(1 - q))$

segments of uncommitted voters. For example, in the left-leaning segment with probability $\phi_L(1 - f_L)$, voters only see L 's ad and thus vote for L with probability one. With probability $\phi_L f_L$, voters see both ads and thus vote according to their prior (i.e., a fraction q vote for L). With probability $(1 - \phi_L)f_L$, voters do not see L 's ad but see R 's ad, and thus vote for party R . With probability $(1 - \phi_L)(1 - f_L)$, voters do not see either ad and vote according to their prior. Applying similar reasoning to the right-leaning segment, we write the generalized expression for the expected vote of the Left party, V_L :

$$\begin{aligned} V_L = & \frac{1}{2}(\phi_L((1 - f_L) + f_L q) + (1 - \phi_L)(1 - f_L)q) \\ & + \frac{1}{2}(f_R \phi_R(1 - q) + (1 - f_R) \\ & \cdot ((1 - \phi_R)(1 - q) + \phi_R)). \end{aligned} \quad (3)$$

Because of the assumption that all voters vote, the expected vote for the Right party is simply $1 - V_L$. Tables 1–5 summarize party L 's expected vote as a function of its strategy and R 's strategy.

For our analysis, we assume that B is an exogenous campaign spending limit for both parties. With small budgets ($B < x$), parties cannot advertise because they do not have sufficient funds to pay the creative cost x for a single segment. When $B \in [x, 2x)$, parties can advertise to only one segment. When $B > 2x$, parties have the choice of advertising in zero, one, or both

Table 2 Expected Vote for L Party When R Party Advertises in R -Leaning Segment

Left party strategy	Right party adv. right
No adv.	$\frac{1}{2}(q) + \frac{1}{2}(f_R(0) + (1 - f_R)(1 - q))$
Adv. left	$\frac{1}{2}(\phi_L(1) + (1 - \phi_L)q) + \frac{1}{2}(f_R(0) + (1 - f_R)(1 - q))$
Adv. right	$\frac{1}{2}(q) + \frac{1}{2}(f_R \phi_R(1 - q) + f_R(1 - \phi_R)(0) + (1 - f_R)(\phi_R(1) + (1 - \phi_R)(1 - q)))$
Adv. both	$\frac{1}{2}(\phi_L(1) + (1 - \phi_L)q) + \frac{1}{2}(f_R \phi_R(1 - q) + f_R(1 - \phi_R)(0) + (1 - f_R)(\phi_R(1) + (1 - \phi_R)(1 - q)))$

Table 3 Expected Vote for *L* Party When *R* Party Advertises in *L*-Leaning Segment

Left party strategy	Right party adv. left
No adv.	$\frac{1}{2}(f_L(0) + (1 - f_L)q) + \frac{1}{2}(1 - q)$
Adv. left	$\frac{1}{2}(f_L(1 - \phi_L)(0) + \phi_L(1 - f_L)(1) + \phi_L f_L q + (1 - \phi_L)(1 - f_L)q) + \frac{1}{2}(1 - q)$
Adv. right	$\frac{1}{2}(f_L(0) + (1 - f_L)q) + \frac{1}{2}(\phi_R(1) + (1 - \phi_R)(1 - q))$
Adv. both	$\frac{1}{2}(f_L(1 - \phi_L)(0) + \phi_L(1 - f_L)(1) + \phi_L f_L q + (1 - \phi_L)(1 - f_L)q) + \frac{1}{2}(\phi_R(1) + (1 - \phi_R)(1 - q))$

Table 4 Expected Vote for *L* Party When *R* Party Advertises in Both Segments

Left party strategy	Right party adv. both
No adv.	$\frac{1}{2}(f_L(0) + (1 - f_L)q) + \frac{1}{2}(f_R(0) + (1 - f_R)(1 - q))$
Adv. left	$\frac{1}{2}(f_L(1 - \phi_L)(0) + \phi_L(1 - f_L)(1) + \phi_L f_L q + (1 - \phi_L)(1 - f_L)q) + \frac{1}{2}(f_R(0) + (1 - f_R)(1 - q))$
Adv. right	$\frac{1}{2}(f_L(0) + (1 - f_L)q) + \frac{1}{2}(f_R((1 - \phi_R)(0) + \phi_R(1 - q))) + (1 - f_R)(\phi_R + (1 - \phi_R)(1 - q))$
Adv. both	$\frac{1}{2}(\phi_L((1 - f_L) + f_L q) + (1 - \phi_L)(1 - f_L)q) + \frac{1}{2}(f_R \phi_R(1 - q) + (1 - f_R)(\phi_R + (1 - \phi_R)(1 - q)))$

segments. We analyze the full range of budgets for symmetric competitors.¹⁶

4. Optimal Advertising Strategies

Given the objective of maximizing the expected vote and the budget constraint, we now explore the parties' optimal advertising strategies.

4.1. The Case of Low Campaign Budgets,

$$B \in [x, 2x)$$

When budgets are such that $B \in [x, 2x)$, we use the expression from the online appendix and compare the expected vote for each party. Proposition 1 identifies the equilibrium when the parties only advertise to one segment (proofs for all results are provided in the online appendix, which is provided in the e-companion).¹⁷

PROPOSITION 1. *When the parties advertise to one segment, each party adopts an aggressive stance and focuses its advertising on the segment of the market that has a predisposition to vote for the other party. The optimal advertising intensity to that segment is $\sqrt{B - x}$.*

Proposition 1 shows that the unique equilibrium is for each party to focus its advertising on the segment of the market that has a predisposition to vote for the opposition (poaching in the other party's backyard is the dominant strategy with low budgets). The intuition for this finding is that advertising has a significant impact on voters who are likely to vote for the opposition when advertising levels are low. In particular, when advertising levels are low, it is unlikely that a voter in the right-leaning segment

who sees advertising from the Left party also sees advertising from the Right party (the joint probability of a voter seeing advertising from both parties is small). As a result, it is difficult for the Right party to defend against the Left party's advertising in its backyard (similar reasoning applies to the Right party's advertising in the left-leaning segment). To summarize, when parties only have the budget to advertise to one of the two segments, offensive advertising is more effective than defensive advertising (a party that chooses to defend in these conditions will have an expected vote of less than 50%).

4.2. The Case of Intermediate Campaign Budgets,

$$B \in [2x, 2x + 1)$$

When parties have the budget to advertise to both segments, the parties must decide whether to advertise to both segments and if they do, how much media to purchase in each segment. Proposition 2 identifies the transition points and also highlights the dependency of the transition points on the creative cost (x).

PROPOSITION 2. (1) *When creative costs are high ($x > \frac{1}{2}$), the parties advertise to the segment with a predisposition to vote for the opposition when $B < 2x + \frac{1}{2}$ and to both segments when $B > 2x + \frac{1}{2}$.*

(2) *When creative costs are low ($x < \frac{1}{2}$), at some point in the interval $B \in [2x, x + 1)$, parties shift from only advertising to the segment with a predisposition to vote for the opposition to advertising in both segments.*

Proposition 2 identifies strategies for each party that are weakly dominant. In other words, when the players are ex ante symmetric, any equilibrium delivers an expected vote of 50% to each party. When $B > 2x$, the parties have budgets sufficient to advertise to both segments. Nevertheless, the benefit of focusing advertising in the segment that has an ex ante preference for the opposition is sufficiently high that parties sometimes leave money on the table rather than reduce the intensity of advertising. These findings are summarized in Corollary 1.

¹⁶ Campaigns with small budgets and low awareness are common in many municipal elections. In contrast, many presidential elections on the federal level are associated with awareness levels that border on saturation (Surlin and Gordon 1976, Hume 1992, Brians and Wattenberg 1996, Friedman 2003, Liu 2004).

¹⁷ An electronic companion to this paper is available as part of the online version that can be found at <http://mansci.journal.informs.org/>.

Table 5 Expected Vote for L Party When Parties Only Have the Budget to Advertise in One Segment

Left party strategy	Right party strategy	
	Adv. left	Adv. right
Adv. left	$V_L(L, L) = \frac{1}{2}(\phi_L(1 - f_L) + \phi_L f_L q + (1 - \phi_L)(1 - f_L)q) + \frac{1}{2}(1 - q)$	$V_L(L, R) = \frac{1}{2}(\phi_L + (1 - \phi_L)q) + \frac{1}{2}(1 - f_R)(1 - q)$
Adv. right	$V_L(R, L) = \frac{1}{2}((1 - f_L)q) + \frac{1}{2}(\phi_R + (1 - \phi_R)(1 - q))$	$V_L(R, R) = \frac{1}{2}(q) + \frac{1}{2}(f_R \phi_R(1 - q) + (1 - f_R)(\phi_R + (1 - \phi_R)(1 - q)))$

COROLLARY 1. *When the creative costs are high ($x > \frac{1}{2}$), the parties do not spend the entire budget when $B \in (x + 1, 2x + \frac{1}{2})$.*

Corollary 1 highlights a trade-off that political strategists sometimes face when creative costs are high relative to media costs. When $B \in (x + 1, 2x + \frac{1}{2})$, a fraction of the campaign budget may not be spent (in the limit as x becomes arbitrarily large, this fraction approaches 50% of the available budget). If a party were to choose to advertise to both segments in these conditions, the opposition would restrict advertising to its high-preference segment and garner an expected vote of more than 50%.

It is important to note that Corollary 1 obtains because the creative costs are lumpy and the budgets are high enough to finance maximum advertising in one targeted segment. These characteristics occur from time to time even in the context of political elections. In general, the costs to produce creative for a segment (or market) are lumpy. For example, in Canada, a number of political parties restrict their advertising to English Canada (this includes the Anglophone audience that lives in Quebec). Often, the fixed cost of producing French-language commercials for Quebec cannot be justified. Second, while 100% awareness is rarely achieved in a targeted segment, intensity in our model is nothing but a proxy for saturation, the point where advertising has no further effect (Palda 1991). Indeed, a model where a fraction w of noncommitted voters cannot be reached by advertising would achieve saturation once a fraction $1 - w$ of voters has been reached by advertising.¹⁸

Corollary 1 implies that when the creative and media costs to fully inform a segment are equal (i.e., $x = 1$), as much as 20% of the campaign budget can remain unspent.¹⁹ This happens because to increase spending, the creative costs to advertise to a second segment need to be financed. For a party, financing the creative costs for a second segment requires a

reduction in media to the segment that has a predisposition to vote for the opposition. When the media weights are low, reducing weight to this segment makes a party vulnerable to a focussed effort by the opposition. In other words, when budgets lie in this region, parties will not sacrifice media weight to increase the breadth of their campaigns. Only when parties can afford sufficiently high media weights for both segments is advertising to both segments optimal.

An alternative interpretation for why parties sometimes leave a fraction of their campaign budget unspent is that the marginal benefit to increasing media spending is less than the marginal benefit of spending the funds elsewhere (in another electoral district or in a future election).

4.3. The Case of High Campaign Budgets,
 $B \in (2x + 1, 2x + 2)$

When budgets are high enough to make advertising to both segments feasible (i.e., the budgets are sufficient to finance creative for both segments and maximum advertising to one segment), the optimal advertising strategies change. When the parties advertise to both segments of the uncommitted electorate, a solution to four equations and four unknowns in the second degree needs to be solved.²⁰ The nature of the equilibrium is summarized in Proposition 3.

PROPOSITION 3. *When the parties advertise to both segments of voters, a party directs higher advertising to the segment that has a preference for it than to the segment that is predisposed to vote for the opposition.*

Proposition 3 underlines a significant change in the advertising posture of each party when advertising is targeted to both segments. In contrast to situations where only one segment is targeted, the optimal advertising strategies are more defensive when both segments are targeted. The intuition for this finding is that when both segments are targeted, a party can afford a media intensity of at least 50% for its traditional segment. As a result, at least half of the opposition’s advertising in a party’s traditional segment

¹⁸ A model based on this assumption would generate identical findings (our model is effectively a version of this model where $w = 0$).

¹⁹ When $x > 1$, part of the range where $B \in (x + 1, 2x)$ entails a sum of money being unspent; however, in this range, the parties cannot afford to advertise to both segments. The interesting case is when parties can afford to advertise to both segments but choose not to.

²⁰ A feasible solution requires that all advertising intensities be real numbers between zero and one. There is only one solution that satisfies this requirement. It is unique (i.e., there are no deviations) because second-order conditions are satisfied throughout the allowable zone for media intensities.

is nullified. The marginal gain of advertising to the traditional segment is q (more than 50%) when a voter has seen the opposition's advertising versus $1 - q$ (less than 50%) when the voter has not seen the opposition's advertising. Quite simply, higher advertising weights endogenously make defensive advertising more attractive. In addition, the fruits of advertising in the opposition's traditional segment are lower when the opposition has the funds to defend. Once each party can neutralize 50% (or more) of the opposition's aggressive advertising, defensive advertising becomes more attractive and aggressive advertising less so.

These findings show that higher budgets cause parties to adopt advertising policies that are more traditional (higher advertising to traditional voters and lower advertising to the opposition's traditional voters). It is interesting that the stronger parties are in terms of campaign budgets, the less aggressive they are in terms of advertising strategy. Our analysis suggests that the most aggressive attacks on the traditional supporters of the opposing party occur in an environment of limited campaign funds.

In addition, we find that the optimal advertising strategies are influenced by the degree of polarization in the market (reflected by q). The equilibrium values for equilibrium spending in the opposition's traditional segment are particularly interesting. In conditions where the parties advertise to both segments, it is natural to think that budget increases should lead to higher advertising in both segments. However, Proposition 4 identifies conditions where parties choose to retrench, i.e., the parties reduce spending in the opposition's traditional segment to increase defensive spending in the segment of the market where they are preferred. To be specific, we show that the advertising intensities in the opposition's traditional segment, ϕ_R and f_L , are decreasing in B (the spending limit) up to the point at which B leads to maximum advertising by each party in the segment where it is preferred (i.e., $\phi_L = f_R = 1$).

PROPOSITION 4. *When q , the degree of polarization, exceeds $\frac{2}{3}$ and spending in both segments is less than one, budget increases lead to reductions in the level of advertising directed toward the opposition's traditional segment.*

Proposition 4 implies that increases in the campaign budget lead to reductions in the media weight directed toward the opposition's traditional segment when q is larger than $\frac{2}{3}$ (given that the media weights in both segments are less than one). This reduction means that the increase in spending directed toward "defensive" media spending exceeds the increase in the budget.

On the one hand, parties might be expected to spend more on all types of advertising when budgets increase. On the other hand, advertising directed

toward the opposition's traditional segment is less productive when the opposition focuses high levels of media on its traditional segment: this creates an incentive to reduce advertising in the opposition's segment.

Thus, the optimal level of advertising to the opposition's traditional segment depends on the relative strength of these two effects. When q is high, the effectiveness of advertising in the opposition's segment is high when there is low defensive advertising. When a party's advertising reaches a voter in the opposition's traditional segment who has not seen an ad from her "preferred" party, the party's advertising converts a voter who was practically a guaranteed vote for the opposition. Conversely, the effectiveness of advertising in the opposition's segment is low when there is significant defensive advertising.

Said differently, with a high level of defensive advertising, higher levels of q imply lower effectiveness for advertising in the opposition's traditional segment. When $q > \frac{2}{3}$, this effect dominates the positive effect of an increased budget. Accordingly, funds are shifted out of the segment that prefers the opposition to increase defensive spending: Higher campaign budgets in a polarized market lead to campaigns that are more focused on protecting the traditional vote.

4.4. Special Case: Optimal Advertising in the Absence of Creative Costs

A benchmark to understand the impact of creative costs on media strategy is the equilibrium when creative costs are zero (i.e., $x = 0$). While creative costs are never actually zero, this case may be relevant in elections where there are significant legal or financial restrictions on the types of advertising that can be used. In such a context, two questions come to mind. First, when creative costs are negligible, are there conditions when parties choose to advertise to only one of the two segments? Second, when the parties advertise to both segments, what is the relationship of the intensities directed toward each segment?

To answer the first question, we use the expressions for expected vote in Tables 2 and 3 subject to the budget constraint with $x = 0$. The nature of the equilibrium is summarized in Lemma 1.

LEMMA 1. *When creative costs are zero, parties advertise to both segments for all budgets $B > 0$.*

Lemma 1 shows that the parties advertise to both segments even when the budget available for media is arbitrarily close to zero. This is explained by the convexity of advertising costs. By concentrating all media in one segment, a party operates on a steeper part of the cost curve than a party that allocates its media spending across segments. This finding highlights the role that fixed costs (like the production of advertising commercials) play in making targeted marketing

strategies attractive; when there are no fixed costs, broad marketing efforts are relatively more attractive.

To answer the second question, the equilibrium advertising intensities and their relationship are presented in Proposition 5.

PROPOSITION 5. *When creative costs are zero, each party directs an advertising intensity of*

$$\frac{Bq(2q-1) + (1-q)\sqrt{B(4Bq-B-4Bq^2+1-2q+2q^2)}}{1-2q+2q^2}$$

to the segment where it is preferred and an advertising intensity of

$$\frac{B(1-3q+2q^2) + q\sqrt{B(4Bq-B-4Bq^2+1-2q+2q^2)}}{1-2q+2q^2}$$

to the segment where the opposition is preferred. When $B < \frac{1}{2}$, the advertising intensity to the segment where the party is preferred is lower than the intensity directed toward the segment where the opposition is preferred. The reverse is true when $B \in (\frac{1}{2}, 2)$.

The expressions for advertising intensity in Proposition 5 are identical to those used to derive Proposition 3. The difference when creative costs are zero is that advertising to both segments is the equilibrium for all budget levels (this is not the case when creative costs are positive). Interestingly, when $B < \frac{1}{2}$, a party's advertising to the segment that prefers the opposition is higher than to the segment where the party is preferred. The reverse is true when budget levels are higher. The findings, while analytically different than the case of $x > 0$, are analogous. At low-budget levels, each party adopts aggressive advertising strategies and advertises more in the competitor's segment than in its high-preference segment. This is similar to the findings for $x > 0$ at low-budget levels (parties only advertise to the competitor's segment). In contrast, at high-budget levels, each party employs higher advertising intensity in its own backyard than in the competitor's segment.

5. Conclusion

5.1. Summary of Findings

The results of this study suggest an interesting relationship between campaign spending budgets and the communication strategies of political parties during a campaign. When the preferences of noncommitted voters are strongly affected by information related to the characteristics of candidates and less affected by party policy, we find that campaign spending limits have an important effect on equilibrium strategies. As one might expect, political parties choose broad campaigns when spending limits are high. In addition, the

parties place more emphasis on advertising to segments of traditional support than to segments that typically support the opposition when spending limits are high. However, when spending limits are low, we find that the parties adopt narrow but aggressive strategies. In these conditions, advertising is targeted to change the mind of voters that typically vote for the opposing party.

These findings are driven by the gains that are possible when media levels are low through attacking a segment that has a predisposition to vote for the opposition. Low-media levels prevent a party from effectively negating an attack from the opposition with defensive advertising. In fact, the gains from advertising to a segment that is predisposed to vote for the competitor are so compelling that when spending limits are in an intermediate range, parties will leave money unspent to ensure maximum advertising in the segment that has a predisposition to vote for the opposition.

The degree of polarization amongst noncommitted voters, q , also has an interesting effect on advertising strategies. When parties employ broad advertising strategies (and advertise to both segments), it is natural to think that an increase in campaign spending limits would lead to higher media spending across all segments. However, when the degree of polarization q is greater than $\frac{2}{3}$, parties reduce advertising to the segment that leans toward the opposing party to increase defensive media weight. In other words, higher campaign budgets in a polarized market lead to campaigns that are more focused on protecting the traditional vote (an apparent narrowing of the campaign focus). This provides an alternative explanation for the narrowing of political advertising campaigns that has occurred recently.

5.2. Limitations and Extensions

A limitation of our analysis is the assumption that all potential voters participate in the election. If political advertising has an impact on voter turnout, the returns to advertising are potentially high at low advertising levels. For example, in many jurisdictions, the role of political advertising is to get voters of a certain orientation to vote ("to get out the vote"). Conversely, when political spending is high, voters sometimes respond to an overload of political messages by deciding not to participate in the election (voter apathy). Here, the returns to increased advertising can be higher or lower depending on the characteristics of voters who lose interest. Because our model is based on the assumption that all voters vote, this aspect of political advertising is not reflected.

Second, in the analysis, we assume that all voters exhibit lexicographic preferences (this implies that the

voters revert to their priors when they see advertising from both parties). In reality of course, not all voters make decisions according to a lexicographic rule. For example, suppose that a fraction of consumers do not return to their prior but vote with 100% probability for the party which they preferred a priori. In this case, the results of the model would be similar, but weakened. In particular, the incentives to advertise in the opposition's traditional segment when budgets are low remains. However, the tendency to advertise defensively would be stronger. Interestingly, Sen (1997) argues for the use of lexicographic rules not because they accurately reflect how all voters make decisions, but because they do a good job of representing voting behavior empirically.

Third, we assume that the positions of parties are not freely chosen during the election. Sometimes parties do make policy decisions in the course of a campaign. When these decisions are salient to non-committed voters, our model has less relevance.

Fourth, we assume exogenous symmetric budgets. An interesting extension would be to examine the optimal advertising strategies when one party has a significant budgetary advantage. This might provide useful insight about the importance of building campaign war chests. In addition, campaign budgets are often a function of a party's fund-raising efforts. While not modelled explicitly, the incentive to advertise is obviously higher when more of the electorate is noncommitted. However, it is easier to raise funds from voters that are partisan (i.e., committed voters). This suggests a logic to explain why parties vigorously raise funds from corporations and interest groups when party membership levels are low (many votes are "up for grabs," but there are not enough party members to finance the spending).

Finally, we do not examine the role of incumbency. There is evidence to suggest that incumbents have a significant advantage over challengers through franking privileges and higher awareness among voters (Palda 1991). Given such advantages, this framework provides a basis to study the strategies an incumbent might employ to ensure re-election.

6. Electronic Companion

An electronic companion to this paper is available as part of the online version that can be found at <http://mansci.journal.informs.org/>.

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