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# The Air War vs. the Ground Game: An Analysis of Multichannel Marketing in U.S. Presidential Elections

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**Abstract.** This study jointly examines the effects of television advertising and field operations in U.S. presidential elections, with the former referred to as the “air war” and the latter as the “ground game.” Specifically, the study focuses on how different campaign activities—personal selling in the form of field operations and mass media advertising by the candidates and by outside sources—vary in their effectiveness with voters who have different political predispositions. The voting choice model takes into consideration voter heterogeneity and analyzes comprehensive data that include voting outcomes, detailed campaign activities, and voters’ party affiliation for three presidential elections (2004–2012). The results reveal that different campaign activities have heterogeneous effects depending on voters’ party affiliation. Field operations and political advertising from outside groups are more effective with partisans, whereas a candidate’s advertising is more effective with non-partisans. These findings can help strategists better allocate resources across and within channels to design an effective political marketing campaign.

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**Keywords:** multichannel marketing • ground campaigning • advertising • personal selling • political campaigns • consumer heterogeneity

## 1. Introduction

Multichannel marketing has increasingly become a critical competitive strategy for a firm’s success. In particular, mass-media advertising and personal selling are among the most important instruments at a firm’s disposal. Advertising has the advantage of reaching a large audience via well-scripted communications. Its importance goes without saying, given that global advertising spending was approximately \$563 billion in 2019.<sup>1</sup> Personal selling, on the other hand, occurs at a more micro and personal level and takes the form of in-person visits, distribution of fliers, and tele-marketing, to name just a few. Like advertising, personal selling is of great importance to many businesses. In the United States alone, the total spending on a company’s sales force is about three times the total spending on advertising (Zoltners et al. 2006), with approximately 10% of the nation’s labor force directly involved in sales or sales-related activities (U.S. Department of Labor 2020). As advertising and personal selling are foremost in the minds of marketers, it is essential to examine and understand the relative effectiveness of these channels.

This study examines the effects of multichannel marketing—mass-media advertising and personal selling—in the context of U.S. presidential elections.

Choosing the right product (the “president”) every four years is, perhaps, among the most critical decisions that U.S. consumers (the “voters”) face. The amount of marketing behind each campaign is massive: Democrats and Republicans spent about \$2 billion on presidential campaigns in the 2012 election alone, making it one of the most expensive in U.S. history (Hudson 2012). In recent years, presidential campaigns have increasingly employed a multichannel strategy. One notable phenomenon is the large-scale personal selling effort in the form of ground campaigning, also known as field operations or grassroots campaigning. Former President Barack H. Obama deployed unprecedented field operations in 2008, such that many attributed his election success to these on-the-ground efforts: “Obama’s effective organization [of the field teams] . . . could be a harbinger for how successful elections are won in battlegrounds in years to come” (Allison 2008). However, this speculation remains untested. Were Obama’s ground campaigns as pivotal as the press stated? If so, which *types* of voters were most affected by different types of campaigns? In terms of voting behavior, people are likely heterogeneous at different stages of their decision-making process (DMP). Some may have already established a

political predisposition toward a certain candidate and need only a nudge to turn out to cast a ballot, whereas others may remain undecided and continue to explore their options. Hence, how do field operations and advertising persuade and/or mobilize individuals with different political predispositions?

Researchers have long been interested in the effect of campaigning in political elections. As better data and empirical models have become available, there has been an increase in empirical research assessing the effect of campaign advertising (Shaw 1999; Klein and Ahluwalia 2005; Huber and Arceneaux 2007; Krasno and Green 2008; Lovett and Shachar 2011; Gordon and Hartmann 2013, 2016; Lovett and Peress 2015; Wang et al. 2018) and field operations (Masket 2009; Darr and Levendusky 2014). Although these studies have generated insights into political campaigns, two issues remain. First, extant research has focused largely on just one campaign activity, which does not allow for a comparison of multiple marketing instruments within the same context (e.g., U.S. presidential elections). Second, and perhaps more importantly, existing research has yet to provide sufficient insights into the heterogeneous effect of campaign activities. With technologies to better target individual voters, the question of how different campaign activities work in different voter segments has become increasingly important. Hence, this study seeks to generate more granular insights into the heterogeneous effects of multiple political campaign activities—field operations and candidate and outside advertising—on different types of voters.

In U.S. presidential elections, campaign staff and volunteers carry out on-the-ground campaigning, which includes conducting door-to-door canvassing, making phone calls, sending mailings, and delivering door hangers with candidate signs. Although these outreach activities may serve the purposes of both persuading voters and inducing them to turn out, ground campaigns tend to focus more on get-out-the-vote efforts (e.g., Gerber and Green 2000a, 2000b; Green et al. 2003; Wielhouwer 2003; Nickerson et al. 2006). Because these “retailing” efforts involve personal contacts, they give the campaigns an opportunity to directly nudge voters toward turning out to vote. In contrast, the classic “wholesale” campaigning method of television advertising sends broad messages to express a candidate’s policies or to attack his or her rivals. Research on campaign advertising has found that it has a limited effect on turnout (Krasno and Green 2008) but a positive effect on establishing preferences and persuading voters (Huber and Arceneaux 2007, Lovett and Peress 2015).

Establishing preferences and deciding to turn out likely occur at different stages of an electorate’s DMP. Naturally, turnout—the choice between going and

not going to the polls—is determined at a later stage of the DMP, after voters have established their candidate preferences. Voters who have already formed a political predisposition for a particular candidate would be more likely to identify with targeted turnout messages from that candidate, whereas voters who have not yet decided on their preferred candidate would be more receptive to broad messages that provide information about the candidates. Following these arguments, one would expect that different presidential campaign activities—field operations and television advertising—would have varying effects on different types of voters, depending on where they are in their voting DMP. Field campaigning in modern elections focuses on partisan turnout operations, and, thus, this approach is expected to have a stronger effect among voters with an established political predisposition. In contrast, television advertising, being less targeted but more informational in nature, is expected to be better received by those who are yet undecided and, thus, might still change their minds.

Campaign advertising in the extant literature typically corresponds to advertisements sponsored by the candidates and their party committees (Huber and Arceneaux 2007);<sup>2</sup> however, recent presidential elections have seen rapid growth in advertisements sponsored by outside political groups, known as Political Action Committees (PACs or super PACs).<sup>3</sup> Existing research has found that the two types of campaign advertisements have different average effects in U.S. senatorial elections (Wang et al. 2018). We further hypothesize that they could have heterogeneous effects on different voter segments.

This study’s theoretical arguments originate from the well-established receive-accept-sample (RAS) model in political science (Zaller 1992). According to the RAS model, voters form political preferences through a two-stage process: receive and accept. The model states that people with high political awareness (in general, those with an established predisposition) are more likely to receive campaign information but are less likely to accept messages that are inconsistent with their predisposition. In contrast, people with moderate political awareness (typically, those who are unaffiliated with any major party) are less likely to receive political messages but are more open to persuasion and, thus, are more likely to accept and be influenced by such information. This process holds for traditional candidate advertising (Huber and Arceneaux 2007) but may apply less to PAC advertising, because the content of the latter tends to be more negative and have an attacking tone rather than a promoting tone.<sup>4</sup> Moderately aware people would be less likely to receive and accept the PAC messages because they tend to have a lower tolerance for negativity than do those with higher political

awareness (Fridkin and Kenney 2011). Therefore, the net effect of PAC advertising on moderate voters remains an empirical question.

Based on existing theoretical and empirical findings, voter segments are hypothesized to moderate the effects of campaign activities. To examine this, we compile a unique and comprehensive data set integrating multiple sources. The ground-campaigning data include detailed records of field operations from the Democratic and Republican candidates. The data on television advertising include ad impressions at the designated-market-area (DMA) level for advertisements made by the candidates and their party committees, as well as those by outside political groups. For voter segments, this study focuses on voters' party affiliation: those who have affiliated themselves with a party tend to have a stronger political predisposition and awareness (Holbrook and McClurg 2005, Iyengar and Hahn 2009). Thus, the partisan versus unaffiliated segmentation matches the voter segmentation proposed in the RAS theoretical framework.

To model individual voting preferences, we specify a random-coefficient aggregate discrete-choice model, which estimates the interaction between campaign effects and voter characteristics using aggregated data. However, estimating the true effects is nontrivial because campaign resources are strategically allocated, causing an endogeneity problem. To address this challenge, the model incorporates an extensive set of county-party fixed effects and uses advertising cost shifters as instrumental variables.

The results show that campaign effects significantly vary by voters' affiliated partisanship. In particular, field operations are more effective with partisans than with nonpartisans, whereas candidate advertising is more effective with nonpartisans. PAC advertising, which typically consists of negative and attacking messages, is more effective with partisan voters. It is novel to see that the two types of advertising have different effects by voter segment.

This study makes three contributions to the literature on political campaigns. First, we collect detailed and comprehensive data on candidate advertising, outside advertising, and ground campaigning. By jointly examining these campaign activities, the study speaks to the relative importance of various marketing instruments within a specific event (the U.S. presidential election). Second, the study identifies and distinguishes the effect of outside advertising from that of candidate advertising. This study is among the first few to systematically examine political advertising sponsored by outside interest groups in U.S. presidential elections, a highly controversial

subject among the general public.<sup>5</sup> Third, and most importantly, the study makes inferences about the heterogeneous campaign effects to determine whom (partisans vs. nonpartisans) to target with specific campaign activities (field operations vs. advertising). The results provide guidance on targeted campaign-resource allocation across different voter segments.

The remainder of the paper is organized as follows. Section 2 describes the campaign activities and the data used for empirical analysis. Section 3 specifies the model and discusses identification. Section 4 presents the parameter estimates and the counterfactual results, and Section 5 concludes.

## 2. Data

The data come from multiple sources and include voting outcomes and various campaign activities for the 2004–2012 U.S. presidential elections. Compared with those used in other studies, the data for this study are more comprehensive in at least four aspects. First, the collection of multiple campaign activities encompasses a more complete record of advertising and ground campaigning than seen in previous studies. Knowing where and to what extent candidates chose to campaign enables us to assess the effects of various campaign activities after controlling for one another. Second, the unit of analysis in this study is at the county level, which is as granular as it can be to reliably obtain voting outcomes across all states. In addition, the measure of campaign activities is also at the most granular level possible. Hence, such data allow us to take a finer look at campaign allocation, curtailing potential aggregation bias. Third, the data include registered party affiliation at the county level, making it possible to examine how campaign effects differ according to voter partisanship. Lastly, the data span a period of three elections, and, thus, the results are not confined to a particular combination of candidates.

### 2.1. Election Votes

The outcome variable of this study is the number of votes cast for the presidential candidates in each county. These data come from the CQ Press Voting and Elections Collection, a database that tracks major U.S. political elections.

A county constitutes a "market" in which residents choose up to one "product" (candidate).<sup>6</sup> A county's "market size" equals the total number of resident citizens aged 18 and older, typically known as the voting-age population (VAP).<sup>7</sup> The county-level age-specific population counts come from the U.S. census database. The "market share" or "vote share" of each candidate is the percentage of votes that he or she receives out of the county's VAP. Table 1 lists the county-level summary statistics of vote outcomes.



**Table 1.** Summary Statistics of Vote Outcomes by County

Year	Party	N	Mean	SD	Min	Max
Vote share						
2004	Democrat	3,111	0.22	0.08	0.04	0.58
	Republican	3,111	0.35	0.09	0.05	0.76
2008	Democrat	3,106	0.25	0.10	0.04	0.64
	Republican	3,106	0.33	0.09	0.04	0.78
2012	Democrat	3,108	0.22	0.10	0.02	0.70
	Republican	3,108	0.33	0.10	0.02	0.73
Turnout rate						
2004		3,111	0.57	0.09	0.19	0.98
2008		3,106	0.58	0.09	0.16	0.90
2012		3,108	0.55	0.09	0.15	0.99

*Notes.* The turnout rate is the sum of votes for the Democratic and the Republican candidates divided by the number of resident citizens aged 18 and above. The vote share is the total votes cast for a candidate, divided by the number of resident citizens aged 18 and above. SD, standard deviation.

## 2.2. Ground Campaigning

To an average voter, presidential elections are likely most visible on the ground level through personal selling activities. Candidates establish field operations to organize ground-level voter outreach (hereafter, ground campaigning and field operations are used interchangeably). As field offices are the backbone of outreach activities, the number of field offices deployed in each county is the measure used to quantify the scale of a candidate's field operations. The 2004 and 2008 field office data come from the "Democracy in Action" project at George Washington University, and the 2012 data come from *Newsweek's* Daily Beast website.<sup>8</sup>

Table 2 displays the summary statistics of field operations. Across all elections, the Democratic candidates had an indisputable lead in establishing field operations: The ratios of the Democratic and Republican

**Table 2.** Summary Statistics of Field Operations by County

		N	Mean	SD	Min	Max	Total
Number of field offices							
2004	Democrat	3,111	0.10	0.45	0	12	313
	Republican	3,111	0.03	0.23	0	5	89
2008	Democrat	3,106	0.28	0.75	0	11	874
	Republican	3,106	0.08	0.46	0	17	247
2012	Democrat	3,108	0.24	0.93	0	21	750
	Republican	3,108	0.09	0.37	0	6	278
Presence of field offices							
2004	Democrat	3,111	0.08	0.27	0	1	237
	Republican	3,111	0.02	0.14	0	1	65
2008	Democrat	3,106	0.20	0.40	0	1	624
	Republican	3,106	0.06	0.24	0	1	192
2012	Democrat	3,108	0.14	0.35	0	1	439
	Republican	3,108	0.07	0.26	0	1	222

*Notes.* The unit of observation is a county. The presence of field operations denotes whether there is at least one field office in the county. SD, standard deviation.

field offices were 3.51, 3.53, and 2.69 in 2004, 2008, and 2012, respectively. Furthermore, even between the Democratic candidates, field offices were more prominent in the Obama campaigns than in the John Kerry campaign: The latter set up field offices in 237 (8%) counties and the former in 624 (20%) and 439 (14%) counties in 2008 and 2012, respectively.<sup>9</sup>

It merits to mention that the number of field offices in each county is a proxy for voters' exposure to field operations. This metric, which has become available only in recent elections, provides a more objective measure of field operations at a granular geographical level than alternative survey-based measures, which are prone to recall errors and nonresponse bias. Due to this advantage, several recent studies have used the number of field offices (Masket 2009, Darr and Levendusky 2014). However, this measure is not without limitations. For example, a field office may serve multiple purposes, including coordinating voter contacts, organizing fundraising events, or even laying the groundwork to raise voter support for future party candidates. Some of these activities may not be directly related to winning the current election (Darr and Levendusky 2014). However, the primary goal for a field office during a presidential election likely centers on the "Race to 270" electorate votes. Therefore, the number of field offices should still indicate the degree to which a candidate uses ground campaigning to gain votes.

Nevertheless, a question remains. To what extent does the number of field offices reflect the level of voter exposure to ground campaigning? One way to assess the validity of this metric is to correlate it with the number of voter contacts made by the ground campaign personnel. The American National Election Studies (ANES), a large-scale survey on voting and political participation, provides survey responses regarding voter contacts. In the 2004, 2008, and 2012 ANES time-series surveys, respondents were asked whether they had been contacted by a party about the campaign and, if yes, by which party. The correlation between voter contacts (in the ANES responses) and the number of field offices was 0.76 for the Democrats and 0.73 for the Republicans.<sup>10</sup> Hence, despite its limitations, the number of field offices provides the best available proxy for field operations in the scope of this study—nationwide at the county level across three elections. At the same time, we acknowledge the limitations and believe that future research can benefit from improving the measure of field operations.

## 2.3. Television Advertising

Three types of advertising sponsors exist in U.S. presidential elections: (1) the candidates; (2) their party committees—namely, the Democratic National Committee (DNC) and the Republican National

Committee (RNC); and (3) outside political groups. Because a candidate and his or her party committee often coordinate advertising efforts (Wielhouwer 2003), the combined amounts of advertising from these two sources represent the candidate's own advertising amount—hereafter, referred to as *candidate advertising*.

Outside political groups (i.e., PACs), the third type of advertising sponsor, also finance independent television advertising spots to support their preferred candidates and attack their rivals. Although they have played a role in presidential elections for decades, PACs have taken on much greater prominence in recent elections, partly due to the 2002 campaign finance reform law that set stricter restrictions on fundraising and spending for campaigns. As a result, outside political groups stepped in to fill the gap. Especially in the 2012 election, a relatively new kind of organization, super PACs, emerged as a major advertiser. Super PACs, consisting of several independent PACs, support a candidate with unlimited, and often anonymous, donations from unions, companies, or individuals. Due to the large number of PACs that advertise in presidential elections, it is challenging to track all of their advertisements. The advertising data used in this study include the top PAC advertisement spenders, which represent more than 90% of the total ad spending by PACs.

In this study, the advertising measure uses gross rating points (GRPs), which quantify advertising impressions as a percentage of the target audience reached. Using GRPs is a better measure of ad exposure than dollar spending, because the cost of advertising varies significantly across markets. For example, the same amount of ad dollars would yield less exposure in Boston than in Kansas City. In contrast, GRPs provide a measure of audience reach that is independent of the advertising cost.

The advertising data come from Nielsen Media Research. Nielsen divides the U.S. media market into 210 designated market areas (DMAs): Residents from the same DMA receive the same television advertising. Therefore, the advertising measures are at the DMA level. It is noteworthy that the outcome variable of interest (vote share) is at the county level, with each county belonging to one and only one DMA. Hence, the implicit assumption is that the percent of the audience reached in a county equals the percent of the audience reached in the DMA to which the county belongs.

It is fair to assume that the cumulative amount of advertising affects a voter's preference on Election Day, and, thus, the cumulative GRPs of each DMA since September 1 of that year form the advertising measure for analysis. Table 3 presents the summary statistics of advertising sponsored by candidate, party, and PACs, respectively. The Democratic candidates had

**Table 3.** Summary Statistics of Television Advertising by DMA

		N	Mean	SD	Min	Max	Total
Advertising by candidate (GRPs)							
2004	Democrat	206	1,420.4	2,374.1	0	8,933	292,611
	Republican	206	1,885.9	2,764.0	0	8,440	388,501
2008	Democrat	206	3,809.9	3,797.8	255	13,838	784,848
	Republican	206	2,075.3	2,422.7	77	8,452	427,517
2012	Democrat	206	2,232.2	4,143.7	0	15,779	459,827
	Republican	206	1,320.7	2,576.5	0	9,535	272,055
Advertising by party (GRPs)							
2004	Democrat	206	1,942.0	2,211.0	0	7,561	400,054
	Republican	206	868.0	1,271.1	0	5,858	178,814
2008	Democrat	206	1,766.5	2,324.9	0	12,277	363,905
	Republican	206	1,553.5	1,890.5	0	11,035	320,013
2012	Democrat	206	1,063.8	1,604.2	0	7,270	219,144
	Republican	206	1,069.4	1,774.5	0	11,044	220,291
Advertising by PACs (GRPs)							
2004	Democrat	206	255.9	505.0	0	2,248	52,726
	Republican	206	394.4	866.2	0	4,023	81,250
2008	Democrat	206	159.4	407.3	0	2,513	32,830
	Republican	206	217.2	435.7	0	2,188	44,736
2012	Democrat	206	254.3	694.6	0	3,840	52,378
	Republican	206	2,030.9	2,714.9	67	12,137	418,356

Notes. GRPs correspond to the percentage of the target population reached in each DMA. SD, standard deviation.

more candidate advertising than the Republicans by 20%, 50%, and 40% in the 2004, 2008, and 2012 elections, respectively. Interestingly, the PACs, which had less advertising than the candidates in 2004 and 2008, reached a much greater scale in the 2012 election. In particular, PAC advertisements supporting Mitt Romney were responsible for roughly 46% of the total advertising, and there were seven times more PAC advertisements for Romney than for Obama. Although the Obama campaign had more candidate advertising than the Romney campaign, the PACs filled the gap. In the end, the pro-Romney advertisements outnumbered the pro-Obama ones by 25%.

## 2.4. Additional Variables

The data used in this study also include a large set of county-level contextual factors that may influence a county's voter preferences. First, the percentage of African American residents is included to capture the racial composition of a county. In addition, the data include a large set of variables that measure demographics and the socioeconomic conditions of a county: distribution of age, educational attainment, population density, number of new establishments, number of newly created employment positions, average wage, median household income, unemployment rate, Gini index, median house value, high-school dropout rate, and poverty rate. These variables come from the U.S. Bureau of Labor Statistics and the U.S. Census Bureau databases. Furthermore, the data include the percentage of registered partisan voters for the Democratic and the

Republican parties, respectively, which is a key variable to examine voter heterogeneity in response to various campaign activities (see Section 3.2 for details). This variable comes from a proprietary database tracking U.S. elections.<sup>11</sup> Lastly, the data also contain variables that measure the local political climate regarding a particular party (Campbell 1992): whether it is the home state for the presidential candidate; whether the governor is from the same party; whether the governor is an incumbent (if from the same party); and how far each county is from the campaign headquarters. These variables vary by party within the same county.

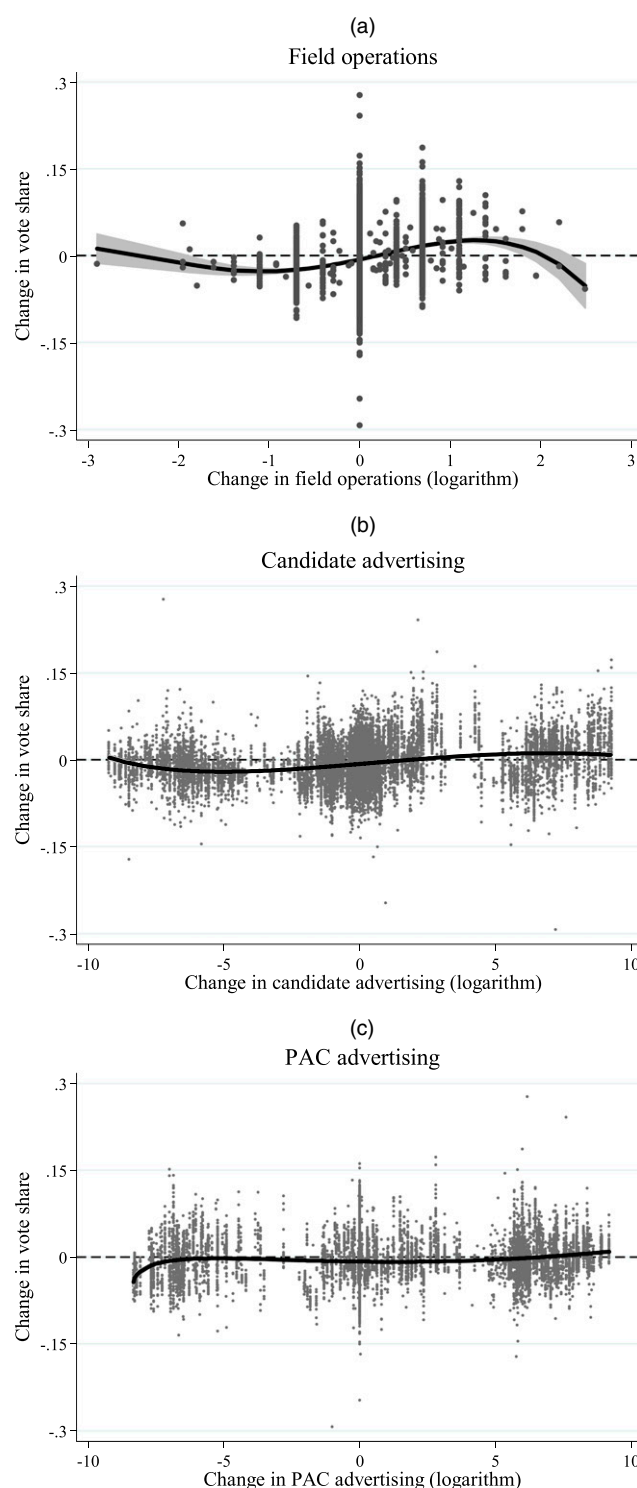
## 2.5. Model-Free Evidence

This section presents the model-free evidence on the campaign effect and campaign resource allocation.

**2.5.1. Campaign Effects.** To visually examine the campaign effects, each campaign activity is plotted against the voting outcome. To control for the large cross-sectional variation across counties, the plots show the changes in the vote share and campaign activities from one election to the next. Figure 1(a) depicts the association between the vote share and ground campaigning. The vertical axis of the figure corresponds to the change in vote share—that is,  $s_{cj,t+1} - s_{cj,t}$ , where the vote share in county  $c$  for party  $j$  during election  $t$  is computed as the vote counts for that party divided by the county's VAP. The horizontal axis is the difference in the number of field offices (in logarithm), and each dot corresponds to a county-party combination. Figure 1(a) also includes the best-fitting fractional polynomial curve with its 95% confidence interval. The pattern exhibits an overall positive relation, indicating that a candidate's vote share in a county increases with additional field offices. The positive trend tails off and turns downward at the right end, driven largely by a few outlier counties in which the competition was intense, and the candidates added five or more field offices. However, because of the sparse data support, one should be cautious when interpreting the relation at the extremes.

Similarly, Figure 1, (b) and (c), shows the changes in a county's vote share against the changes in candidate advertising and PAC advertising, respectively. The horizontal axis now corresponds to the changes in advertising GRPs (in logarithm) for each county-party combination. The slopes for advertising are flatter than the slope for field operations but still reveal a positive trend: A candidate's vote share goes up with an increase in advertising. The trend for PAC advertising is less obvious than that for candidate advertising, suggesting a potentially weaker effect for outside advertising.

Figure 1. Vote Share vs. Campaigning



Notes. Each dot corresponds to a county-party combination. The line is the best-fitting fractional polynomial curve with its 95% confidence interval shaded in gray. One unit was added to the campaign variables before taking the logarithm.

**2.5.2. Voter Heterogeneity.** A key research question of this study is: Do different types of voters respond to campaigns differently? To obtain insights into this question,

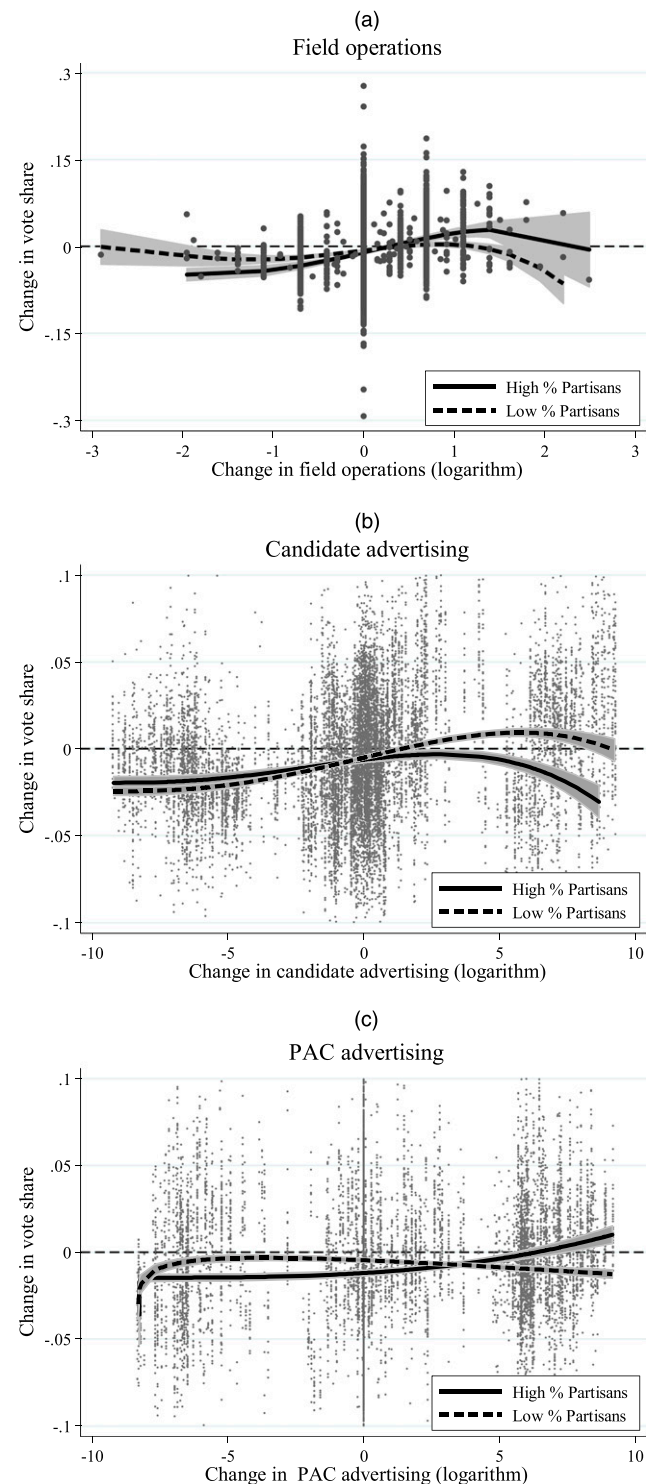


the association between campaigns and vote outcomes is further related to voter partisanship, which is an essential characteristic signaling voters' political predisposition (Campbell 1992). Thus, counties are divided into two groups: high-partisan Democratic (Republican) counties in which the percentage of registered Democratic (Republican) voters is above the mean, and low-partisan Democratic (Republican) counties in which the corresponding percentage of partisans is below the mean. Figure 2(a) depicts the relation between the vote share and field operations, with the lines fitted for low-partisan (dashed line) and high-partisan (solid line) counties, respectively. Again, for illustration, the figure shows the scatter plot and the best-fitting fractional polynomial curve with its 95% confidence interval. Although both lines exhibit a positive trend, the solid line has a steeper slope, suggesting that ground campaigning seems to have a stronger effect in counties with a higher percentage of partisan voters.

Interestingly, the plots for advertising show different patterns for candidate advertising (Figure 2(b)) and PAC advertising (Figure 2(c)). Similar to the pattern shown for ground campaigning, the effect of PAC advertising is stronger in counties with a higher percentage of partisans (solid line) than in those with a lower percentage (dashed line). The opposite pattern exists for candidate advertising: the slope is steeper in counties with a lower percentage of partisans than in those with a higher percentage, which seems to suggest that candidate advertising is more effective with nonpartisans than with partisans.

**2.5.3. Campaign Allocation.** Figures 1 and 2 provide suggestive evidence of the overall campaign effects and their heterogeneity by voter partisanship, but such correlational observations are simply descriptive and not causal. The observed correlation would differ from the true effect if candidates strategically allocated campaign activities. There are at least two primary reasons that campaign deployment could be endogenous: (1) the need to campaign where it is necessary, and (2) the need to campaign where the effects are stronger. Regarding the first reason, the nature of U.S. presidential elections is such that candidates are incentivized to campaign where they are not necessarily winning (or losing) but have a chance of winning—namely, the so-called “battle-ground” states. In contrast, states in which they are likely to win or to lose have only modest importance—that is, there is a nonmonotonic relation between competition intensity and campaign allocation. The second reason for endogeneity is that candidates may also allocate resources where they expect them to be more effective. If they have information on which

**Figure 2.** Effect of Campaigning for Low- and High-Partisan Counties



*Notes.* Each dot corresponds to a county-party combination. The solid and dashed lines are the best-fitting fractional polynomial curve with its 95% confidence interval shaded in gray for counties with above and below the average percentage of partisans, respectively. To better exhibit the patterns, panels (b) and (c) focus on the middle range of the vertical axis, which excludes only 1% of the data.

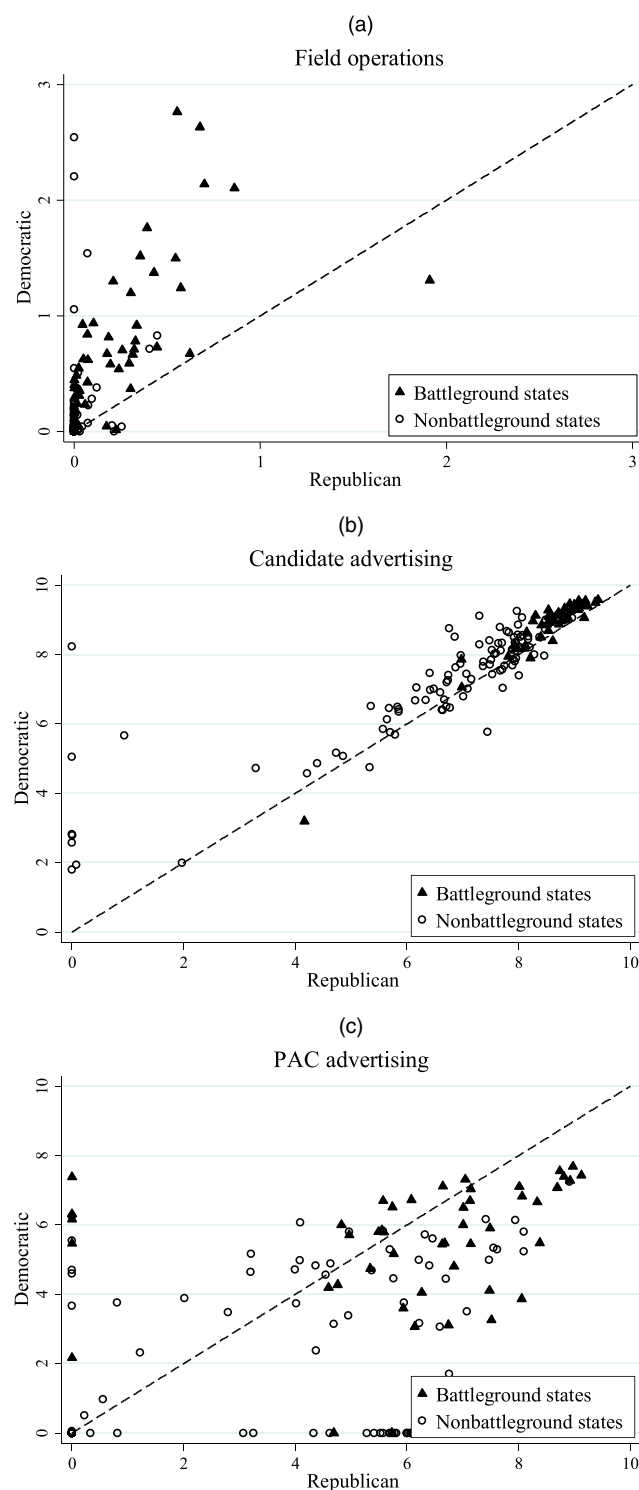


voters are more responsive, the campaign managers could consider engaging in more campaign activities to take advantage of the potentially higher returns on investment. Hence, we examine whether and how candidates strategically allocate campaign activities (see Section 3.3 for the empirical strategy to address these endogeneity concerns).

First, we examine the amount of campaigning based on competition intensity. Figure 3(a) shows the Democratic field offices versus the Republican field offices for battleground and nonbattleground states, respectively.<sup>12</sup> Because states vary in voter size, the number of field offices is normalized by the VAP for each state. The figure shows that the Democratic candidates had more field offices than the Republicans and that the battleground states had more field offices than the nonbattleground states. Similarly, Figure 3, (b) and (c), illustrates the GRPs for candidate advertising and PAC advertising, respectively. Candidates advertised more intensively in battleground than in nonbattleground states. However, PAC advertising exhibited a less obvious association with competition intensity. PACs advertised somewhat more evenly across battleground and nonbattleground states, perhaps because PAC advertising comes from multiple organizations, which likely have varying political motivations and strategic objectives. Nevertheless, the difference between PAC and candidate advertising empirically confirms that there was little coordination between the two types of sponsors.<sup>13</sup>

Next, we examine the extent to which campaign managers allocate resources according to the expected effectiveness. This task is nontrivial, as it is unknown to researchers how managers form expectations about campaign effectiveness. However, Section 2.5.2 provides suggestive evidence that campaign effects vary by voter partisanship. If the observed pattern is related with the campaign managers' allocation decisions, then one would expect the counties with relatively higher partisan support to have more field offices and PAC advertising, but less candidate advertising. To test this hypothesis, counties are again split into low and high groups, depending on whether the percentage of partisan voters is below or above the median. The upper half of Table 4 presents the summary statistics of the campaign activities in each county by the level of partisan support and battleground status. The bottom half of Table 4 shows the results of a regression analysis to test the statistical significance of competition intensity and partisan support with regard to the three campaign activities. Not surprisingly, campaign activities were much more prevalent in battleground states than in nonbattleground states.

**Figure 3.** Campaign Allocation by State-level Competition Intensity



*Notes.* The plot depicts the campaign allocations between the Democrats and the Republicans, split by battleground and nonbattleground states. Field operations are normalized by age-eligible voters (in 100,000). Advertising variables are on a log scale. The diagonal reference line represents when the two parties have the same level of campaign allocation.

**Table 4.** Campaign Activities by State-Level Competition Intensity and County-Level Partisan Support

Voter Partisan Level	Descriptive statistics					
	Field operations		Candidate advertising		PAC advertising	
	High	Low	High	Low	High	Low
Battleground states	0.28 (0.45)	0.24 (0.43)	8,259.6 (4,501.0)	7,846.9 (4,545.8)	1,232.1 (1,954.5)	1,325.1 (2,025.1)
Nonbattleground states	0.04 (0.19)	0.03 (0.17)	2,377.4 (3,213.3)	2,104.4 (2,903.6)	341.4 (1,061.4)	310.6 (965.8)
	Regression analyses					
	Field operations		Candidate advertising		PAC advertising	
	Est (SE)	<i>p</i>	Est (SE)	<i>p</i>	Est (SE)	<i>p</i>
Battleground	0.077 (0.015)	<0.001	1.531 (0.182)	<0.001	1.416 (0.159)	<0.001
Partisan voters (%)	0.103 (0.015)	<0.001	-0.029 (0.066)	0.656	0.328 (0.120)	0.007
Democrat	0.087 (0.006)	<0.001	0.587 (0.018)	<0.001	-2.089 (0.038)	<0.001
County fixed effects	Included		Included		Included	
Election fixed effects	Included		Included		Included	

*Note.* The unit of observation is a county-party combination. Counties are classified into high vs. low partisan levels depending on whether the county-level percent of partisan voters is above or below the median. In battleground states, there are 1,367 and 1,575 counties with high and low partisan levels, respectively. In nonbattleground states, there are 2,619 and 2,411 counties with high and low partisan levels, respectively. For field operations, the percentage of counties that had at least one field office is reported. The bottom portion of the table presents the linear regression results for the battleground indicator and local partisan support after controlling for the county and election fixed effects. The dependent variable is each of the log-transformed campaign variables. Robust standard errors clustered by county are reported. Est, parameter estimate; SE, standard error.

More interestingly, the levels of field operations and PAC advertising are, indeed, positively and significantly associated with local partisan support. However, for candidate advertising, the county's level of partisan support is statistically insignificant. These patterns are directionally consistent with the conjecture that field operations and PAC advertising are more effective with partisan voters, whereas nonpartisans tend to respond more to candidate advertising. Overall, the analysis here provides correlational support that candidates allocate campaign activities by competition intensity and the level of local partisanship. Thus, to estimate the true campaign effects, it is important to control for voter partisanship and the unobserved competition intensity. Given these considerations, the next section describes the modeling approach and presents the identification strategy.

### 3. Model

#### 3.1. Model of Voter Preference

Individual  $i$  from county  $c$  has latent voting utility that he or she associates with a candidate from party  $j$  during election  $t$ , denoted as  $u_{icjt}$ . An individual faces three voting options: the Democratic candidate, the Republican candidate, and the outside option (i.e., voting for an independent candidate or choosing not to vote). Individual  $i$  chooses the option that yields the highest utility, and the market share for the three options results from aggregating individual choices. The utility of individual  $i$  takes the form of

$$u_{icjt} = \Gamma_i(G_{cjt}, A_{cjt}) + \alpha_i + \eta X_{cjt} + \xi_{cj} + \Delta \xi_{cjt} + \phi_{jt} + \varepsilon_{icjt}. \quad (1)$$

The term  $\Gamma_i(G_{cjt}, A_{cjt})$  captures how individual  $i$ 's goodwill toward party-candidate  $j$  is affected by the candidate's ground campaigning,  $G_{cjt}$ , and television advertising,  $A_{cjt}$ . The effect of campaigns may differ by individual, denoted by the subscript  $i$ , because of heterogeneous tastes (see Section 3.2 for the detailed specification of the campaign effect).

The term  $\alpha_i$  captures the remaining individual-specific heterogeneity in voting preferences. It can be understood as the mean voting utility for  $i$  that is not explained by the voter's exposure to campaigns. This term is further decomposed into three parts: (1) the grand mean across individuals,  $\alpha_1$ ; (2) the deviation from the mean that is attributed to observable individual characteristics, such as the voter's partisan affiliation,  $P_{ijt}$ ; and (3) the individual's departure from the mean related to all other unobservable individual characteristics,  $\sigma v_i$ , where  $v_i$  comes from a standard normal distribution. The unobservable characteristics include factors such as the individual's financial conditions, which could shape the voting preference but are missing from the data. The three terms enter utility linearly such that  $\alpha_i = \alpha_1 + \alpha_2 P_{ijt} + \sigma v_i$ .

The term  $\eta X_{cjt}$  captures how observed county-election-specific characteristics affect voting utility. Examples of such variables include the county's racial composition, political climate, and socioeconomic conditions, such as the median household income and the unemployment rate, all of which may influence voters' preferences for candidates. The interaction of these contextual variables with a party indicator captures the differential effects across parties.

Utility is also a function of unobservable characteristics that are specific to a county-party-election combination. This is further decomposed into three parts:  $\xi_{cj}$ ,  $\Delta\xi_{cjt}$ , and  $\phi_{jt}$ . The unobserved  $\xi_{cj}$  refers to the mean utility toward the candidate from party  $j$  across all residents in the same county. People from the same county likely exhibit similar political preferences due to exposure to the same socioeconomic stimuli. The fixed effect  $\xi_{cj}$  absorbs the cross-sectional variation in party preferences across counties, and, thus, the model estimates result from the cross-election variation within counties.

The component  $\Delta\xi_{cjt}$  is the county-party-election-specific deviation from the mean utility  $\xi_{cj}$ , which quantifies the hard-to-measure utility shifts over time. For example, when Hurricane Sandy hit the northeastern part of the United States in 2012, then-President Barack Obama promptly committed to relief operations and was praised for his crisis leadership, causing a positive boost in his support, especially in the areas impacted by the hurricane. Such unobserved factors would not be reflected in  $\xi_{cj}$  but would be captured by  $\Delta\xi_{cjt}$ . The county-party-election-specific deviation in candidate favorability, though unobserved by the researcher, affects voters' preference for candidates. Thus, the potential correlation between the campaign variables and the unobserved candidate favorability may bias the model estimates of  $\Gamma_i(G_{cjt}, A_{cjt})$  in an ordinary least squares (OLS) regression (see Section 3.3 for the empirical strategy to address this issue).

The component  $\phi_{jt}$  captures the common shift in voters' overall preferences across elections and is allowed to differ between parties; for example, there could have been unobserved differences when the Republican candidate changed from George W. Bush to John McCain and when the Democratic candidate changed from John Kerry to Barack Obama. Finally,  $\varepsilon_{icjt}$  is the idiosyncratic utility shock that is assumed to be independently and identically distributed type-I extreme value across individuals, counties, candidates, and elections.

### 3.2. Specification of Campaign Effects

The campaign effect,  $\Gamma_i(G_{cjt}, A_{cjt})$ , is a function of party-candidate  $j$ 's ground campaigning,  $G_{cjt}$ , and mass-media advertising activities,  $A_{cjt}$ . Campaign advertising has two primary types: advertisements made by the candidates and their respective parties,  $A_{cjt}^p$ ; and advertisements sponsored by outside PAC groups,  $A_{cjt}^o$ . All three types of campaign measures enter the model in the log form to capture a potentially diminishing return. Furthermore, all campaign activities can have heterogeneous effects across individuals,

captured by the subscript  $i$ . Hence, the combined campaign effect takes the following form:

$$\Gamma_i(G_{cjt}, A_{cjt}) = \beta_i G_{cjt} + \gamma_i A_{cjt}^p + \pi_i A_{cjt}^o. \quad (2)$$

Parameter  $\beta_i$  captures voter  $i$ 's taste for field operations and consists of two components: (1) the mean effect of field operations,  $\beta_1$ ; and (2) the deviation from the mean that could be attributed to observable individual characteristics,  $\beta_2 P_{ijt}$ .<sup>14</sup> Similarly, the parameters  $\gamma_i$  and  $\pi_i$  consist of two components such that

$$\begin{aligned} \beta_i &= \beta_1 + \beta_2 P_{ijt}, \\ \gamma_i &= \gamma_1 + \gamma_2 P_{ijt}, \\ \pi_i &= \pi_1 + \pi_2 P_{ijt}, \end{aligned} \quad (3)$$

where  $P_{ijt}$  represents a voter's party affiliation, a key factor affecting the political preference for candidates. This individual partisan variable can take on three values—affiliated with the Democratic Party, the Republican Party, or neither—and, thus, follows a multinomial distribution, where the empirical means of the categories correspond to the observed percentages of registered partisan voters for each county. For example, if a county had 30% registered Democrats and 35% Republicans, then the simulated individual partisanship would have approximately 30% labeled Democratic, 35% labeled Republican, and the remaining 35% labeled neither.<sup>15</sup> Note that the individual's partisanship may also affect the overall voting preference, which is captured in  $\alpha_i$ .

The estimation procedure follows the standard random-coefficient model as defined in Berry et al. (1995). This is typically referred to as the "BLP" model and has been used in various marketing applications (e.g., Sudhir 2001, Chung 2013).

### 3.3. Identification and Estimation

The BLP model specification allows us to examine the individual heterogeneity in campaign effectiveness, even though voters' choices are observed at the aggregated county level. The parameters are estimated using the generalized method of moments (GMM), where the moment conditions involve a vector of instrumental variables, which is orthogonal to the unobserved county-party-election shock  $\Delta\xi_{cjt}$  (Hansen 1982).

Inferences about the campaign effects require careful consideration of campaign endogeneity (i.e.,  $\Delta\xi_{cjt}$  is correlated with the level of campaigning). As discussed in Section 2.5.3, at least two reasons can explain how campaign allocations are strategically determined: the need to campaign where it is necessary

and the need to campaign where it is effective. The data used in this study indicate that competition intensity relates to the scale of campaigning (Shachar 2009). Furthermore, the data provide suggestive evidence that campaign allocations vary by local partisan support. When campaigns are deployed where they are better received, the OLS estimate would be greater than the true campaign effect (i.e., upward bias). When campaigns are planned according to the intensity of competition, the sign of the estimation bias becomes ambiguous. Campaign efforts are likely to decrease if the preference for the candidate is either too strong or too weak (Gordon and Hartmann 2013); thus, the OLS estimates would be biased downward for the former and upward for the latter. Combined, the sign of the endogeneity bias becomes unclear. To address the potentially different campaign effects related to partisanship, we control for voters' partisan status and explicitly model how the effects vary by partisan segment. To address the endogeneity concern related to unobserved competition intensity, we estimate the effects for field operations and advertising using different identification strategies, because the two types of campaign activities employ different geo-based allocation strategies.

Regarding the identification strategy of field operations; compared with advertising, which is determined at the DMA level, grassroots field operations are targeted at a more granular and local level (Wielhouwer 2003, Huber and Arceneaux 2007). For example, the DNC stated in its Campaign Training Manual that grassroots campaigns "are designed to reach a very special target group of favorable voters either individually, in select precincts or in most cases a combination of both" (Wielhouwer 2003, p. 639). In other words, the level of field operations closely relates to the local political predisposition and voter characteristics. Thus, it is important that the model includes the county-party-level fixed effects, which help address the targeting of field operations related to unobserved county-level preferences for candidates.

Even with the fixed effects, it is possible that  $\Delta\xi_{cjt}$ , the unobserved time-varying shock to voter preference, may still be correlated with field operations—for example, if the campaign managers detect a change in the local political favorability (relative to the previous election) and adjust the number of field offices accordingly. Wielhouwer (2003) identifies several groups of variables that may influence field office allocations. The most important factor is voters' registered partisanship, as managers can use voter registration to estimate the number of contacts to make. The second group of variables includes voters' age, education, income, and African American ethnicity. For example, field operations tend to target older and better-educated residents, and Democrats and Republicans target African American voters differently.

This study includes these county-level influencers, so that their effects are eliminated from  $\Delta\xi_{cjt}$ . According to Wielhouwer (2003), the next variable is residential connectedness—that is, whether voters live in a more socially connected (e.g., urban) or less socially connected (e.g., rural) area. It is reasonable to assume that the urban/rural status does not change substantially over eight years (the data collection period of this study), so the county-party fixed effects largely absorb this effect. The changes in county-level population density from one election to the next likely capture the remaining cross-election variation in social connectedness. Lastly, a vector of party-county-level variables is included to further control for the local political climate: whether the candidates have home-state advantage; whether the governor is from the same party; whether the governor is an incumbent, if from the same party; and the distance of each county to the campaign headquarters. Given these considerations, the combination of granular (county-party) fixed effects and the many county-level control variables should address the endogeneity concerns related to field operations. Nevertheless, we acknowledge that if some unobserved contextual changes over elections (that this study does not control for) affect the number of field offices, then the model estimates would produce biased results. As with advertising, the direction of the bias is ex ante unclear because campaign strategists may decide to have fewer offices when their candidate's favorability is very low or when the focal county is considered secure for voting outcomes (i.e., favorability is very high).

Next, regarding the identification strategy of advertising, the county-party fixed effects would not directly address the endogeneity problem related to advertising because advertising is determined strategically at the DMA level. Thus, the identification strategy relies on the instrumental variable approach, using cost-shifting variables. The instruments follow those of Gordon and Hartmann (2013)—that is, the third-quarter DMA-level ad prices in the year before each election. The argument for the validity of these instruments is that price changes affect advertising costs and, hence, shift the amount of advertising. However, the cause of the price fluctuation in the previous year, instead of in the election year, is assumed to be outside the system (i.e., independent of  $\Delta\xi_{cjt}$ ).

The ad-price data come from the Kantar Media SRDS TV and Cable Source, in which prices exist for four dayparts: prime access, prime, late news, and late fringe. Although they are invariant across candidate advertising and PAC advertising, the ad costs can instrument both types of advertising through the difference in airtime for each type. Data from the University of Wisconsin Advertising Project (Goldstein and Rivlin 2008) illustrate that candidates' advertisements aired more during the prime and prime access dayparts than did PAC advertisements, whereas the



latter appeared more frequently during the late news dayparts (see Figure A1 in the online appendix). Therefore, the costs for different dayparts have varying effects on the two types of advertising, providing the variation necessary for identification. Section 4.1 presents the detailed diagnostic statistics for the instrumental variables.

The instruments by themselves, however, would not provide the between-party variation because they are constant across parties. The interactions between the party indicator and each of the cost shifters would provide the between-party variation in the first-stage fitted values for the endogenous variables (Gordon and Hartmann 2013). Furthermore, the interactions between the ad costs and the county-level percentage of partisans for each party would help identify the observed heterogeneity parameters associated with individual partisanship. This set of instruments, adding the partisan-related variation in the first-stage fitted values, helps leverage the covariance between advertising and the vote share that is associated with voter partisanship concentration. Thus, the final matrix of instruments contains the lagged ad prices, the interactions with the party variable, their respective interactions with county-level percentage partisans, and all of the exogenous variables in Equation (1), including the county-party fixed effects.

Individual partisanship is coded using the “simple contrast” method: 0.5 for a partisan voter for each party and  $-0.5$  for an unaffiliated voter. By using simple contrast coding instead of conventional dummy variable coding, the main campaign effect (mean coefficients) in the linear component of the model becomes the average campaign effect for a typical voter (Irwin and McClelland 2001). For the states with open primaries, voters do not declare party affiliation, and, thus, such data are unavailable.<sup>16</sup> For those states, the model includes only the linear components to capture the aggregated average campaign effects, and the instruments include only the ad costs and their interactions with the party indicator.

Note that the coefficients regarding observed heterogeneity are identified from the states with partisanship information. Heuristically, the variation in vote share for counties with different partisan density but the same campaign activities helps identify the observed heterogeneity parameters related to campaign effects. For example, suppose that two counties observe the same increase in the number of Democratic field offices from one election to the next. If the increase in the vote share is higher for a county with a higher percentage of registered Democrats, then the coefficient on the partisan variable is identified as positively interacting with the effect of field operations. The same logic applies to how partisans respond to advertising. Unobserved heterogeneity is

identified through different substitution patterns in the data (Nevo 2000).

## 4. Results

### 4.1. Parameter Estimates

Table 5 presents the results of four model specifications.<sup>17</sup> The first two specifications are based on an OLS regression with and without the county-party fixed effects, respectively. The third specification incorporates the instrumental variables (IVs) for advertising, and the fourth specification allows for heterogeneous campaign effects across individual voters.

The addition of the county-party fixed effects increases the model  $R$ -squared from 0.601 in column 1 to 0.955 in column 2. Furthermore, the estimates of campaign effects decline significantly with the inclusion of the fixed effects, confirming the importance of addressing the heterogeneous political preferences across counties. The Durbin–Wu–Hausman (DWH) test (Durbin 1954, Wu 1973, Hausman 1978) is also performed to examine the model specification of treating county-party effects as fixed effects. If the unobserved county-party heterogeneity is correlated with the explanatory variables, then the fixed-effect model is consistent; otherwise, the more efficient random-effect model is preferred (Greene 2018). The results show that the random-effect model is rejected and that the fixed-effect specification is preferred ( $\chi^2(51) = 2,157.6$ ,  $p < 0.001$ ). Therefore, the subsequent analyses always include the fixed effects.

Column 3 of Table 5 presents the parameter estimates based on the instrumental variables. First, the estimates for field operations remain qualitatively similar to those in column 2. The similarity of the IV estimator with the fixed-effect estimator is expected, as the instrumental variables of DMA-level cost shifters should not covary with the number of field operations in a county. Next, with the use of instrumental variables, the estimates for both types of advertising are larger than the fixed-effect estimates. The larger IV estimates (i.e., larger than the corresponding OLS estimates) suggest that the unobserved demand shocks are negatively correlated with the changes in advertising: candidates and PACs tend to increase advertising in the contested areas in which the favorability is low, thus causing the OLS estimates to be attenuated.

To examine whether the advertising variables should be treated as endogenous, the DWH test is performed by comparing the more efficient OLS estimator with the less efficient, but consistent, IV estimator (Hausman 1978). The null hypothesis of the test is that the preferred model is the more efficient OLS estimator. After including the fixed effects and the socioeconomic variables, the DWH test results are significant for candidate advertising ( $\chi^2(1) = 54.284$ ,  $p < 0.001$ )

**Table 5.** Parameter Estimates

	(1)	(2)	(3)	(4)	
	Est (SE)	Est (SE)	Est (SE)	Est (SE)	Partisanship (SE)
Field operations	0.252*** (0.012)	0.072*** (0.006)	0.058*** (0.008)	0.078*** (0.007)	0.135*** (0.018)
Candidate advertising	0.014*** (0.001)	0.006*** (0.0004)	0.034*** (0.004)	0.034*** (0.005)	−0.019*** (0.002)
PAC advertising	0.020*** (0.001)	0.008*** (0.001)	0.018*** (0.004)	0.026*** (0.004)	0.018*** (0.002)
Year 2008	−0.033*** (0.012)	−0.059*** (0.007)	−0.112*** (0.012)	−0.121*** (0.013)	
Year 2012	−0.187*** (0.017)	−0.183*** (0.013)	−0.192*** (0.024)	−0.298*** (0.027)	
Year 2008 × Democrat	−0.053*** (0.016)	0.123*** (0.010)	0.114*** (0.012)	0.119*** (0.014)	
Year 2012 × Democrat	−0.183*** (0.022)	0.009 (0.018)	0.037 (0.032)	0.126*** (0.036)	
Intercept	−1.303*** (0.343)	0.776 (0.629)	1.415** (0.600)	1.314** (0.648)	0.251*** (0.059)
Unobserved heterogeneity (Sigma)					0.097 (0.476)
Control variables	Included	Included	Included	Included	
County-party fixed effects	No	Yes	Yes	Yes	
Instrumental variables	No	No	Yes	Yes	
Sample size	18,266	18,266	18,266	18,266	7,588
R-squared	0.601	0.955	0.943		

*Notes.* Column (1) reports the estimates of an OLS model without fixed effects, and column (2) reports estimates with fixed effects. Column (3) reports the estimates with the use of instrumental variables. In specifications (1)–(3), the dependent variable is the log ratio of the candidate vote share over the outside option. Column (4) reports the estimates of the model, including voter heterogeneity in campaign effects, in addition to the use of instrumental variables. The column labeled “Partisanship” lists the estimated difference in campaign effects between partisan and nonpartisan voters. The intercept estimate under the “Partisanship” column corresponds to the main effect of partisanship. The table reports abridged results for illustrative purposes. Table A2 in the online appendix reports the full results, including the parameter estimates for the control variables: home state advantage for presidential candidates; home state advantage for vice-presidential candidates; whether the governor is from the same party; whether the same-party governor is an incumbent; the distance to campaign headquarters; percent of African Americans; population density; age-group indicators (18–24, 45–64, 65 and above); educational attainment indicators (less than high school, high school and associate, graduate and above); median household income; unemployment rate; Gini index; median house value; dropout rate; poverty rate; number of new employment positions; number of new establishments; weekly wage; and the interaction between the party indicator and each of the control variables. Est, parameter estimate; SE, standard error.

\*\* $p < 0.05$ ; \*\*\* $p < 0.01$ .

and PAC advertising ( $\chi^2(1) = 25.945$ ,  $p < 0.001$ ), indicating that the estimators without the IVs are inconsistent for both advertising variables.

The diagnostic statistics on the relevance of our instrumental variables are as follows. The first-stage regression equations are specified following Angrist and Pischke (2008), and Shea’s partial  $R$ -squared is computed to account for the potential collinearity among multiple endogenous variables and the instruments. For each endogenous variable, Shea’s partial  $R$ -squared directly measures the correlation between the variation orthogonal to the other endogenous variables and the component of its projection on the instruments orthogonal to the projection of the other

endogenous variables on the instruments (Shea 1997). Shea’s partial  $R$ -squared reveals the relevance of the instruments in uniquely identifying each endogenous variable. Note that this is after controlling for the county-party fixed effects and all the control variables. Shea’s partial  $R$ -squared is 5.2% for candidate advertising and 5.3% for PAC advertising, indicating that the instruments have explanatory power to identify both types of advertising. The Stock and Yogo (2005) test is further conducted to test weak instruments. The minimum eigenvalue statistic from the test is 18.22, which is greater than the critical value of 10.96. Thus, the null hypothesis of weak instruments is rejected for a bias of 10%. See Table A1 in the

online appendix for the results of the first-stage diagnostic statistics.

The final specification in Table 5 incorporates voter heterogeneity. In particular, the model examines ways in which the effect of campaign activities varies with voter partisanship. The first column under specification (4) lists the parameter estimates for an average voter. The column (labeled “Partisanship”) under (4) is the estimated difference between partisan and nonpartisan voters (i.e., the interactions between the campaign effect and voter partisanship).

The advertising elasticities are computed based on the parameter estimates (0.034 for candidate advertising and 0.026 for PAC advertising). For candidate advertising, on average, a 1% increase results in a 0.023% increase in the vote share for the Republicans and a 0.026% increase for the Democrats. The elasticity for PAC advertising is 0.017% and 0.020% for the Republicans and Democrats, respectively. To benchmark these estimates with existing elasticities, Gordon and Hartmann (2013) estimate the ad elasticities (with candidate and PAC ads combined) to be 0.033% for the Republicans and 0.036% for the Democrats in the 2000 and 2004 presidential elections.<sup>18</sup> Using data from the 2010 and 2012 senatorial elections, Wang et al. (2018) estimate the elasticity of negative candidate advertising to be 0.013% for the Republicans and 0.015% for the Democrats, whereas the overall ad elasticity (including positive and negative advertising) is not significant. The ad elasticities estimated in this study fall within the mid range of existing estimates.

The parameter estimate for field operations is 0.078. It is challenging to benchmark the field-operation elasticity, as empirical studies on this topic are scarce. In one exception, Darr and Levendusky (2014) estimate the magnitude of the effect for the Democrats and identify a 1.04% increase in county-level vote share with the presence of a field office. In this study, the percentage change in vote share in response to an additional Democratic field office is 1.25% in 2008 and 1.31% in 2012.<sup>19</sup> The finding is qualitatively consistent with Darr and Levendusky’s (2014) and, thus, suggests that the estimated magnitude for field operation elasticity is robust to different model specifications (i.e., controlling for more county-level characteristics and taking the county-level partisan support into consideration).

Not surprisingly, voter partisanship has a strong main effect. Independent from the campaign effects, partisans tend to favor the candidates from their party more than do nonpartisans. Second, the interaction estimates with campaign activities are all significant, indicating that partisans and nonpartisans react differently to campaign activities. Interestingly, partisans do not always react more positively to campaign

messages, and the nature of the interaction depends on the type of campaigning. Field operations are more effective with partisan voters, whereas candidate advertising is less effective with partisans than with nonpartisans. PAC advertising, surprisingly, is different from candidate advertising and has a stronger effect on partisans.

Table 6 summarizes the campaign-effect estimates by partisanship. Field operations have a positive effect on partisan voters but a limited effect on nonpartisans. Candidate advertising has a positive effect on both partisan and nonpartisan voters, whereas the effect is larger for nonpartisans. In contrast, the opposite pattern exists for third-party-sponsored PAC advertising, with a larger effect on partisans.

Why would the effectiveness of various campaign activities differ by voter partisanship? We first discuss the difference in mechanism between field operations and advertising in general, followed by the difference between candidate advertising and PAC advertising.

The interaction between voters’ predispositions and DMP status may explain the difference between field operations and candidate advertising. When a voter encounters on-the-ground canvassing efforts by a campaign, the messages typically involve why the voter should turn out to support the focal candidate (e.g., Gerber and Green 2000a, Green et al. 2003, Wielhouwer 2003, Nickerson et al. 2006). The voter’s decision of whether to vote for his or her preferred candidate on Election Day occurs after the voter has decided on the preferred candidate from the pool of candidates. Compared with unaffiliated voters, partisan voters are likely to have established favorable opinions about their party’s candidate, and, thus, they are more likely to be at a later stage in their DMP. As a result, the partisan turnout messages delivered during field campaigning will be better received by partisan voters than by unaffiliated voters.

In contrast, existing research suggests that advertising has a limited effect on turnout (Krasno and Green 2008)

**Table 6.** Campaign Effects by Voter Partisanship

	Average	Nonpartisan	Partisan
Field operations	0.078*** (0.007)	0.011 (0.012)	0.146*** (0.011)
Candidate advertising	0.034*** (0.005)	0.043*** (0.005)	0.025*** (0.005)
PAC advertising	0.026*** (0.004)	0.017*** (0.004)	0.035*** (0.004)

*Note.* The effects are computed based on the parameter estimates from model specification (4) in Table 5.

\*\*\* $p < 0.05$ ; \*\* $p < 0.01$ .

but a positive effect on influencing voters' preferred candidate choices (Huber and Arceneaux 2007, Lovett and Peress 2015) at an earlier stage of voters' DMP. For a typical voter's process of receiving persuasive messages and responding to them, the RAS model (Zaller 1992) postulates that voters form preferences through a two-stage process: receive and accept. Table 7 lays out the framework.

In large part, there are three unique electorates in the population: those who are highly aware, those who are moderately aware, and those who are not aware at all and do not care about politics. Awareness here does not narrowly refer to being aware of a particular advertising message; rather, it means awareness of politics in a broader sense (i.e., whether people care about politics). Partisan voters, as the name implies, are people who care deeply enough about politics to have registered with a particular party. Thus, it is reasonable to assume that partisans have a higher level of political awareness than an average voter (the general public). The majority of independent voters, on the other hand, are people who are moderately aware of politics. They care enough to cast their votes on Election Day but do not identify with a particular party. Of course, some independent voters are highly aware of politics; nevertheless, partisan voters as a group are relatively more aware. Finally, some people simply do not care about politics. These people are not likely to vote in any election (about half of the entire U.S. electorate) and, thus, are not the focus of campaigns.

When a message (information) intended to persuade arrives (through advertising), highly and moderately aware people will "receive" the message—highly aware people even more so—whereas unaware people will not. For example, when seeing an advertisement on television, both highly and moderately aware people will understand its political nature and consume the message, whereas unaware people will simply ignore it. However, after receiving the message, highly aware people will not accept it if the message goes against their political predisposition (e.g., the message attacks their party's candidate). Even if the message is consistent with their political predisposition, it still will have limited influence because they are likely to have already established their preferences for the candidate, and there is no room to increase their favorability. In contrast, moderately aware people, although less likely to receive the

message, would be more open to accepting and being influenced by the information in the message. This mechanism helps explain the different effect of candidate advertising on voter types.

Regarding PAC advertisements, besides an obvious difference in sponsorship, they are also known to differ from candidate advertisements in their tone. PAC advertising is typically known for its negativity and attacking tone. Because moderately aware people (nonpartisans) have a low tolerance for negativity (Fridkin and Kenney 2011), they are less likely to receive negative or combative messages. For example, independent voters may be put off by attack advertisements and, thus, may simply ignore them. Therefore, although unaffiliated voters have more room to be persuaded (similar to candidate advertising), the negativity of PAC advertisements may create a backlash and cause nonpartisan voters to not receive the message. This leads to a weakened effect on nonpartisan voters. Partisan voters, on the other hand, are more tolerant of a negative tone and, thus, allow the PAC advertisements to still have an effect (Finkel and Geer 1998).

## 4.2. Robustness Analyses

Table 8 presents the results from alternative model specifications to test the robustness of the results.<sup>20</sup> Model 1 includes only field operations, whereas Model 2 includes only candidate and PAC advertising. Models 3 and 4 retain field operations and only one type of advertising: candidate for Model 3 and PAC for Model 4. Model 5 replaces the two original types of advertising with the combined total of candidate and PAC advertising.

Overall, the alternative models yield results that are qualitatively consistent with those of the study's main model: all three campaign activities have a significant average effect, and the effect varies with a voter's partisanship. Field operations and PAC advertising interact positively with the voter's partisanship, whereas candidate advertising interacts negatively with partisanship. When excluding one or both advertising variables (Models 1, 3, 4, and 5), the average effect of field operations is slightly overestimated, whereas the IV estimates for advertising are more robust to the removal of field operations (Model 2).

Furthermore, in Model 5, in which candidate advertising and PAC advertising are combined into one advertising variable, the coefficient estimate for an

**Table 7.** RAS Model Framework

Type of electorate	Receive message	Accept message
Highly aware (partisan)	Always	Not open to persuasion
Moderately aware (unaffiliated)	Occasionally	Open to persuasion
Unaware (do not care about politics)	Never	Open to persuasion



**Table 8.** Robustness Analyses: Alternative Models

	Model 1		Model 2		Model 3		Model 4		Model 5	
Campaign main effect	Est	SE	Est	SE	Est	SE	Est	SE	Est	SE
Field operations ( $\beta_1$ )	0.093***	0.005	–	–	0.099***	0.005	0.111***	0.006	0.114***	0.005
Candidate advertising ( $\gamma_1$ )	–	–	0.033***	0.005	0.028***	0.004	–	–	–	–
PAC advertising ( $\pi_1$ )	–	–	0.028***	0.004	–	–	0.017***	0.003	–	–
Combined advertising	–	–	–	–	–	–	–	–	0.021***	0.005
<b>Interaction with partisan</b>										
Baseline effect ( $\alpha_2$ )	0.326	0.234	0.353***	0.058	0.349***	0.056	0.381***	0.058	0.339***	0.059
Field operations ( $\beta_2$ )	0.142***	0.015	–	–	0.121***	0.016	0.217***	0.016	0.163***	0.015
Candidate advertising ( $\gamma_2$ )	–	–	–0.024***	0.002	–0.013***	0.002	–	–	–	–
PAC advertising ( $\pi_2$ )	–	–	0.020***	0.002	–	–	0.005***	0.001	–	–
Combined advertising	–	–	–	–	–	–	–	–	–0.008***	0.002
<b>Sigma (<math>\sigma</math>)</b>	0.385**	0.160	0.097	0.475	0.090	0.463	0.096	0.424	0.099	0.411
Controls	Included		Included		Included		Included		Included	
County-party fixed effects	Included		Included		Included		Included		Included	

Notes. The alternative models differ from the main model with regard to the inclusion of campaign variables. The remaining model specifications and model assumptions are kept the same. Est, parameter estimate; SE, standard error.

\*\* $p < 0.05$ ; \*\*\* $p < 0.01$ .

average voter is 0.021 ( $p < 0.01$ ), whereas the interaction between partisanship and combined advertising is  $-0.008$  (vs.  $-0.019$  for candidate advertising and 0.018 for PAC advertising in the main model). The different partisan effect of advertising between Model 5 and the main model emphasizes the importance of modeling the separate effect for candidate advertising and PAC advertising, respectively.

### 4.3. Counterfactual Analyses

This section provides results of counterfactual simulations using estimates from the main model to answer the following “what if” question: What would the election results have been if the candidates had allocated campaign resources differently?

The first counterfactual analysis quantifies the magnitude of each campaign activity. It computes the would-have-been vote results had the corresponding activity been eliminated from the campaign. To do so, we (1) set the focal activity to zero and leave the other campaign activities intact; (2) compute the predicted county-level votes for the Democrats and the Republicans, respectively; and (3) predict the winner in each state. Before discussing the results, it is worth pointing out that this counterfactual exercise is not an equilibrium analysis. The simulation does not take into consideration the competitive response or the reallocation of resources, in the sense that when a party removes or alters one activity from the campaign mix, the party’s and its rival’s other activities are kept intact. A full equilibrium analysis would require a supply-side model that solves the new equilibrium level for all the remaining activities,

given a fixed campaign budget. Such an analysis should consider the costs and competitive response, but doing so is beyond the scope of the current study. Nevertheless, the analysis here still helps compare the relative effectiveness of the various campaign activities.

The results in Table 9 highlight the importance of field operations for the Democrats. No field operations by either side would have resulted in the Republicans winning Pennsylvania and Wisconsin in 2004, Florida, Indiana, and North Carolina in 2008, and Florida in 2012. Although the final national results would have remained unchanged, the absence of field operations would have reduced the winning margin for the Democrats. In the absence of candidate advertising, the Republicans would have won New Hampshire and Wisconsin in 2004 and Indiana and North Carolina in 2008, whereas, in the 2012 election, the changes in the popular votes would not have led to different electoral votes for the two parties. The effect of field operations on electoral outcomes is more substantial than that of candidate advertising, which is consistent with the findings of existing research in a more general setting. Specifically, meta-analyses of various studies find that the elasticity of personal selling expenditures is about 0.34 (Albers et al. 2010), whereas that of advertising expenditures is 0.22 (Assmus et al. 1984). Furthermore, jointly examining a particular context of Navy enlistment, Carroll et al. (1985) find that the elasticity of a field sales force was large and significant, whereas advertising was less so.

**Table 9.** Predicted Total Electoral Votes for Counterfactual Analyses

	2004		2008		2012	
	Democratic	Republican	Democratic	Republican	Democratic	Republican
Actual	252	<b>286</b>	<b>365</b>	173	<b>332</b>	206
No field operations	221	<b>317</b>	<b>312</b>	226	<b>303</b>	235
No candidate advertising	238	<b>300</b>	<b>339</b>	199	<b>332</b>	206
No PAC advertising	253	<b>285</b>	<b>354</b>	184	<b>374</b>	164
PAC advertising rolled over to candidate advertising	253	<b>285</b>	<b>354</b>	184	<b>358</b>	180

*Notes.* For the counterfactual scenario “no field operations,” each candidate was assigned with no field offices, keeping the other campaigning activities unchanged. Similar steps were taken for the other counterfactual conditions, except for the last counterfactual exercise, where the PACs donated their advertising money to the candidate, so that PAC advertising became additional candidate advertising (respective of the relative advertising prices). The reported numbers are the total electoral votes won by each party. The predicted winner of each election is in bold.

The next question relates to PAC-sponsored advertisements. Eliminating outside advertising barely moved the needle on election results in 2004 and 2008, which is unsurprising given that the amount of PAC advertising in these elections was small and comparable between the parties. However, in the 2012 election, for which the amount of outside advertising was more sizable, eliminating PAC advertising could have helped the Democrats win Georgia, Indiana, and North Carolina. In other words, there is some evidence that the high PAC advertising spending helped the Republicans in 2012. Given that the amount of outside advertising has grown substantially in recent presidential elections, this counterfactual analysis suggests that PAC advertising could play an important role in shaping election results and, thus, is a factor that cannot be ignored in the presidential campaign mix.

Currently, super PACs are legally prohibited from directly coordinating their advertising efforts with candidates.<sup>21</sup> The next counterfactual analysis is to understand the effect of this policy (row 5 in Table 9). Specifically, PACs are made to donate their advertising money to the candidates they favor. Therefore, PAC advertising becomes zero, and candidate advertising increases. The relative prices paid by the candidate and the PACs, respectively, determine the amount of the increase.<sup>22</sup> For the 2004 and 2008 elections, when the level of PAC advertising was relatively low, donating PAC advertising expenditures to campaign advertising yielded the same state-level voting outcomes as eliminating PAC advertising from the campaign mix. In 2012, however, with the PAC spending donated to the candidates, the Democrats would have won Indiana and North Carolina. Given that the Republicans received far more PAC advertising, it may seem surprising at first glance that donated PAC ad spending benefited the Democrats more than the Republicans. The reason is, perhaps, the net effect of two factors. First, PAC advertising is, overall, more expensive than candidate advertising

(Moshary 2020). When PACs donate advertising funds to the candidates, they are trading more-expensive ads for less-expensive ones, which translates into more exposure. Second, however, the incremental advertising exposure from the candidate campaigns has diminishing returns due to saturation and fatigue, for example. The combination of these forces benefits the Democrats more than the Republicans.

The importance of field operations for the Democrats warrants a counterfactual analysis that computes the “value” of a field office. In other words, how much additional spending would have been needed to obtain the same election results if the Democrats had eliminated their field operations? The focus is on the three states in which the Democrats would have lost to the Republicans with no field operations in the 2008 election. For each of these states, we compute the optimal additional candidate advertising required by the Democrats to still win the state (again, in the absence of field operations). The values are searched through constrained optimization: the additional Democratic advertising should be the least costly, given that the Democrats would still win the state.<sup>23</sup> Table 10 shows the results. Note that the advertising amount and cost are at the DMA level to mimic the actual ad allocation process as much as possible. Again, this is not a full equilibrium analysis, as the analysis assumes that the Republicans would not adjust their campaign efforts upon observing the changes in the Democrats’ campaigns.

The results indicate that field offices were “valuable,” in the sense that, in the absence of field operations, the Obama campaign would have needed about \$3.0 million worth of additional television advertising to win Florida, \$4.0 million to win Indiana, and \$9.3 million to win North Carolina. These figures could help assign a dollar amount to an Obama field office: An office was, on average, worth about \$0.05 million (of television advertising) in Florida, \$0.22 million in Indiana, and \$0.19 million in North Carolina. It is interesting to zoom in on the comparison between

**Table 10.** Value of Democratic Field Offices in the 2008 Election

State	Actual field offices	Actual ads (\$M)	Additional ads (\$M)	Value of office (\$M)
Florida	58	7.5	2.99	0.05
Indiana	18	10.2	3.96	0.22
North Carolina	49	8.6	9.34	0.19

*Notes.* The table reports the minimum additional advertising spending that would have allowed the Democrats to win the state without field operations. The included states are those that the Democrats would have lost to the Republicans in the absence of field operations.

Florida and North Carolina. In 2008, the Obama campaign deployed a comparable scale of field operations and TV advertising in these two states. However, the above analysis shows that a field office would have been more valuable in North Carolina, as it would have been more expensive for the Obama campaign to try to replace field operations with TV advertising. What could have accounted for this difference is that the percentage of Democratic voters is higher in North Carolina than in Florida. Because field operations are more effective on partisans whereas candidate advertising is more effective on nonpartisans, for a state with higher partisan support, replacing field operations with TV advertising would be costlier and less efficient.

## 5. Conclusion

This study examines the effects of marketing through personal selling and mass-media advertising in the 2004–2012 U.S. presidential elections. By linking campaign activities to county-level vote results, the study offers a comprehensive view of the effects of various campaign activities. Distinct from extant research, this study simultaneously considers on-the-ground campaign efforts and television advertising and distinguishes between the effects of candidate and PAC advertising. Most importantly, the study examines the heterogeneous effects of campaign activities on different types of voters—partisans and nonpartisans. The results generate insights into the effectiveness of each campaign activity by voter segment. Field operations and PAC advertising are more effective with partisan voters, whereas candidate advertising is more effective with unaffiliated voters. The study’s findings can provide guidance to campaign strategists on resource allocation.

Counterfactual election results in several hypothetical scenarios show that ground campaigning played an important role for the Democratic Party in several battleground states during the 2008 and 2012 elections. In addition, replacing field operations with candidate advertising in these states (to achieve winning status) would have been quite costly.

Some of the results merit further discussion. First, it is interesting to note that candidate advertising is more effective with nonpartisan voters, whereas PAC

advertising is less effective with this segment, likely because of the difference in advertisement content. PAC advertisements typically are highly negative and tend to attack rivals rather than promote the preferred candidate. Such a negative tone may turn off unaffiliated voters, who are less tolerant of negative and attack messages in political advertisements (Fridkin and Kenney 2011). Furthermore, the finding that candidate advertising is more effective with nonpartisans also seems to suggest that there is a stronger effect on persuasion than on turnout (Huber and Arceneaux 2007, Krasno and Green 2008, Lovett and Peress 2015).

Second, the definition of field operations is worth closer examination. Field offices differ in terms of their intended target population, the efficiency of their internal organization (e.g., the data available on voters and techniques used to target and persuade them), and the primary focus of the office (i.e., get-out-the-vote vs. fundraising).<sup>24</sup> Therefore, the effect of field operations on voting outcomes could be heterogeneous across offices. Despite the importance of office heterogeneity, detailed data on how field teams operate are challenging to obtain, especially at a granular level. We acknowledge this data limitation and believe that future research can benefit from better data to more precisely examine the operations of ground campaigning.

Another issue worth discussing is the mechanism of field operations. Field campaigning in this study is largely related to partisan outreach efforts organized by the candidate’s field offices, in the form of phone calls and canvassing contacts that were meant to deliver partisan messages favoring the focal candidate. The study finds that these field operations are effective for partisans but have limited effects on nonpartisan voters. However, there are also nonpartisan-based mobilization campaigns, during which volunteers encourage general turnout without explicitly advocating a specific candidate. For these nonpartisan grassroots activities, Gerber and Green (2000a) find a larger effect with the independents than with partisans. These different results seem to suggest an interaction between voter segment and the content of canvassing messages. Because this study is restricted

to partisan canvassing only, we are unable to make inferences on nonpartisan field campaigns. This study aims to raise interest in modern partisan field operations by documenting the scale and magnitude of the effect. We hope that future research can incorporate nonpartisan field operations and validate this study's findings using alternative identification strategies.

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## Endnotes

<sup>1</sup> See <https://www.statista.com/statistics/236943/global-advertising-spending> (accessed April 2, 2020).

<sup>2</sup> Hereafter, we refer to advertising sponsored by a candidate and his or her affiliated party committee as *candidate advertising*.

<sup>3</sup> For ease of exposition, we refer to outside political groups as PACs. Unlike traditional PACs, super PACs can raise an unlimited amount of money for an election, but the spending has to be independent of any candidate or party. Hereafter, we use the terms *PAC advertising* and *outside advertising* interchangeably to refer to advertising that is not sponsored by the candidate or his or her affiliated party.

<sup>4</sup> The Wisconsin Advertising Project coded the content of the creatives for the 2004 and 2008 presidential elections for selected designated-market areas (Goldstein and Rivlin 2008). The data pattern confirms that PAC advertisements in those two elections were much more negative (i.e., using an attacking tone rather than a promoting tone) than the candidate and party advertisements. For example, in 2008, 33.1% of the advertisements from PACs used a negative tone compared with 2.7% from candidates and party committees.

<sup>5</sup> Public interest in PAC advertising remained high in the 2016 presidential election, when more than 100 organizations contributed to election advertising (see <https://www.opensecrets.org/pres16/outside-groups>). The role of PAC advertising also received considerable attention and discussion; see, for example, <https://www.bloomberg.com/politics/graphics/2016-presidential-campaign-fundraising/> and <https://www.harvardmagazine.com/2016/07/does-money-matter>.

<sup>6</sup> Hereafter, we use “market” and “county” interchangeably. There are a total of 3,144 counties and county equivalents in the United States. We exclude Alaska and Louisiana from the analysis due to data issues.

<sup>7</sup> Perhaps a better measure of the market size of a county is the voting-eligible population, which equals the VAP minus ineligible felons. This metric, however, is available only at the state level.

<sup>8</sup> We use geographic information system software to map the office addresses onto the corresponding county.

<sup>9</sup> Field operations remained a major campaign activity in the 2016 presidential election. Hillary Clinton had more than twice as many field offices as Donald Trump (489 vs. 207); see <https://fivethirtyeight.com/features/trump-clinton-field-offices>. However, the ratio between the

parties was 2.36, which is smaller than the ratio of 2.69 in the 2012 election.

<sup>10</sup> ANES responses were available only at the census-region level instead of at the county level and, thus, cannot be used as a proxy for field operations in this study. ANES materials ([www.electionstudies.org](http://www.electionstudies.org)) were based on work supported by the National Science Foundation under grant numbers SES 1444721, 2014-2017, the University of Michigan, and Stanford University.

<sup>11</sup> Because not all states require voters to declare party affiliation during registration, partisan information is available for 27 states in 2004 and 2008 and 28 states in 2012. Data come from a repository tracking of U.S. elections (see <http://uselectionatlas.org/>), where partisan numbers come from various official websites, such as those of the Secretary of State and the Office of Elections.

<sup>12</sup> Typically, a battleground state (also known as a *swing state* or a *contested state*) refers to a state in which no party is predicted to have an obvious winning margin, based on polls and election results from previous years. The contested states defined by popular outlets (e.g., Real Clear Politics, *the Washington Post*, etc.) were as follows: In 2004, the states were Arkansas, Colorado, Florida, Iowa, Maine, Michigan, Minnesota, Missouri, Nevada, New Hampshire, New Jersey, New Mexico, Ohio, Oregon, Pennsylvania, West Virginia, and Wisconsin. In 2008, they were Colorado, Florida, Indiana, Iowa, Michigan, Minnesota, Missouri, Nevada, New Hampshire, New Jersey, New Mexico, North Carolina, Ohio, Oregon, Pennsylvania, Virginia, and Wisconsin. And in 2012, they were Arizona, Colorado, Florida, Iowa, Michigan, Minnesota, Missouri, Nevada, New Hampshire, North Carolina, Ohio, Oregon, Pennsylvania, Virginia, and Wisconsin.

<sup>13</sup> According to the Federal Election Commission (FEC) advisories, super PACs cannot legally coordinate with candidates or political parties directly; nor can they donate funds to candidates.

<sup>14</sup> The results of an alternative model, which includes unobserved individual heterogeneity for each campaign effect, show negligible unobserved heterogeneity (i.e., parameter values were small and insignificant).

<sup>15</sup> States differ in terms of how independent or unaffiliated voters can participate in a state primary. In states with closed primaries, only voters affiliated with a party can vote in the party's nominating contests. However, in a number of other states, unaffiliated voters can take part in a party's primary. However, voters affiliated with the other party cannot cross over to vote. Therefore, the meaning of “unaffiliated” voters could be different in different states. The inclusion of county-party fixed effects can help address this cross-sectional difference since the requirement is at the state level and constant over time. We thank an anonymous reviewer for raising this point.

<sup>16</sup> In states with open primaries, voters do not reveal party affiliation during registration. Thus, whether partisanship data are available depends on a state's type of primary, which is determined by historical factors. Hence, the availability of partisanship is likely exogenous to the competitive level of each election. A robustness check shows that states with and without the partisan variable are not statistically different in terms of the level of the three types of campaign activities.

<sup>17</sup> Table 5 presents abridged results for simplicity of exposition. Table A2 in the online appendix shows the full results, including parameter estimates for the control variables.

<sup>18</sup> Another robustness analysis that combined the candidate advertising and PAC advertising, as done in Gordon and Hartmann (2013), shows that the advertising elasticity is 0.024 for the Republicans and 0.028 for the Democrats. Note that Gordon and Hartmann (2013) reconstructed the advertising GRPs based on price, whereas this study uses the actual GRPs.



<sup>19</sup>The addition of one field office can be understood as a proxy for the average number of voter contacts associated with a typical field office. The fact that the number of field offices is highly correlated with the number of self-reported voter contacts (see Section 2.2) suggests that there may be a narrow distribution for the number of voter contacts behind each field office. We thank an anonymous reviewer for this comment.

<sup>20</sup>We thank an anonymous reviewer for suggesting these robustness checks.

<sup>21</sup>The detailed regulations are on the FEC website at <https://www.fec.gov/help-candidates-and-committees/filing-pac-reports/registering-super-pac/>.

<sup>22</sup>The following steps are conducted for this analysis. First, for each party in each DMA, we use the total amount of advertising spending and GRPs to compute the average advertising prices paid by the candidate and the PACs, respectively. Then, with the relative prices and the total amount of PAC advertising spending, we compute the counterfactual amount (in GRPs) had the money been donated to the candidate.

<sup>23</sup>The detailed procedure of this counterfactual exercise is as follows: (1) we set the field offices to zero; (2) we set the choice variable as the additional DMA-level candidate advertising GRPs for the Democrats; (3) the DMA-level GRPs are mapped to the county level; (4) we estimate the county-level new vote counts based on the new campaign variables for the Democrats (assuming that the Republicans do not readjust their campaigns); and (5) the state-level voting results are realized. The values in (2) are searched by minimizing the additional total advertising spending under the constraint that the Democrats still win the state in step (5).

<sup>24</sup>In the same vein, there may be reasons to suspect that field offices, even from the same party, may have a heterogeneous effect due to operational differences. We thank an anonymous reviewer for this comment.

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