Essays on Economic Incentives in the Political Market

by

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# Abstract

The following essays examine economic incentives in the political market. Chapter 1 asks if U.S. presidential candidates are leaving dollars on the sidewalk by foregoing televised advertising in uncontested states. Chapter 2 studies the supply side incentives for going negative in U.S. electoral contests. The third chapter investigates the potential local economic benefits that accrue to a state hosting a Presidential primary race.

**Chapter 1**

Presidential candidates in the United States do not intentionally advertise in states without rigorous competition for electoral votes. However, in some areas of non-competitive states, media markets overlap with battleground states, exposing these regions to political ads. These spillover advertisements allow us to examine the relationship between advertisements and individual campaign contributions, with data from the Wisconsin Advertising Project and the Federal Elections Commission. Using propensity score matching within uncontested states, we find that 2008 aggregate giving in zip codes exposed to political ads was approximately $6,800 (31.3% of mean contributions) more than in similar zip codes without advertisements.

**Chapter 2**

Why is negative advertising such a prominent feature of competition in the US political market? We hypothesize that the typical two-candidate race provides stronger incentives for going negative relative to non-duopoly contests: when the number of competitors

is greater than two, airing negative ads creates positive externalities for opponents that are not the object of the attack. We investigate the empirical relevance of the fewness of competitors in explaining the volume of negative advertising. Using a cross section of US non-Presidential primary races, we find that duopolies are twice as likely to air a negative ad when compared to non-duopolies.

**Chapter 3**

The nature of U.S. Presidential primary elections provides incentives for candidates to campaign sequentially. Variation in the duration of primaries over election cycles and changes to the relative ordering of states allow states to be reached in some election cycles and not others. Exploiting this variation in receipt of campaign spending, we construct a novel dataset of state primary information from 1976-2008, quarterly state income in different sectors, and campaign expenditures to determine if hosting a Presidential primary increases income. We find that the exogenous spending during primary campaigns increases income in the hosting state; this effect is largest in the accommodations sector.

# Contents

# Chapter 1

### Dollars on the Sidewalk: Should U.S. Presidential Candidates Advertise in Uncontested States? (with Sarah Niebler)

## I. Motivation

Between 2004 and 2008, U.S. presidential candidates and political parties spent over $750 million on televised campaign advertising in an effort to influence the outcome of the general election. However, because of the structure of the American electoral system, none of these advertisements were aired in five of the ten largest media markets - markets covering approximately 43 million voting-age individuals.[1] The goal of presidential candidates is not to maximize their share of the popular vote, but instead to win the majority of Electoral College votes, making it unnecessary, or even illogical, to advertise and campaign in states that are not competitive in the general election. For example, in 2004, Senator Kerry (D) won New York by 18 percentage points and President Bush (R) carried Texas by 23 points. In 2008, Senator Obama (D) carried New York by 27 points, while Senator McCain (R) won Texas by 15 points. Because these states were not competitive, no campaigning occurred. Despite the fact that New York, Dallas, and Houston are three of the largest media markets in the country (in terms of population), no candidates aired

[1] New York, Los Angeles, Dallas, San Francisco, or Houston

campaign advertisements in these areas. The winner-take-all system by state makes campaigning logical only in “battleground," or competitive states.[2]

However, if ads provide candidates with more than just votes, politicians may be overlooking a potential fundraising opportunity. For instance, if exposure to campaign advertising leads to increased monetary contributions to political candidates, then by not advertising in these non-competitive states, presidential candidates may be leaving “dollars on the sidewalk" that could be used to help them win elections.[3]

Economists have long studied the role of televised advertising in the product market, asking what advertisements do. Ackerberg (2001; 2003) finds that ads play an informative role in consumers' decisions, making consumers more likely to buy products they have never tried before. He finds no prestige effect, where celebrities persuasively promote a product, on viewers' consumption choices. In addition, Hertzendorf (1993) finds that ads are a signal of quality, where when a product airs on television, consumers assume that the firm is of a certain, high-quality type and are thus more likely to purchase the good. This study continues to explore the role of televised advertisements but focuses instead on the political market.

In the realm of political advertising, previous scholars have concentrated on the effect of advertising on turnout (Franz et al. 2008; Krasno and Green 2008; Lau et al. 2007; Gordon and Hartmann 2010; Shacar and Nalebuff 1999; Coate and Conlin 2004) and vote choice (Johnston et al. 2004; Huber and Arceneaux 2007; Franz and Ridout 2010), as this is the way consumers “purchase" a politician.[4] In a working paper, Lovett and Peress (2010) take a marketing approach and model the optimal targeting behavior for political ads and

[2]Stromberg (2008) creates a model of where politicians should campaign to satisfy the electoral college and maximize vote share, and his equilibrium predictions match politicians' actual campaign schedules.

[3]See Gerber (1998), Levitt (1994), and Stratmann (2009) for more on the effect of campaign spending on election outcomes.

[4]On an even broader scale, DellaVigna and Kaplan (2007) and Gentzkow (2006) study the effects of media slant and television entry respectively on voter turnout.

compare this to what politicians actually do. They find that politicians' advertisements serve a persuasive role, and advertisements should (and do) appear on shows that attract median voters who are likely to turn out. However, Ackerberg's "informative" effect of advertising may solicit "consumption" of the politician's product long before election day. For instance, if an individual wants to contribute to the candidate's campaign, he can do this at any point in the election (up to the capped limit). Instead of focusing on individuals' decisions to turn out to the polls or vote for a specific candidate, this study explores the possibility that advertisements induce campaign contributions. We are the first to examine the relationship between campaign advertising and monetary contributions to presidential candidates and national parties.

This paper uses novel data, combining Wisconsin Advertising Project data (WiscAds) on televised campaign advertisements and Federal Election Commissions (FEC) data on individual campaign contributions to determine the financial returns to television advertisements in uncontested states. Our data allow us to use variation in advertisements at the media-market level and contributions data at the zip-code level to determine how people in different zip codes differ in terms of donations.[5]

We focus our analysis on non-competitive states, as there are other campaign events, such as speeches by candidates, campaign offices, and rallies in battleground states that we do not have adequate information on and cannot control for. While there is no intentional advertising in non-competitive states, some areas of these states receive spillover advertisements from competitive states, as the boundaries of media markets do not align directly with state borders. Huber and Arceneaux (2007) argue that including battleground states in a study of campaign strategy introduces endogeneity, but by focusing only zip codes within non-competitive states, we are able to eliminate this bias.[6] In ad-

[5]Prior to this paper, research on campaign effects was concentrated at the county (Franz et al. 2008), or even media-zone level (Krasno and Green 2008).

[6] While Huber and Arceneaux (2007) consider the effects of television advertising in only uncontested

dition, we recognize that all areas of uncontested states that receive spillover ads (the treatment zip codes) may have characteristics that are intrinsically different than those areas in uncontested states that did not (the control zip codes). To address this, first, we only compare people in exposed and unexposed zip codes within an uncontested state, as this holds an electoral environment (i.e., state partisanship, number of electoral votes, etc.) constant. Second, realizing that comparing zip codes in Chicago, IL (who receive spillover ads), for example, to zip codes in Rockford, IL (that do not receive spillover ads) may be making an inappropriate comparison, we employ propensity score matching. This way, we match treated zip codes to observationally similar control zip codes in the same uncontested state. We remove all zip codes without a nearest match.

We also test that the effect is not specific to 2008, including data from the 2004 Presidential Election to determine if people in zip codes in uncontested states who received ads in one election year and not the other donated more in the year they saw ads. Finally, this paper provides sensitivity analysis to account for the timing of the election. We want to ensure that the timing of the election is not simultaneously explaining rises in ads and contributions. Thus, we create a monthly panel of zip codes that received ads at some point in the election to determine the effects of increases in ads, controlling for the month of the election and including zip code level fixed effects.

We find that aggregate giving in zip codes exposed to advertising was, on average, $6,800 (or a third of mean contributions) more than comparable zip codes that were not exposed to ads. In addition, a 10% increase in monthly spillover ads yields approximately a 0.4% increase in aggregate monthly zip code giving. These findings are not specific to 2008: the effect is similar in 2004 and robust to the inclusion of zip-code level fixed effects. While we expect that in the product market, firms are optimally advertising to maximize

states, they do so by relying on self-reported survey measures of the candidates respondents voted for. We rely solely on observational data in our study.

their profit levels, we ultimately conclude that overlooking uncontested states may not be an optimal advertising strategy for presidential candidates.[7]

In Section II, we explain why ads may generate giving. Section III describes the identification strategy and Section IV describes the data. Section V explains the main estimation procedure along with results, and Section VI displays refinements to the main effect. Section VII includes the strategic implications of the effect, and Section VIII concludes.

## II. Individuals' Decisions to Contribute

Since 2000, over $1.13 billion has been raised through individual donations for presidential candidates in general elections (FEC 2010). 2008 marked the first year that a presidential candidate rejected federal matching funds and continued to raise money from individual contributions throughout the general election campaign. In doing so, throughout the course of the entire campaign, Senator Obama raised nearly $656 million in individual contributions, which comprised 88% of all funds raised from June through November (OpenSecrets.org 2010). Even though Senator McCain accepted federal matching funds, 54% of his contributions still came from individual donations, amounting to $199 million (OpenSecrets.org 2010). These dollar amounts and percentages indicate the importance of individual-level contributions and demonstrate that they are an integral part of presidential general election campaigns. While other papers (Snyder 1990; Ansolabehere et al. 2003) focus on contributions from Political Action Committees (PACs) and corporations, the literature involving individual-level contributions is sparse.

Consistent with Ansolabehere et al. (2003), we assume that donating to a campaign directly enters a giver's utility function. We posit that ads provide an informative mech-

[7]This paper does not investigate the strategic interaction of party advertising, and thus only finds the partial equilibrium effect of advertising on campaign contributions.

anism, teaching viewers something about the politician.[8] Without having to seek additional information, someone watching television can quickly learn something about the candidates running for office and perceive himself to be more informed about the election. The idea that short political videos are informative for viewers is not new to this study. Benjamin and Shapiro (2009) find suggestive evidence in an experimental context that individuals previously unaware about political candidates can predict 20% of the variance in electoral outcomes by simply watching 10 second silent clips of the candidates' debates. They posit that a large factor in indviduals' abilities to predict the winners lies in observing characteristics such as likeability and attractiveness.[9] Thus, we suggest that the information individuals receive from advertisements is very broad and not necessarily directly related to the policy preferences of the candidate. Instead, information simply serves as a resource and individuals with more information are more likely to participate in elections (Brady et al. 1995).

In addition, Anand and Shachar (2011) find that advertisements serve as a matching device to provide consumers with the necessary information to choose the correct product for their tastes and preferences. We expect that political ads serve a similar matching purpose for politicians and contributors. In particular, information reduces uncertainty and according to Alvarez (1998), people tend not to participate in politics if they are uncertain about the candidates running. Thus, we expect that by reducing the fixed cost of obtaining information about candidates, ads increase an individual's probability of contributing to a political campaign.

Unlike the relationship between advertising and voter turnout, the relationship between seeing an advertisement and contributing to a campaign can be immediate. After an ad airs, an individual may be enthusiastic about a candidate and prepared to vote for

[8] See Ackerberg (2001; 2003).

[9] This study shows 10-second clips of gubernatorial debates to experimental audiences completely unaware about these candidates, and asked them to determine who won the election.

him. Unfortunately, this individual still must wait until November to actually cast his vote. By then, some of this enthusiasm may dwindle. Contributing, however, can be thought of as a consumption good, where an individual can donate as soon as he experiences excitement for a candidate.

# III. Identification

To estimate the effects of advertisements on contributions, we focus our analysis on people in states that were not competitive throughout the presidential general election. The analysis exploits the fact that politicians do not outwardly advertise in non-battleground states. Figure 1.1 shows where U.S. presidential candidates and political parties advertised during the 2008 general election campaign. States that were competitive throughout the general election campaign, like Florida and Ohio, were inundated with ads; every part of the state received advertising. In states that were not competitive, like New York and Texas, only very small portions of the state received advertising; this is because of the incongruence of media market and state boundaries. Since borders of media markets do not directly align with borders of states, some areas of non-competitive states receive spillover advertisements from competitive states. For example, areas of northeastern New York receive spillover ads from Vermont and New Hampshire, while areas of northern and western Texas receive spillover ads from New Mexico. These “accidental" advertisements in non-competitive states provide us with the ability to isolate and estimate the effect of campaign advertising on campaign contributions.

Figure 1.2 shows advertising volume as a function of competitiveness in markets that are fully contained within one state.[10] The figure shows that markets within states where the Repbulican and Democratic candidates predicted probabilities' of winning never fell

[10]We define our specific measure of competitiveness in Section IV.

below 10 percentage points received no advertising in 2008. Markets fully contained within contested states (those where the leading candidates were within 10 percentage points of one another at some point) saw between 1,000 and 22,000 advertisements over the election cycle.

While we expect a similar relationship between television advertising and campaign contributions also exists in battleground states, we limit our empirical work to non-competitive states. In battleground states, we face a problem with omitted variable bias, as we cannot control for critical campaign activity, such as locations of speeches made by the candidates, extensive get-out-the-vote campaigns, rallies, and other unobserved activity that could also encourage contributions. This makes it difficult to isolate the effects of advertising in determining an individual's level of contributions in states that received a lot of campaign activity. By limiting our analyses to non-competitive states, we are able to isolate the effect of television advertising from that of other campaign activities.[11]

Figure 1.3 further highlights the identification strategy used throughout this paper, using Illinois as an example. The gray areas on the map indicate places that received at least some television advertising during the 2008 presidential general election campaign. Throughout the race, Illinois was never considered a battleground state. As it was Senator Obama's home state, the Democratic candidate was predicted to win (and ultimately did carry) the state by a large margin. While neither presidential candidate intentionally advertised in Illinois media markets, several of the surrounding states - Indiana, Iowa, and Missouri - were competitive and received television advertising from both candidates throughout the election. Again, since media market borders do not align with state borders, individuals living in parts of Illinois still saw a significant level of advertising. People living in southwestern Illinois saw ads aired in the St. Louis media market; people

[11] Huber and Arceneaux (2007) make this point in their study of the persuasive effects of television advertising.

living in southeastern Illinois saw ads aired in the Terre Haute media market, and individuals living in northwest Illinois saw ads aired in the Davenport media market. Voters in Chicago saw television advertisements because the Chicago media market also covers northwest Indiana. However, individuals living in media markets completely contained in Illinois, such as Champaign, Peoria, and Rockford, saw no advertisements. This is consistent with the incentives of candidates; no ads were aired in the three markets fully contained in Illinois, while all markets that overlapped with competitive states (IA, IN, MO) received television advertisements.

# IV. Data Description

For contributions data, we rely on the Federal Election Commission's (FEC) individual contributions file. This file includes all contributions greater than $200 that were raised during the entire two-year election cycle (for example, 2007-2008 for the 2008 presidential election).[12] As the FEC does not require the reporting of campaign contributions less than $200, one limitation of this study is that we are unable to account for all the money raised by the candidates and parties.

From the FEC database, we examined only the national party committee contributions and the contributions assigned to each of the two major-party candidates in the 2004 and 2008 presidential election years.[13] We include all contributions aimed at the general election campaign; for 2008, that was any contributions reported from June 1 to Election Day. For the 2004 campaign, we extended the time period and examined contributions

[12]The maximum "hard money" contribution is now indexed to inflation. In 2004, after the passage of the Bipartisan Campaign Reform Act (BCRA), the contribution limit to candidates was raised to $2,000. In 2008, the amount increased again, to $2,300. Also, in 2004, individuals were permitted to contribute $25,000 to the national party committees and in 2008, that amount increased to $28,500 (FEC 2010).

[13]This is the same approach Mutz (1995) took in her study of the influence of horse-race media coverage on presidential contributions.

reported between March 1 and Election Day because both the Republican and Democratic presidential nominating campaign wrapped up quickly in 2004.

Because the individual-level FEC data do not enable us to control for important covariates such as income and ethnicity, we aggregate the individual contribution data to the zip code level. At this unit of analysis, we obtain demographic variables from the 2000 Census, such as population, population density, age, race, education, and income.[14] We also obtain information on all populated zip codes in the US in order to determine in which zip codes no one gave. Using zip code as the unit of analysis is a significant improvement over previous work (studying advertisements and turnout) that use county or higher levels of aggregation. Zip codes within the same county can be expected to differ greatly in their campaign contributions. For example, within Los Angeles County, there are zip codes with extremely high per capita incomes (Beverly Hills) and zip codes with much lower per capita incomes (Compton). Since we do not have information on individuals that did not give (i.e. a list of all individuals, allowing us to have people give $0), the zip code is the smallest unit of analysis at which we can reliably study campaign contributions. In addition, because the Census provides us with a comprehensive list of all populated zip codes in the United States, when merged with the FEC data, we are able to determine in which zip codes no one contributed money to the candidates or national party committees. This way, when we perform our analysis, we are not restricted to models that look only at zip codes that contain "givers."

For campaign activities, we utilized the Wisconsin Advertising Project's (WiscAds) data that tracks televised campaign advertisements. WiscAds has recorded all airings of candidate, party, and group advertisements during presidential campaign elections since 2000. We limit the time frame to the same period covered by the FEC data, meaning

[14] We choose population instead of voting age population, since legally, people younger than 18 are permitted to contribute to a political campaign. However, the correlation between voting-age population and population is 0.996.

we are focusing specifically on the relationship between contributions and advertising during the general election cycle of the past two presidential elections. Throughout the paper, we use some measure of the number of advertisements aired by the presidential candidates and political parties.[15] Each year of the WiscAds data, however, has a different number of media markets included: WiscAds tracked the largest 100 media markets in 2004 (or 85% of the U.S. population), but all 210 U.S. media markets in 2008. We focus our analysis on 2008, using 2004 data to verify that 2008 was not an anomaly, and include one specification that aggregates 2004 and 2008 data, using the data available for both years (i.e., the largest 100 media markets).[16]

To determine whether or not a state was competitive over the course of the general election, we use polling data and prediction markets. We first examine Intrade Prediction Market data to determine if each state's election was competitive throughout the 2008 Presidential cycle. A state is considered competitive if the predicted probability of the Democratic candidate winning was within ten percentage points of the predicted probability of the Republican candidate winning at any point during the general election campaign.[17] Prediction markets provide an average estimate of the probability that an event occurs, and these predicted probabilities are based on beliefs (Wolfers and Zitzewitz 2006; 2004). These give us a reliable measure of the competitiveness of a given state for each month of the election, giving a consistent measure for each state and each month of the

[15]Other research uses gross ratings points (GRPs) as the measure of advertising. However, GRPs are a survey-based measure of how many people may have seen a particular program or advertisement (Calame (2007); see also Franz et al. (2008)). Airings are observed.

[16]We use the general election campaign for this paper because the incentives for advertising during the primary election are quite different than they are for the general election. In the primaries, the timing of contests and the rules pertaining to the allocation of delegates drive advertising. This means there are fewer accidental spillover markets that receive advertising.

[17]This definition is robust to different specifications, including marking only the closest 15 states as competitive and both decreasing and increasing the threshold by 5 percentage points. Ten percentage points, in the data, seemed to most clearly mark states that had no advertising from states with outward advertising, and hence we focus on this benchmark.

probability that each candidate will win the electoral votes in a state.[18]

As a reliability check, we also look at polling data, as obtained from Pollster.com to determine whether the Democratic and Republican candidates were ever within 10 percentage points of one another in each state. Using polling data to label a state as competitive or not is logical because it mirrors the way that politicians determine whether or not they are competitive in a particular state. The measure from Pollster.com labels more states as competitive than the Intrade prediction markets do, and is somewhat more volatile. One cautionary note about the polling data is that the number of polls varies dramatically by state. For example, in 2008, there were over 100 polls conducted in Pennsylvania, approximately 75 of which were taken after the Pennsylvania primary was over. In contrast, there were just 11 state-wide surveys conducted in Utah, all of which were following the Utah primaries. The measures of competitiveness, however, are comparable, so for our purposes, we used the Intrade measure. Unless specified otherwise, our results are robust to a competitiveness measure based on polling data.[19] A list of all states that are considered non-competitive is included in Appendix A.

Table 1.1 displays summary statistics of candidate, party, and total contributions for 2008 in both competitive and non-competitive states. Although the caps on contributions to the national parties (RNC and DNC) are less restrictive than the caps on contributions to individual candidates, dollars contributed to candidates greatly exceed contributions to committees. It is important to point out that in cases where candidates accepted federal funding, such as Senator McCain in 2008, contributions could still be made to the Republican National Committee (RNC) in support of his campaign expenses, so these two

[18]Malhotra and Snowberg (2010) and Snowberg et al. (2007) also use the predicted probabilities in prediction markets to study political behavior. The former examines how primary and caucus results affect a candidates chances in the general election, and the latter investigates the increase in financial fluctuations preceding a presidential election based on beliefs of which candidate win a close presidential election.

[19]Our competitiveness measures are also consistent with the Cook Report (`http://cookpolitical.com/`, a non-partisan newsletter that lists battleground and uncontested states in each election) with four exceptions. However, when we drop those states from our analysis, our results do not change.

“goods" - contributing to a candidate and contributing to a committee - can be thought of as substitutes.[20]

Table 1.2 shows the distribution of contributions in both competitive and non-competitive states by zip code. In all locations, the median contribution is significantly less than the mean, meaning that many zip codes contain no contributors, and over half of those that do, contributors only give small amounts.[21] Even the 75th percentile of contributions is significantly lower than the mean contribution, so it is clear that the majority of dollars contributed are coming from individuals in zip codes that are in the top 95 percent of the contributions distribution. In the analysis that follows, we examine both zip codes with average contributing patterns as well as zip codes with a large amounts of individual giving.

## V. Propensity Score Estimation and Results

Several concerns exist when estimating the effects of spillover advertisements on campaign contributions. Fundamentally, we want to ensure that the zip codes we compare are as similar as they can be, based on demographic characteristics like population density, per capita income, and race. For example, looking at Figure 1.3, we do not want to compare zip codes in Chicago, IL to zip codes in Champaign, IL, unless we have some reason to believe those zip codes are similar. Instead, we want our counterfactual to capture the level of campaign contributions from zip codes in the Chicago media market had those zip codes not been exposed to any televised advertisements.[22] Given this objec-

[20] We do, in fact, see an increase in contributions to the RNC post-September, as Senator McCain could no longer accept contributions in his name. We did not see this same substitution pattern in Senator Obama’s contributions.

[21] Or, at the zip code level, this means that a fewer number of people may be contributing.

[22] As concern may arise that Chicago is intrinsically different than the rest of the sample, because it was the hometown of Senator Obama, we replicate all analysis omitting this media zone and find similar results.

tive, we employ propensity score matching to pair like zip codes based on observable characteristics and estimate the effect of being “treated" with ads. Our treatment level is 1,000 ads, which is a low level of ads that are aired in competitive states.[23] The analysis takes each “treated" zip code, pairs it with the most similar zip codes in observables, and computes the average treatment effect on the treated zip codes.[24]

Within the matching framework, we use both kernel and nearest-neighbor specifications to pair treated and untreated zip codes based on density, median household income, percent of African Americans, percent of Hispanics, and percent of college graduates.[25,26] We calculate the propensity score based on the logit specification with state fixed effects shown in Equation 1.1.[27] We do our matching with replacement, allowing two “treated" zip codes to have the same zip code as the closest “control." We compute our standard errors based on bootstrapping methods.[28] Our empirical specification is in Equation 1.1 below.

$$Prob(Treatment_{z,s} = 1 | \boldsymbol{X_{z,s}}, \delta_s) = \Phi(\boldsymbol{X'_{z,s}}\beta + \delta_s) \tag{1.1}$$

$$\boldsymbol{X}_{z,s} \equiv \text{Median Household Income, Percent Hispanic, Percent African American, Percent of College Graduates, Population Density}$$

[23] If we increase or decrease this treatment threshold by 20%, the results remain consistent.

[24] Mattei and Bia (2008) have developed a propensity score estimator for continuous treatments. However, we opt to use a binary treatment, in favor of a multi-level treatment since we restrict matches to be within a state. In some states, there is only one spillover media zone, and thus, only one intensity of treatment in that state. For instance, NJ only receives spillover ads via the Philadelphia media market, and thus have a level of treatment in this media zone only.

[25] See Rosenbaum and Rubin (1983), Rosenbaum and Rubin (1985) for more on matching.

[26] While we would ideally like to match on political variables, specifically voter turnout and levels of political interest, this information is not comprehensively available at the zip code level.

[27] Doing this results in dropping all non-competitive states that received no spillover advertisements. Results from the logit are presented in Appendix B.

[28] However, Abadie and Imbens (2008) find that bootstrapping gives incorrect standard errors with nearest-neighbor matching, so linear matching methods are used in Appendix B to confirm our results.

$Treatment_{z,s} \equiv$ Dummy for receiving ads

$\delta_s \equiv$ State fixed effects

To summarize, we pair zip codes within states that are alike in observable characteristics. For the nearest-neighbor estimation, we take an average of the nearest (up to) 20 matches.[29] For the kernel specification, we take a weighted average from the distribution of propensity scores, using the normal distribution,[30] which gives a weight approaching zero to zip codes that are not very similar in observables to the "treated" zip code.[31] Matching within state compares zip codes in Davenport, IL to zip codes in Champaign, IL, allowing rural areas with lower population densities to be compared to other rural areas, and dropping the treated zip codes that have no matches in observable variables. This specification enables us to pair each zip code receiving spillover ads with its most similar controls in the state in order to conclude how much people in a given zip code would have contributed had they received no televised advertisements.[32]

There are several limitations to this empirical specification. First, we assume that the assignment of treatment is "strongly ignorable" given the observables from Equation 1.1.[33] This means that people are randomly assigned into treatment and control groups conditional on observables. For example, we assume Hispanics who select to live in urban areas close to the border are equivalent to those that choose to live in urban areas closer to the center of the state. In addition, we assume that local radio and local news

[29] We also set a caliper of 0.0001 standard deviations in our main nearest-neighbor specification, removing all zip codes that do not come within the caliper of matching from the estimation entirely. In Appendix B, we show results for nearest neighbor with different calipers.

[30] The results are robust to instead using an Epanechnikov kernel, as is shown in Appendix B.

[31] Since all matching occurs within states, balancing reports are done by state. However, an overall balance report is available in Appendix B. State-by-state balancing reports are available upon request.

[32] If we create a placebo effect and match two zip codes within an uncontested state that both received no advertisements, we find the difference in contributions to be effectively zero.

[33] See Rosenbaum and Rubin (1983) for more on strong ignorability.

coverage of the national election is similar across treatment and control groups. In general, we think this assumption is valid since news on broadcast networks is more likely to cover local events, while cable news covers the national election and coverage is consistent across markets. However, the assumption will be violated if a Presidential candidate visits the competitive state. If local news covers the event in a spillover market, people in the uncontested spillover area see this on a television program, and they choose to contribute based on this coverage.[34] We do not think this concern is likely to be empirically important, as candidates are more likely to visit areas centrally located within a competitive state to best use the Presidential candidate's time. This way, candidates visit areas that will attract the maximum number of swing voters.

Table 1.3 shows results from the propensity score matching, using both the kernel and nearest neighbor estimates. We find that the average treatment effect on the treated (ATT) of receiving ads for people in zip codes in uncontested states, relative to not receiving ads in observationally similar zip codes in the same state, is between $6,800 and $7,200 for the 2008 general election cycle. When we compare this to the mean contributions level in zip codes in non-competitive states, this is approximately a third of mean contributions of $21,816 in both specifications.[35] In other words, individuals in zip codes in non-competitive states that received accidental spillover advertisements contributed, on average, $6,800 more than did individuals in zip codes in non-competitive states that did not receive any television advertisements.

A significant benefit of aggregating the data to the zip-code level is our ability to include all zip codes where individuals did not give. However, this makes it important to look not only at the average effect, but at the distribution of effects overall. The bot-

[34] We find that most visits from candidates do not occur at the same time as the maximum level of advertising, and we estimate the correlation between the level of advertisements and dollars contributed in the following section.

[35] In all comparisons to means that follow, we compute the sample mean in the cut of the data analyzed.

tom half of Table 1.3 displays propensity matching results, where we focus on the top 10 and 25 percent of the effects distribution. We see that the median effect is disproportionately smaller than the average effect, as expected since we include zip codes that do not give in this specification. While the 75th percentile is slightly smaller than the mean effect, the 90th percentile is significantly larger than the mean. Thus, we are interested in determining what factors distinguish the zip codes with the largest effect sizes. Table 1.4 characterizes the observable differences between treated zip codes with large effects (above the 90th percentile) and treated zip codes with smaller effects (below the 90th percentile.) Even though we matched on observables for our counterfactual, we still find that when comparing zip codes similar in income and population density, the dense markets with high median household incomes have the strongest effect sizes (i.e. markets like DC and Chicago), probably because they have the largest pool of “givers" who are responsive to political ads.[36]

# VI. Refinements

There are two additional concerns that we address in this section in order to ensure that the propensity score matching results are robust. First, we validate that the relationship we find is not specific to the 2008 election. Second, we investigate the timing of the election cycle, using advertisements as a continuous variable. All of our results are also robust to dropping all zip codes within counties reporting more than 10% of the population commuting to different states from the Census' ACS. This results in dropping 1,064 zip codes, primarily those in the Philadelphia, St. Louis, and Reno media markets, where more than 10% of commuters travel from uncontested to contested states to work.

[36]We are also careful to ensure that the top of the distribution is balanced in our propensity score estimation, and not just the mean values.

## Beyond 2008?

Since we previously focused on the effects of advertising on dollars contributed during the 2008 presidential general election, we want to ensure that these results are not unique to 2008. Specifically, one might be concerned that results are driven by Senator Obama's record-setting fundraising efforts (and rejection of federal matching money).

This specification addresses the difference in aggregate zip code giving in a year the people within a zip code received ads, when compared to a year when these same individuals did not. Including data from both the 2004 and 2008 presidential general elections, this specification allows us to identify the effect of being "treated" on a single zip code, as is shown in Equation 1.2. The identification of $\beta_1$ comes from zip codes that received spillover ads in one election cycle but not the other, based on receiving ads from a bordering state in one election and not the other.[37] For example, states like Indiana and Virginia were competitive in 2008 but not in 2004, which results in zip codes in Illinois and Maryland (non-competitive states in both 2004 and 2008) receiving spillover ads in one election cycle, but not the other. Arkansas and Washington were competitive in 2004 and not in 2008, resulting in spillover ads in Idaho and Tennessee respectively in 2004, but not in 2008.[38] This parameter is identified via 2,096 zip codes (4,192 observations) that flip from "treated" to "untreated" or vice versa over the two election cycles. Throughout, we are careful to cluster our standard errors at the media zone level, as errors may be correlated geographically. This is an important robustness check to ensure that the effect we find is not merely a case study of the 2008 election. The specific empirical model is shown in Equation 1.2.

[37] The representativeness of this sample to the entire set of uncontested states is included in Appendix A.

[38] A full list of states where we find cases of flipped "treatment" is included in Appendix A, along with figures depicting these markets geographically.

$$Cont_{z,y} = \beta_0 + \beta_1 Treatment_{z,y} + \beta_2 Y08_y + \delta_z + \eta_{z,y} \tag{1.2}$$

$$\begin{aligned} Cont_{z,y} &\equiv \text{Contributions in zip code z in year y} \\ Treatment_{z,y} &\equiv \text{Zip code z in year y received ads} \\ Y08_y &\equiv \text{Dummy for 2008} \end{aligned}$$

We again find a significant, positive effect between television advertising and campaign contributions, as is shown in Table 1.5. When “treated" with ads, in either 2004 or 2008, aggregate zip code contributions were on average, $9,369 more than when they were not “treated." This result is slightly larger in magnitude than our previous results using the matching framework, and the dollar amount corresponds to 27% of mean contributions. Thus, even when using two years of data, we still find that being exposed to ads increases aggregate contributions.

These results presented in Table 1.5 also indicate that individuals contributed about $14,000 more in each zip code in 2008 as compared to 2004. We posit two reasons for the stronger relationship in 2008. First, as mentioned earlier, Senator Obama raised a record level of contributions, resulting in a greater level of dollars contributed in 2008; the larger dollar amount raised could contribute to a stronger effect. Second, in 2004, the Republican candidate (President George W. Bush) was an incumbent; it is likely that advertisements lead to diminished contributions as the candidate is a known entity. Again, we suspect that advertisements are, at least in part, an information shortcut about the candidate. If the electorate already knows a lot about the candidate, because he or she is an incumbent, television advertisements may only provide new information about the current status of

the race. In other words, potential campaign donors were not learning anything new about President Bush in 2004 when they saw television ads, though they may still have been learning about Senator Kerry.

We now turn to one final specification, designed to test whether the effects of television advertising on campaign contributions persist when we consider the timing of the election cycle, as well as the level of advertising.

## The Timing Issue: Monthly Panel of Zip Codes, 2008

While we argue that the demographics we employ are reasonable observables on which to match, we validate this with an additional specification designed to overcome the potential problem of "hidden bias" in assignment to the treatment or control group. For instance, we may be concerned that zip codes receiving spillover ads may differ in terms of past political participation, which we do not have information on at the zip code level. To ensure that such unobservables are not driving our results, we propose an additional model including monthly variation in ads and contributions, which includes zip code level fixed effects to control for any time-invariant unobservables at the zip code level.

In addition, this specification has the benefit of allowing us to examine the timing between advertisements and contributions. When testing the effects of advertising on variables like voter turnout and vote choice, the decision of whether to vote or for whom to vote necessarily comes after the advertising occurs. Campaign contributions are different. Individuals might see television ads and immediately decide to contribute to the campaign; they do not have to wait until Election Day to act. Using a panel of zip codes throughout the 2008 Presidential general election, we exploit the timing of ads and contributions, focusing on monthly variation in both variables.

We want to show that cumulative ads from time $t_0$ through time $t_1$ (or contemporane-

ous ads at time $t_1$ alone) explain contributions at time $t_1$ alone. To do this, we break the election into monthly periods from June through October.[39] Since border states change in competitiveness over the course of an election, each zip code receiving spillover ads will receive different amounts of ads each month. Thus, we expect monthly contributions to vary based on spikes in advertisements, and for each observation (a zip code, month pair) we look at the contributions (and logged contributions) by month, as in Equation 1.3.[40] This specification allows us to use a continuous measure of ads to determine if an increase in advertisements increases contributions in a zip code. Our empirical model is shown in Equation 1.3.

$$Cont_{z,m} = \beta_0 + \beta_1 log(Ads)_{z,m} + \gamma_m + \delta_z + \eta_{z,y} \tag{1.3}$$

$$\begin{aligned} Cont_{z,m} &\equiv \text{Dollars (or logged dollars) contributed from } z \text{ in month } m \\ log(Ads)_{z,m} &\equiv \text{Alternately, logged cumulative ads up to month } m \\ &\quad \text{or logged ads in month } m \text{ alone} \\ \gamma_m &\equiv \text{Month fixed effect} \\ \delta_z &\equiv \text{Zip code fixed effect} \end{aligned}$$

We alternate between two measures of our key independent variable, monthly advertisements and cumulative advertisements. We argue that each of these captures different aspects of the advertising environment and might affect contributions in slightly different ways.[41]

[39] For our purposes, the 4 days in November are included in October.

[40] We also cluster our standard errors at the media zone in this specification.

[41] We choose the number of ads and not spending on advertising as our independent variable of interest, since politicians are getting these ads "for free." Also, the level of ads is a measure of intensity, where

First, we use monthly ads to capture the dynamic nature of the general election campaign. Candidates advertise based on their perceived competitiveness of the contests and thus the number of advertisements aired can vary dramatically from month to month. For instance, Pennsylvania was very competitive in June 2008 and received many ads, which meant that southern New Jersey received the same large number of spillover advertisements. However, as the 2008 election progressed, PA became less competitive, Senators Obama and McCain aired fewer ads there, and thus southern NJ received fewer spillover ads in September than June. The effect of monthly ads on monthly contributions measures the immediate effect of television ads on individual campaign contributions. Second, we may think that a higher dosage of total ads may increase the probability that any individual in a zip code may see an ad. Since we are measuring contributions at the zip code level, we also examine the possibility that cumulative ads up to a certain month can explain contributions in that specific month alone. Thus, the effect of cumulative ads on monthly contributions measures the likelihood that an individual has seen ads over the course of the campaign. This specification also uses zip-code-months as the unit of analysis, which allows us to account for unobservables at the zip code level as well as consider more explicitly the causal relationship between ads and contributions.

With the inclusion of monthly data and zip code level fixed effects, it is no longer feasible to include all zip codes that never gave in 2008, as we did in the propensity score matching. Instead, we are looking only at zip codes that contributed something (and received ads) during at least one of the months of the general election campaign. Table 1.6 shows us the role of the election cycle. Across all specifications, controlling for the volume of advertising, contributions in September and October are significantly higher

1,000 ads in Philadelphia should not be different than 1,000 ads in Chicago in terms of how they affect individuals' campaign contributions despite the price difference. While the cost of airing an ad is a proxy for market size, it is not a good predictor of zip code size and income. See Stratmann (2009) for more on the difference between spending and advertisements.

than contributions in June (the excluded month), July, and August. Table 1.6 further illustrates the results of the monthly panel specification. In Columns 1 and 2 we see that a 10% increase in monthly ads, i.e. 1,000 to 1,100 ads, yields approximately a 0.4% increase in aggregate monthly zip code giving. Columns 3 and 4 show a similar effect using cumulative ads as the key independent variable. There, we see that increasing ads by 10% leads to a 0.6% increase in aggregate zip code giving for that single month.

These specifications are also consistent with the matching results. In the matching specification, going from zero to 1,000 ads (the treatment level) resulted in a 31% increase in contributions over the course of the general election cycle. In the monthly zip code panel specification, increasing from 0 to 200 ads per month yielded an approximately 25% increase in monthly contributions.[42]

Overall, each of our three empirical specifications - propensity score matching, a 2004-2008 zip code panel, and a monthly panel of zip codes in 2008 - indicate that television advertising has a statistically significant effect on campaign contributions at the zip-code level. However, up until this point, candidates have been receiving these increased campaign donations “for free." In other words, because of the incongruence between media market and state boundaries, candidates were unable to avoid airing spillover ads in non-competitive states if they wanted to cover competitive states with ads. In the next section we examine whether candidates could intentionally advertise in non-competitive states in an effort to increase their overall fundraising totals, taking into account the costs of advertising.

[42]If instead, we look at ads as a binary treatment effect in this setup, we obtain also obtain parallel results to the matching specification.

# VII. Strategic Implications

Since the top of the distribution has a large influence on the mean propensity score matching results, it seems that a politician may be able to receive additional resources by intentionally advertising in non-battleground states with very high income individuals. For instance, though New York state has not been competitive in a number of years, running ads in the New York media market could result in enough contributions to not only pay for those advertisements, but also to generate additional money to redistribute to other areas of the country that are more competitive.

To explore this further, we write down the politician's objective function for each market fully contained in an uncontested state, i.e. that did not receive spillover ads, to determine the optimal level of ads in each market. We begin with the simple profit maximization problem shown in Equation 1.4, where "profit" is equal to the increase in dollars contributed in a media market due to advertising, $C_M$, less the total cost of running a certain number of ads. Here total cost is equal to the marginal cost of an ad, $P_M$ times the number of ads aired in a month, $A_M$, assuming constant marginal cost.[43] The 2008 Governor, House, and Senate WiscAds data report estimated costs of ads in each market, so this allows us to identify the median cost in each market, or the price of an ad. The median ad cost for presidential ads should not be different from the median ad cost for these advertisements as networks are not permitted to price discriminate when selling advertising slots, and politicians all tend to advertise on similar programs and at similar times of day. A presidential candidate solves the following maximization problem in each market fully contained within an uncontested state.

[43] We scale profit by 5, since there are 5 months in the general election and the estimates found the marginal effect of monthly ads on monthly giving. We also implicitly assume that prices are set exogenously in the market, as markets must charge the same price to politicians as firms.

$$\max_{A_M} \Pi_M \;=\; 5(C_M - P_M A_M) \text{ s.t } \Pi_M \geq 0 \tag{1.4}$$

Substituting the marginal relationship between ads and contributions from Equation 3 and multiplying this effect by the number of zip codes, $Z_M$, we obtain the following simplification, where $\beta_1 = 101$ from Column 1 of Table 6.

$$\Pi_M \;=\; 5(Z_M \beta_1 log(A_M) - P_M A_M)$$

Taking first order conditions, and assuming there is an interior solution in each market yields the following,[44] where $\hat{A}_M$ is the optimal amount of advertisements in market $M$.

$$\begin{aligned} \frac{\partial \Pi_M}{\partial A_M} &= \frac{Z_M \beta_1}{\hat{A}_M} - P_M = 0 \\ &\Rightarrow \quad \hat{A}_M = \frac{Z_M \beta_1}{P_M} \end{aligned}$$

We first take five media markets that contain some of the top contributing zip codes in non-competitive states, all of which do not receive ads: New York, Los Angeles, Dallas, San Francisco, and Houston. Table 1.7 illustrates the results of this hypothetical policy experiment, using the optimal ads calculation described above. The second column simply reports how many zip codes are in each of these five media markets, and the third displays the median cost, or price of one ad in each market. Next, in column 4, we report the calculated optimal level of monthly ads in each market. From this, we also calculate the net gain by market as described above, which we report in the final column. In all five media markets listed, we assert that candidates could make money by simply air-

[44] If the profit at the optimal point is less than zero, this implies that the politician should not advertise in this market, and hence $\hat{A}_M = 0$.

ing ads in media markets in these non-competitive states. From these five markets alone, presidential candidates could potentially raise $891,000 in individual contributions if they advertised at each market's optimal level.[45] We expect this estimate actually understates the effects in these markets, since we learned from the propensity score matching that higher income zip codes are those in which the effect is largest, so we consider this to be a lower bound. This "extra" money could then be redistributed to spending on a battleground state in order to increase a candidate's probability of winning that state's electoral votes.

Using this same methodology to predict expected gains, we find that if candidates were to air the "optimal level" of advertisements in each uncontested market, this would result in a $6.03 million gain in all markets in uncontested states, and only three markets would not generate a positive return.[46,47] Again, based on the positive relationship between television advertising and campaign contributions, we argue that presidential candidates are leaving money on the table that they could collect if they were to advertise in media markets contained solely within non-competitive states.

We understand that this policy recommendation makes out-of-sample predictions. However, we still assert that at a minimum, we find from our zip-code fixed-effects analysis that individuals gave more when their zip code was treated with ads than they did in the absence of ads. Thus, if an area was ever exposed to ads, it may be beneficial to a politician to continue advertising there, even in years where there is no overlap with a competitive state. For instance, even if New Hampshire were not competitive, advertising in Boston may still leave a politician with net gains.

[45]This figure is for both candidates together. Separating out specific parties is an avenue for future research.

[46]To put this into perspective, Obama and McCain together raised just over $855 million over their entire campaigns (OpenSecrets.org 2010).

[47]These three markets are Bend, OR, Laredo, TX, and Biloxi, MS.

# VIII. Concluding Remarks

In 2000, George W. Bush spent $5.5 million on campaign advertisements in California - a state Governor Bush ultimately lost by twelve percentage points, and a state that has not been won by a Republican presidential candidate since 1988. The question of why governor Bush spent precious advertising money in California, when that money could possibly have been put to better use in more competitive states like Ohio, Pennsylvania, Wisconsin, and of course, Florida puzzles many scholars. According to a top Bush advisor, the expenditures were intended to fulfil the campaign's promise to be a force in California. "There was a commitment that we made to California early on, and that commitment was time and money," (Marks 2000). Based on our examination of fundraising and advertising in the 2004 and 2008 campaigns, this strategy likely paid off. By running television advertisements in a non-competitive state, the Bush campaign may have raised more money from Californians than it spent in airing the ads and more than it would have raised had it not aired the advertisements at all.

However, in the two presidential elections since 2000, we have not seen any presidential candidates or political parties spend money to advertise in non-competitive states.[48] We argue that by not doing so, candidates and parties appear to be leaving "dollars on the sidewalk." In other words, because advertisements in spillover markets lead to increased campaign contributions, by not advertising in media markets with high-income zip codes, candidates may not be reaching their full fundraising potential. We ultimately conclude that targeting advertising in non-competitive areas with a large concentration of high income individuals may prove to be profitable for politicians.

[48]Interest groups, however have spent money advertising in non-competitive states. We do not consider these ads in our analysis because we are focused solely on candidate strategy and fundraising. Outside groups may have different incentives for advertising than influencing an election.

# IX. Figures

Figure 1.1: Presidential Candidate Advertising, 2008

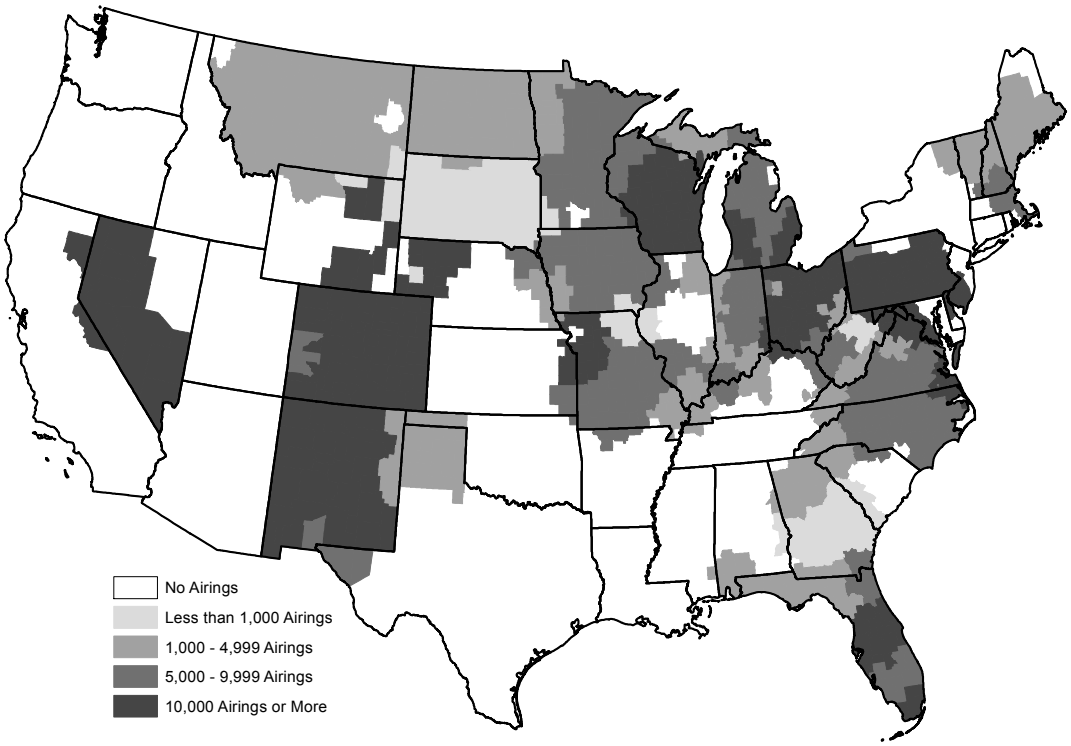


Figure 1.2: Advertising and Competitiveness in Non-Spillover Markets, 2008

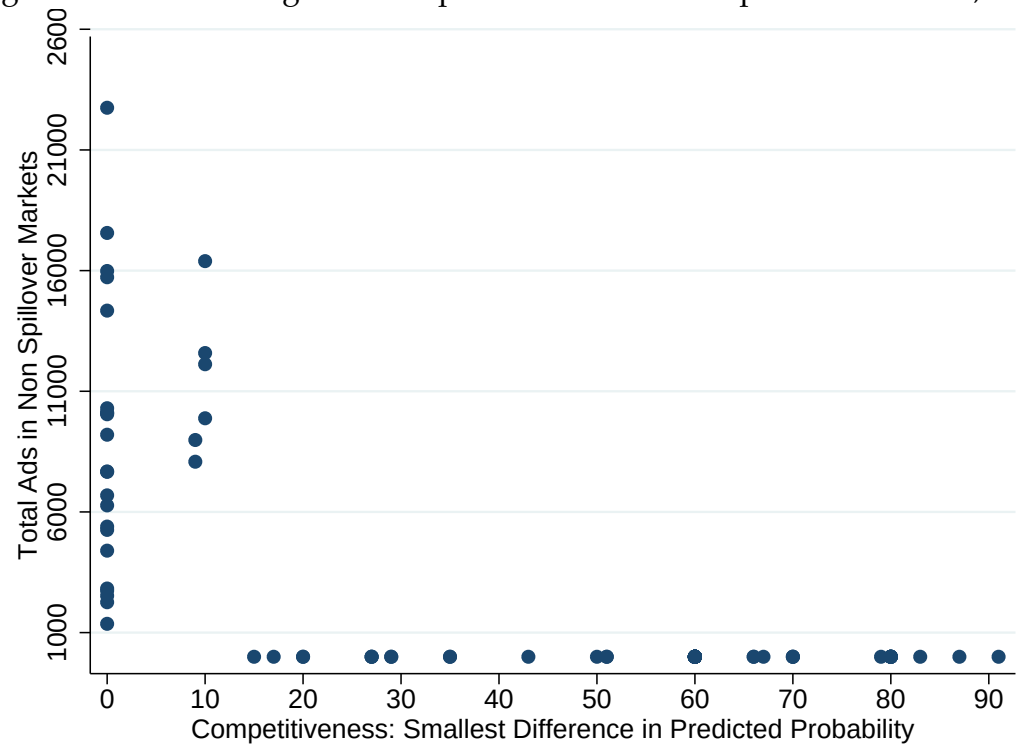
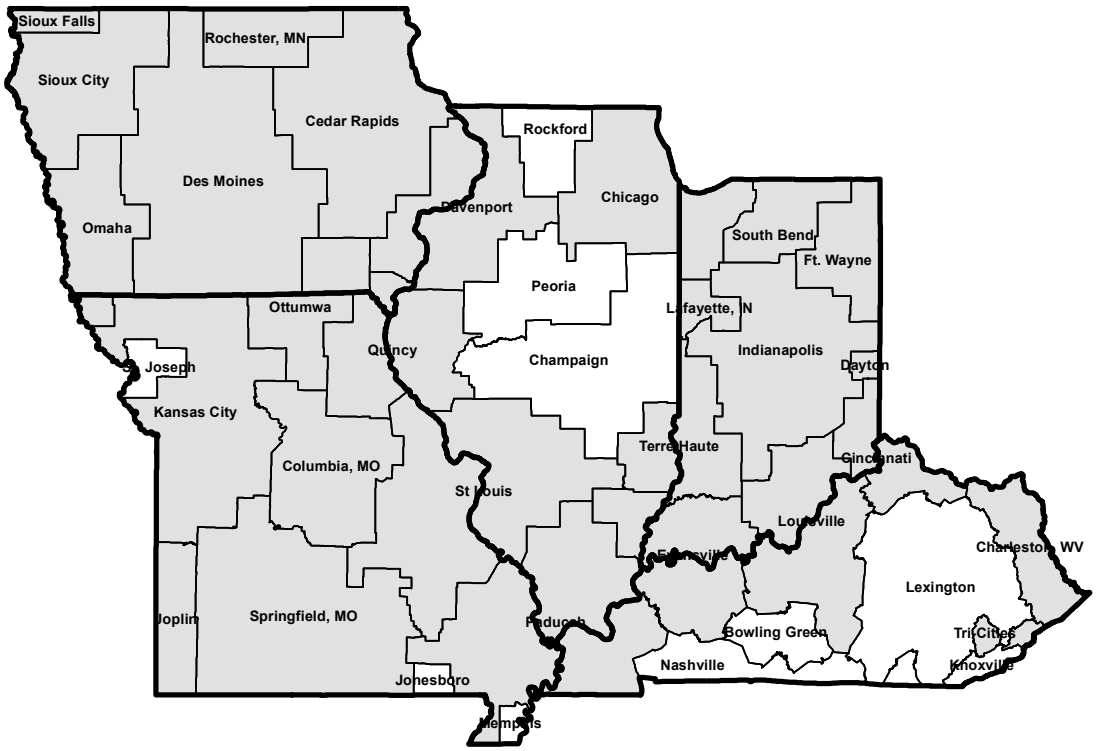


Figure 1.3: Illinois Airings, 2008 General Election



# X. Tables

Table 1.1: Candidate versus Committee Contributions, 2008

| | All | Non-Competitive | Competitive |
|---|---|---|---|
| National Party | 1,956.2 | 2,101.58 | 1,671.14 |
| | (43.93) | (59.82) | (56.14) |
| Candidate | 17,494.08 | 19,714.19 | 13,140.72 |
| | (549.14) | (781.13) | (543.04) |
| Observations | 30,571 | 20,246 | 10,325 |

Mean dollars reported, standard errors in parentheses.
National party contributions made to the RNC or DNC.
Only contributions made during general election considered.

Table 1.2: Distribution of Contributions, 2008

| | Everywhere | Non-Competitive | Competitive |
|---|---|---|---|
| Mean | 19,450.28 | 21,815.76 | 14,811.86 |
| Median | 750 | 750 | 600 |
| 75 Percentile | 6,667 | 7,130 | 5,850 |
| 95 Percentile | 76,832 | 80,779 | 69,016 |
| Standard deviation | 102,316.7 | 118,245.3 | 59,563.88 |
| Observations | 30,571 | 20,246 | 10,325 |

Aggregate individual contributions (in dollars) at the zip code level are reported.

Table 1.3: Results: Propensity Score Matching 2008

| | (1) Contributions Kernel | (2) Contributions Nearest-Neighbor |
|---|---|---|
| ATT | 7.213*** | 6.822*** |
| | (1.436) | (1.445) |
| **Percent of Mean** | **33.10** | **31.31** |
| | | |
| **Top of Distribution of Treatment Effects** | | |
| 50th Percentile | 1.27 | 1.62 |
| | (8.65) | (2.39) |
| 75th Percentile | 6.28*** | 5.79*** |
| | (1.82) | (1.84) |
| 90th Percentile | 15.72*** | 19.44*** |
| | (3.94) | (3.93) |
| Number Treated | 6,397 | 6,343 |
| Total Sample | 20,215 | 20,150 |

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Standard Errors are in parentheses and computed using bootstrapping.

The Treatment is whether or not a zip code received spillover ads.

ATT is average treatment on the treated, reported in thousands of dollars.

The dependent variable is thousands of dollars contributed in a zip code.

Percent of mean calculated using the sample mean.

Table 1.4: Characterizing the Treated Zip Codes with the Largest Effects

| | Top 90% | Less than 90% | P-value |
|---|---|---|---|
| Total Ads | 6,181.5 | 6,470.4 | 0.22 |
| | (220.6) | (68.8) | |
| Income (in thousands) | 61.31 | 39.06 | 0.00 |
| | (0.977) | (0.18) | |
| Population (in thousands) | 25.51 | 5.90 | 0.00 |
| | (0.71) | (0.13) | |
| Percent of College Grads | 45.90 | 16.74 | 0.00 |
| | (0.72) | (0.14) | |
| Population Density (People per sq mile) | 4,233.16 | 592.99 | 0.00 |
| | (273.38) | (30.35) | |
| Treated Observations | 542 | 5,801 | |

Means reported. Standard errors in parentheses.
Only treated zip codes included.

Table 1.5: Results: 2004 and 2008, OLS with Zip Code Fixed Effects

| | Contributions |
|---|---|
| 2008 | 14.128*** |
| | (1.507) |
| Treatment | 9.369*** |
| | (1.507) |
| Constant | 22.552*** |
| | (1.442) |
| **Percent of Mean** | **27.31** |
| *N* | 4,192 |
| Number of Groups | 2,096 |

Robust standard errors clustered at the media zone in parentheses
Effects reported in thousands of dollars.
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 1.6: Monthly Panel of Zip Codes in 2008

| | (1) Monthly Amount | (2) log(Monthly Amount) | (3) Monthly Amount | (4) log(Monthly Amount) |
|---|---|---|---|---|
| log(Monthly Ads) | 101.0* | 0.0399*** | | |
| | (58.54) | (0.0116) | | |
| log(Cumulative Ads) | | | 43.18 | 0.0629*** |
| | | | (114.8) | (0.0167) |
| July | 466.3 | 0.123*** | 499.7* | 0.0726 |
| | (343.8) | (0.0452) | (287.7) | (0.0438) |
| August | 560.2** | 0.638*** | 535.4 | 0.540*** |
| | (268.0) | (0.0620) | (373.5) | (0.0785) |
| September | 4055.0*** | 1.285*** | 4077.0** | 1.168*** |
| | (1460.1) | (0.0862) | (1686.6) | (0.106) |
| October | 2332.8*** | 1.314*** | 2432.1** | 1.146*** |
| | (599.0) | (0.0867) | (1005.6) | (0.115) |
| Constant | 2657.0*** | 2.262*** | 2839.8*** | 2.189*** |
| | (555.9) | (0.0501) | (452.3) | (0.0612) |
| $N$ | 41540 | 41540 | 41540 | 41540 |
| $R^2$ | 0.806 | 0.797 | 0.806 | 0.797 |

Robust standard errors clustered at the media zone in parentheses.

Excluded group is June. Monthly Amount in dollars.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 1.7: NYC, LA, San Francisco, Houston, and Dallas policy recommendations

| **Expected Gains to Advertising** | | | | |
|---|---|---|---|---|
| Market | Zip Codes | Market Price | Optimal Monthly Ads | Net Gains ($s) |
| NYC | 1,049 | 2,186 | 48 | 351,845 |
| Los Angeles | 473 | 946 | 50 | 166,270 |
| Dallas | 407 | 815 | 50 | 144,441 |
| San Francisco | 305 | 500 | 61 | 121,626 |
| Houston | 301 | 605 | 50 | 106,576 |

Market Price is the median cost based on WiscAds 2008 Gov, House, Senate Election advertisements.

# XI. Appendix A

Table 1.8: Geographic Areas Used to Identify the Diff-In-Diff Model

| Year | Market Receiving Ads | Battleground State | Spillover State(s) |
|---|---|---|---|
| 2008 | Atlanta | GA | AL |
| | Savannah | GA | SC |
| | Chicago | IN | IL |
| | Evansville | IN | KY, IL |
| | Louisville | IN | KY |
| | Tri-Cities | VA | TN |
| | Washington, DC | VA | DC, MD |
| 2004 | Memphis | AR | MS, TN |
| | Shreveport | AR | LA, OK, TX |
| | Spokane | WA | ID, MT |

Table 1.9: Competitiveness of States, 2004 and 2008

| | | 2008 | |
|---|---|---|---|
| | | Competitive | Non-Competitive |
| 2004 | Competitive | CO, FL, IA*, MI*, MO, NV, NH, NM, OH, PA*, WV | AZ, AR, KY, ME, MN, NJ, OR, WA, WI |
| | Non-Competitive | IN, NC, VA, GA | AL, CA, CT, DE, DC, HI, ID, IL, KS, LA, MD, MA, MS, MT, NE, NY, OK, SC, TN, TX, VT, WY |

Data for ND, RI, SD, and UT were unavailable for 2004, and are not included in this table.

Figure 1.4: Geographic Areas that Received Advertising in Either 2004 or 2008

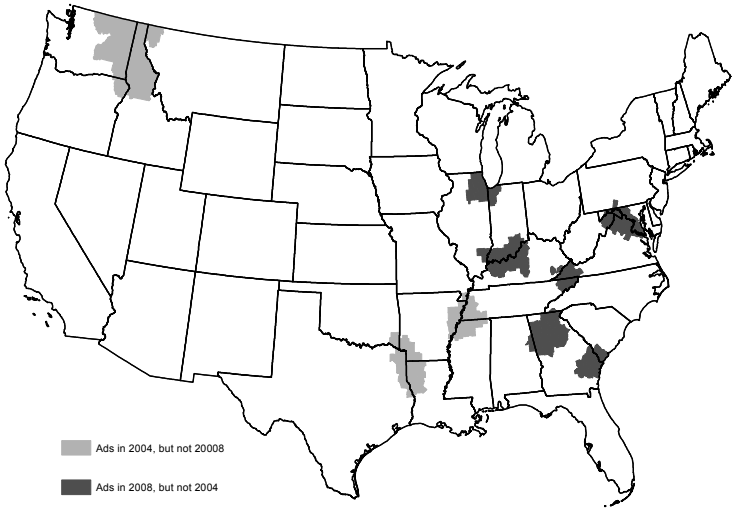



Figure 1.5: Spillover Zip Codes Used to Identify the 2004/2008 Panel

# XII. Appendix B

Table 1.10: Fixed Effects Logit Results used for Propensity Score Matching

| | (1) Treatment | (2) Treatment |
|---|---|---|
| Income | 0.00462** | 0.00411** |
| | (0.00207) | (0.00208) |
| Percent Hispanic | 1.090*** | 0.739*** |
| | (0.245) | (0.261) |
| Percent African American | -0.540*** | -0.707*** |
| | (0.157) | (0.163) |
| Density | 8.76E-6* | 1.38E-6 |
| | (5.25E-6) | (6.01E-6) |
| Percent of College Grads | 0.00563** | 0.00331 |
| | (0.00243) | (0.00249) |
| Population | | 0.0107*** |
| | | (0.00221) |
| *N* | 20,141 | 20,141 |

Standard errors in parentheses; Standardized beta coefficients

State fixed effects included

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Observations from states with no variation in treatment and control are dropped.

Table 1.11: Propensity Score Matching-Balance Report

| | Mean Treated | Mean Control | P-Value |
|---|---|---|---|
| Income (thousands) | 44.301 | 40.751 | 0.137 |
| Population (thousands) | 7.5715 | 7.7295 | 0.454 |
| Density (people per sq mile) | 699.47 | 875.42 | 0.42 |
| Percent Hispanic | 6.19 | 7.66 | 0.096 |
| Percent Black | 5.0 | 5.6 | 0.052 |

Only observations on the support are included.

This report is for the nearest neighbor specification.

Table 1.12: Robustness of Propensity Score Matching

| Method | Effect Size | Standard Error | Off Support |
|---|---|---|---|
| **Logit Specification 1** | | | |
| **Nearest Neighbor** | | | |
| N=20 | 7.324*** | (1.826) | 0 |
| N=10 | 7.280*** | (1.828) | 0 |
| N=1 | 6.509*** | ( 1.982) | 0 |
| **Radius Caliper** | | | |
| $\sigma = 0.01$ | 6.509*** | ( 1.982) | 0 |
| $\sigma = 0.001$ | 6.554** | (1.981) | 2 |
| $\sigma = 0.0001$ | 6.443*** | (1.874) | 54 |
| **Kernel** | | | |
| Epanechnikov | 7.380*** | (1.790) | 0 |
| Normal | 7.213*** | (1.803) | 0 |
| **Local Linear Regression** | | | |
| Epanechnikov | 6.117*** | (1.771) | 0 |
| **Logit Specification 2** | | | |
| **Nearest Neighbor** | | | |
| N=20 | 6.516*** | (1.844) | 0 |
| N=10 | 6.371*** | (1.814) | 0 |
| N=1 | 5.771*** | (2.217) | 0 |
| **Radius Caliper** | | | |
| $\sigma = 0.01$ | 5.771*** | (2.217) | 0 |
| $\sigma = 0.001$ | 6.038** | (2.166) | 4 |
| $\sigma = 0.0001$ | 4.455*** | (2.079) | 66 |
| **Kernel** | | | |
| Epanechnikov | 6.185*** | (1.810) | 0 |
| Normal | 6.484*** | (1.801) | 0 |
| **Local Linear Regression** | | | |
| Epanechnikov | 5.015*** | (1.793) | 0 |

Table 1.13: Representativeness of the 2004, 2008 Panel Sample

| | Observations | Mean | Std Err. | P-val |
|---|---|---|---|---|
| **Median HH Inc** | | | | |
| Full Sample | 18,128 | 39,493.1 | 124.95 | |
| Panel Sample | 2,094 | 45,132.53 | 437.59 | 0.00 |
| **Percent Over 65** | | | | |
| Full Sample | 18,128 | 0.142 | 0.00052 | |
| Panel Sample | 2,094 | 0.129 | 0.00156 | 0.00 |
| **Population** | | | | |
| Full Sample | 18,128 | 8655.783 | 96.486 | |
| Panel Sample | 2,094 | 13186.07 | 352.37 | 0.00 |
| **Percent White** | | | | |
| Full Sample | 18,128 | 0.845 | 0.0015 | |
| Panel Sample | 2,094 | 0.754 | 0.0057 | 0.00 |
| **Percent Black** | | | | |
| Full Sample | 18,128 | 0.070 | 0.0011 | |
| Panel Sample | 2,094 | 0.156 | 0.0051 | 0.00 |
| **Percent Hispanic** | | | | |
| Full Sample | 18,128 | 0.072 | 0.0011 | |
| Panel Sample | 2,094 | 0.055 | 0.0021 | 0.00 |
| **Density** | | | | |
| Full Sample | 18,128 | 1,213.99 | 37.83 | |
| Panel Sample | 2,094 | 1,682.391 | 77.104 | 0.00 |

Full Sample is based on all Non-competitive zips from 2008.

Panel Sample contains all the zip codes in the 2004, 2008 panel.

# Chapter 2

**Negative Advertising and Political Competition (with Amit Gandhi (University of Wisconsin-Madison) and Daniela Iorio (UAB and Barcelona GSE))**

## I. Introduction

Political competition has long been famous for using negative portrayals of one's opponent as a strategic weapon. Indeed negative advertising, or "mudslinging" as it is sometimes called, is usually considered par for the course in any political contest. What is more alarming is the sheer amount spent on negative advertising. For example, Senator John Kerry and President George Bush together spent $522 million in the 2004 presidential campaign, with over $365 million (or 69.9 percent) of this amount being spent on negative advertising.[49] In the 2009-2010 election cycle (the November 2010 electoral contests for state and federal offices), a media analysis company has reported that 80 percent of advertisements have been negative (NPR 2010).

The widespread presence of negative advertising in the political market has been a serious concern to policymakers and news commentators alike. Critics have long bemoaned negative advertising as harmful to the health of a democracy. This perspective is consistent with the conclusions of a strand of studies (see e.g., Crotty and Jacobson

[49]Calculation based on WiscAds 2004 presidential data Goldstein and Rivlin (2007b)

(1980), Cappella and Jamieson (1997), Ansolabehere and Iyengar (1995)) that find negativity alienates the political middle and harms participation.[50] The fear that negative ads turn off voters has prompted policymakers in recent times to regulate its usage. One such well known piece of legislation is the "Stand By Your Ad" provision of the Bipartisan Campaign Reform Act in 2002, which requires each candidate to provide a statement identifying himself and his approval of the communication. By forcing candidates to personally associate themselves with their campaign message, the belief is that candidates will be less inclined to air attack ads.

What is missing from the debate about negative advertising in politics is a clear understanding of *why* negative advertising is such a central feature of political competition. That is, while there has been much interest in the economics and political science literatures as to the consequences of campaigning for election outcomes, virtually no empirical attention has been devoted to the supply side incentives producing negativity. If negative advertising is the norm in political competition, why is it not the norm in the marketing of non-political consumer goods? What is it about the nature of political competition, especially in the United States, that lends itself towards "going negative"?

In this paper we hypothesize that an important part of the explanation lies in a unique feature of the structure of political markets. In particular, the two-party system effectively gives rise to duopoly competition between political candidates in a general election, whereas pure duopolies are rarely observed in the consumer product market.[51] We conjecture that there is a clear economic rationale for why duopolies are more likely to "go negative": when the number of competitors is greater than two, engaging in negative ads creates positive externalities to those opponents that are not the object of the

[50] On the contrary, Freedman and Goldstein (1999) find that exposure to negative advertising mobilizes the electorate, and Finkel and G. (1998) find no effect of negative ads on turnout.

[51] While a number of industries might feature two dominant firms, even in these cases there will typically be a group of firms with smaller market share that impact the behavior of the dominant firms.

attack. In contrast, positive ads benefit only the advertiser. Therefore, the presence of a spillover effect makes it less beneficial to use negative advertising when you face more than one opponent. Moreover the benefit of negative advertising is decreasing in the number of opponents you face (since the spillover to another candidate is more likely when there are more substitutes available). This link between the incentives to produce negative advertising and duopolistic market structures does not appear to have been previously recognized or explored in either the industrial organization or political economy literatures.

Our economic explanation for negative advertising seems to accord with a familiar armchair observation - for the most obvious cases where a consumer product market also looks like a duopoly, there exist some very well known negative advertising campaigns (i.e., Apple versus Microsoft). How then can we empirically isolate the effect of the number of competitors in a market on the incentive to go negative? An ideal strategy is to only use data on political races that share the same institutional features, but have different number of competitors. This strategy however gives rise to a natural problem: if political markets in the United States are for the most part characterized by head to head competition between the two major party candidates, how can we determine the effect of the number of competitors on the propensity for “going negative" when there is little to no variation in the number of candidates? Our strategy is to instead exploit the inherent variation in non-presidential primary contests within the United States, i.e., the contests among Democrats or Republicans that decide who will become the party nominee in a particular House, Senate, or gubernatorial race. The local nature of these primary contests provides us with a cross section of independent races that exhibit a rich degree of variation in the number of entrants. Using this variation, we seek to measure the effect of the number of competitors on the likelihood that a political ad is negative.

We use a unique dataset from the Wisconsin Advertising Project (WiscAds), which

contains information on all political advertisements aired in the top 100 media markets in the United States 2004 elections and the same information for all U.S. media markets in 2008. In addition, we collect candidate level demographic characteristics to create a comprehensive database of primary races, candidate attributes, and advertising patterns. As the constructed data contains a comprehensive record of the amount of political advertising and its content, we are able to measure the probability of going negative at the ad level as a function of market and candidate characteristics. Our main findings are that duopolies have over twice as high a likelihood of airing a negative ad as compared to non-duopolies, and depending on the measure of negativity we use, cutting the number of competitors in half more than doubles the rate of negative advertising. These magnitudes suggest that even just a handful of competitors can all but eliminate the incentives to "go negative" as compared to the duopoly case. These results remain robust to a variety of measures of negativity, as well as the inclusion of a variety of controls that we construct at the ad, candidate, and election level.

Our empirical findings, which tie together the number of competitors and the tone of the campaign, also shed new light on the consequences that the policies aimed at shaping the "competitiveness" of primary elections (and therefore entry) may have on the tone of the campaign, and in turn on voters' behavior. We discuss such policy implications in the conclusion.

The plan of the paper is the following. In Section II we review the related literature. Section III contains a discussion of the data construction process, where we create the most comprehensive dataset on primary contests, candidate characteristics, and advertising patterns; this section also familiarizes the reader with the WiscAds data, unique to the Economics literature. In Section IV we carry out the empirical analysis and illustrate the key empirical relationships in the data. We also include a discussion of the robustness of the raw effects in the data to omitted variable bias by controlling for relevant race, ad,

and candidate level covariates. Finally, in Section V, we formally illustrate our hypothesis that the introduction of more competitors creates a spillover effect that diminishes the incentive to negatively advertise, as it pertains to political competition. We construct a simple theoretical framework that draws upon ideas from the political literature based on games of voters' mobilization, which were first developed by Snyder (1989) and Shacar and Nalebuff (1999). We conclude in Section VI.

# II. Related Literature

This paper is broadly related to a vast literature in economics and political science that examines political advertising. Empirical studies of political advertising primarily investigate the effects of campaigning on voter behavior.[52] Shacar and Nalebuff (1999), Coate and Conlin (2004) and references therein focus on the effect of advertising on turnout. Other works, such as Gerber et al. (2007), Stromberg (2008), Gerber (1998) and Levitt (1994), investigate the relationship between campaign spending and vote choice, in gubernatorial, Presidential, Senate and House elections respectively. In a more recent work, DeMello and DaSilveira (2011) overcome the endogeneity problem of campaign spending using races where candidates' TV time is split equally among them (in a second round), and document a large effect of TV advertising on voting outcomes. Finally, a number of papers focus on the effects of negative advertising on voter behavior.[53] Based on the findings of these papers, there is no clear consensus on whether negative advertising has

[52]The empirical literature focusing on the supply side (i.e., candidates' behavior) remains scarce. Notable exceptions are Gordon and Hartmann (2010, 2011), who estimate a model where candidates strategically choose advertising levels across markets, using the methodology in Berry, Levinsohn, and Pakes (1995) to account for the endogeneity of political advertising; Erikson and Palfrey (2000) who investigate the simultaneity problem in estimating the effect of campaign spending on election outcomes. None of the mentioned papers differentiate between positive and negative advertising.

[53]See, for example, Ansolabehere and Iyengar (1994), Freedman and Goldstein (1999), Freedman et al. (2004), Peterson and Djupe (2005), Lau et al. (2007), Che et al. (2007) and references therein.

a mobilizing or a stimulating effect on turnout.

A possible explanation that reconciles the mixed evidence has been provided by Lovett and Peress (2010), who argue that the effect of negative advertising on voters' behavior depends on voters' prior knowledge. In this respect, Landi and Yip (2006) find that the tone of the campaign only affects the turnout of Independents.[54] We differ from these studies in that, instead of focusing on the demand side (i.e., voters) and addressing the question of who is affected by advertising and why, we examine the campaign choices of candidates, positive or negative, and investigate how their advertising strategy changes with the number of competitors in the race. Regarding the supply side, our work is more closely related to the work of Lovett and Shachar (2010) who estimate a model of electoral competition where candidates decide how much to advertise and how to allocate the advertising expenditure between positive and negative advertising. However, the strategies of candidates do not explicitly take into account the spillover effect of negative ads since they consider only races with two competitors. On the contrary, the focus of our work is the spillover effect that arises when there are more than two candidates.

# III. Data Description

In order to explore the empirical relevance of the spillover effect, we assemble a novel dataset that contains information on all entrants of the 2004 and 2008 primary races in the United States. In order to verify the identity and number of candidates running in any of these primary races, we first obtain information on each U.S. House, U.S. Senate, and gubernatorial primary election in both years from the records kept in *America Votes* (McGillivray et al. 2005, 2009). Unlike in general elections where election results are

[54] Another strand on the empirical literature focus on the impact of media market expansion on voter turnout. See for instance, DellaVigna and Kaplan (2007) and citations therein. While they analyze the effects of media bias, they do not precisely study advertisements.

widely available, the lack of consistent and thorough record-keeping for Senate, House, and gubernatorial primary races makes it challenging to obtain primary records. Thus we choose to hard code primary information from this reliable, encyclopediac source. From this data source, we collect information about each race held in that election cycle, the date of the election, the candidates running for office in that race (if there were any), the candidate's incumbency status, and each candidate's final vote share. Throughout our analysis, we refer to an election, or electoral contest, as each specific race (e.g., Democratic Primary for Wisconsin Governor). We then eliminate the unopposed elections (i.e., elections with only one candidate running) and all elections where no candidates ran. In a strongly Democratic district, for example, it is not uncommon for there to be no Republican candidates running in a primary.[55] In 2004, there are 340 primary elections that have two or more competitors (199 are two-candidate races and 141 elections have three or more candidates). Similarly, in 2008, there are 384 primary elections that have two or more competitors (211 two-candidate races and 173 races with three or more candidates).

By matching candidates' names with advertisers' names, we then merge our election-candidate dataset with the dataset assembled by the TNSMI/Campaign Media Analysis Group (CMAG), and made available to us by the University of Wisconsin Advertising Project (WiscAds), to obtain detailed information about the tone of the campaigns and the advertising strategy of each candidate. The WiscAds data set includes information on *each* airing of a political advertisement in all media markets in the U.S. in 2008, and in the top 100 media markets in 2004. The top 100 media markets cover about 85% of the US population (see Figure 2.1).[56]

This merge leaves us with 104 (118) primary elections with two or more candidates

[55]Overall there are 966 elections from 2004 Senate, House, and gubernatorial primaries; but of these, 558 elections are unopposed and 68 elections have no candidates. In 2008 Senate, House, and gubernatorial primaries, we start with 915 races, where 504 are unopposed and 27 have no candidates.

[56]See Goldstein and Rivlin 2004; 2007a for a detailed description of the WiscAds data.

and active campaign advertising in 2004 (2008), with 26 (22) for Senate, 63 (87) for House, and 15 (9) for gubernatorial elections in 2004 (2008).[57]

Finally, for each individual in our sample, we collect information about his/her age when running for the primary, gender, ethnicity, educational background (i.e., if he/she holds a college degree and if he/she holds a law degree), and if he/she has political experience (i.e., holding another public office at the local, state, or federal level or being a member of the U.S. Congress) prior to running in the primary race of interest. This aspect of the data collection is important as it enables us to verify if the influence of the number of candidates on the tone of the advertising is partially driven by the fact that there are potentially different "types" of candidates across races of different size.

Another relevant aspect of the dataset we assemble is that we can exploit variation at the race, candidate, and ad level. Therefore, these data allow us to examine i) the overall tone of the campaign at the election level ii) a candidate's advertising strategy (i.e., the ratio of negative versus positive, conditional on the total level of advertising) and iii) the probability that each ad is negative, based on ad-level attributes such as the time to the election. These three setups allow us to reassure ourselves that the amount of advertising does not influence our results. In case ii) we give equal weight to all candidates, whereas in case iii) we instead place more weight on the candidates who advertised more.

We now describe each part of the data set and the sources we used to construct it in turn.

[57]When we conduct this merge, we lose 214 House races, 7 gubernatorial races and 13 Senate races in 2004. Of these dropped races that arose in the match with the advertising data, approximately 20% are due to the fact that they are outside of the top 100 media markets, and about 80% were due to the fact that there is no advertising for the primary election. In 2008, we have data for all 210 media markets, so we only lose races that do not contain any advertising, or 95 races. We drop one Louisiana governor race in 2004, since it had a runoff after the primary. We also drop Ronnie Musgrove's advertising in a 5 candidate Mississippi election, since he (the incumbent) was prematurely attacking the general election candidate, which does not pertain to primary competition.The 2008 Tennessee Senate race contains a candidate with the same name as the incumbent, who did not advertise and won the election, thus creating odd incentives.

## Candidate Data

**Viable Candidates**:

There is natural concern that our measure of the number of competitors, which is the number of candidates who appear on the primary ballot (we refer to this measure of candidates as "Ballot N") may be overstated, since there could be a number of "fringe" candidates on the ballot who pose no real competitive threat to the "viable" candidates (meaning that the viable candidates effectively ignore potential spillover to the fringe candidate in making advertising choices). We thus construct an alternative measure of the number of candidates in a race by ignoring candidates who earned less than 5 percent of the popular vote in the election. We shall refer to this alternative measure as "Effective N." Table 2.1 shows the effect on the distribution of the number of candidates across races for both election cycles. The "Effective N" measure puts more mass of the distribution on races with 2, 3, or 4 candidates (since elections with 5 or more candidates are getting re-classified into one of these groups). The more compressed distribution accords with general knowledge that primary races with 5 or more credible candidates vying for votes are quite rare.[58] For the remainder of the paper, we will focus on this "Effective N" measure in favor of the ballot measure, though all results that follow are robust to using the Ballot N measure.[59]

As shown in Table 2.2, over 90% of the electoral contests in 2004 and 2008 have two to four viable candidates in the race, with similar patterns across House and Senate races. Races for gubernatorial seats tend to be correlated with lower entry. We also observe a decrease in gubernatorial races from 2004 to 2008, as most states impose 3 year terms, so

[58] If we revise this measure to candidates who earned more than 2% of the vote share or increase the threshold to candidates who received more than 10% of the vote share, the number of 2 candidate, 3 candidate, and 4 candidate elections remain similar. The only variability comes from races with 5 or more candidates. All results that follow are robust to altering the threshold to 2 or 10 percent.

[59] See the Online Appendix for these results.

races that occurred in 2004 already held another election in 2007 (and will not have their next contest until 2010). In 2008 the largest number of viable candidates that competed in a primary contest is eight; it was 7 in 2004.

**Demographics:**

Little is known about the type of candidates who enter U.S. House, U.S. Senate, or gubernatorial *primary* races. Our data collection gives us an opportunity to explore who enters these primary races. For the specific purposes of this paper, concern may arise that individuals with certain demographics and political experience are more likely to enter races with few candidates and may be more prone to go negative. We collect information about each candidate's age, education (college completion and law school completion), race, gender, private sector occupation, and political experience. In cases where the candidate has been a member of the U.S. Congress at some point, we obtain these characteristics from the official Biographical Directory of the U.S. Congress (1789-present). In the many cases where the candidate has never served in a U.S. Congressional office, we search through alternative web-based data sources, such as online versions of state and local newspapers and candidate's biographies on their official campaign pages to obtain the relevant information.[60]

The most common profession in our data for both years are lawyers, followed by businessmen, and the average age of the candidates who advertise is 53, with approximately two thirds of candidates between 45 and 60 years of age. In addition, just over 80% of the candidates in our data were men, and about 90% of the candidates were white. Thus, we see that the "modal" advertiser is a white male between 45 and 60 years old, and is an attorney or businessman.[61]

[60]Specific candidate information and sources are available upon request.

[61]The correlation between the percent of the vote share obtained and whether or not we have a candidate's demographic information is 0.02, so the few candidates for whom we could not obtain this information are not less likely to be viable competitors.

In Table 2.3 we show the summary statistics of the advertisers' demographics and political experience across different levels of entry to ensure that different market sizes do not attract intrinsically different types of competitors. The demographics are quite similar across races, despite the number of competitors. Only political experience in 2004 (whether the individual has held political office in the past 15 years) seems to slightly vary amongst duopolies and non-duopolies, making it crucial for us to control for this in the analysis to follow.

We also collect information on the demographics of candidates running in 2004 who are not included in our final sample (i.e., candidates who did not advertise), to confirm that demographic characteristics of entrants are not systematically different for television advertisers and those that do not advertise on television, as the data we use for the remainder of the analysis uses information pertaining only to advertisers. We find that the only difference is that advertisers are slightly more likely to hold a law degree.[62]

## Advertising Data

Throughout the entire 2004 election season, over half a million television spots -558,989 ads - were aired in favor of gubernatorial, U.S. Senate, and U.S. House candidates in the top 100 markets.[63] In 2008, our data records over 1 million advertisements, 1,342,341 aired throughout the entire 2007-2008 election season. Of the total ads broadcasted, 254,368 (188,957) aired during the primary campaigns for these elections in 2004 (2008), which are the focus of this paper due to their large variation in the number of candidates. Whether

[62] See the Online Appendix for this table. Concern may arise that those races without televised advertising have different entry incentives than those with televised advertising. However, we find that the number of "viable" candidates is similar for elections with and without televised advertising: 2.66 and 2.25 respectively in 2004 and 3.52 and 2.64 respectively in 2008.

[63] Candidates make an extensive use of televised advertising. For example, in the 2008 US presidential election, candidates spent over $360 million on broadcast time throughout their campaigns. Broadcast media accounted for the highest share of the overall media expenditure, followed by miscellaneous media ($273 million), internet media ($43 million) and print media ($21 million). See CRP (2011).

an advertisement was aired during the primary or general election was determined by the date of the primary in each state.[64]

In Table 2.4 we report the total ads aired by viable candidates. We observe 242,461 total ads in campaigns for 2004 races, of which 42% are from Senate elections, 18% from House elections, and 40% from gubernatorial elections. Given the fact that House districts generally span small sections of multiple media markets, making it costly to advertise in small portions of several markets, it is not surprising that a small percentage of campaign advertising is for House candidates. Senate and gubernatorial elections, on the other hand, are state-wide, and candidates more typically campaign via televised advertising.[65] Similar patterns are observed in 2008, as we see that while House races comprise 75% of all elections, they only comprise 44% of advertisements. However, gubernatorial elections, which constitute only 6% of elections make up almost a third of all advertisements. Again, the increased continuity of media markets for state elections creates additional incentives to engage in televised advertising in Senate and gubernatorial races than in House races. In addition, the 2008 primary election season showcased a lower level of total advertisements, though there were more contests in this year.

The CMAG data provides a rich set of information for each ad aired throughout the election, as the unit of analysis is an individual television broadcast of a single advertisement. The data contains information on when the advertisement aired (date, time of day, and program) and where the ad aired (television station and media market) in addition to the cost of the ad.[66] Virtually all advertisements are for 30 second television spots, so

[64] If the ad aired prior to the primary election, then it was counted as a primary ad. Any ads that aired after the primary were dropped from the dataset.

[65] See Snyder and Stromberg (2010) for more on the incongruence between media outlet boundaries and Congressional advertising. The obvious exception to this is in cases where there is only one House district in the state, though these states are more sparsely populated and their media markets are less likely to enter the 2004 sample.

[66] While there are cost measures in the dataset for each ad, they are estimated by TNS (the parent company of CMAG) based on the media market, time of day, and the show the ad aired on. Part of TNS's expertise is the measurement of these costs.

the length of an ad is not a relevant issue.

The WiscAds coders examine the content of each advertisement in the CMAG data and record a number of variables related to the content of the ad, including the name of the favored candidate, his/her political party, the race being contested, the tone, and issues addressed.[67] Specifically related to the tone of the advertisement, coders are asked to determine whether the objective of the ad is to promote a candidate, attack a candidate, or a contrast of the two. Attack ads are coded as such if the favored candidate is not mentioned in the ad at all; contrast ads mention both the favored and opposing candidate; promote ads mention only the favored candidate. The WiscAds data also includes measures for whether or not the opposing candidate is pictured in the ad, but not the identity of this opposing candidate who is the target of the attack, and if the focus of the ad is on personal or policy matters.[68] It is possible to construct various measures of negativity based on this data, as each will contain a different intensity or duration of negativity. Five possible measures of negativity, which are not mutually exclusive, are the following (each of which is coded as one if the advertisement is designated as "negative" under a specific set of criteria, and zero otherwise):

***Negative1*** includes ads that either spend the entire time attacking an opponent or spend some time promoting and some attacking (attack plus contrast ads).

***Negative2*** includes ads that attack for at least half of the airtime.

***Negative3*** includes only those ads that end with an attack.

***Negative4*** includes all ads that only attack the opponent.

[67] We also observe the sponsor of the ad both by name, i.e. "Paid for by Friends of Jon Jennings Committee" or "Paid for by Emily's List" and by category, i.e. candidate, party, or special interest group. Since, however, candidates sponsored over 94% of all ads, with interest groups sponsoring only 4% of ads, we drop the latter two. The election years we study are pre-Citizens United, and thus there are no corporations or Super Pacs advertising in these contests.

[68] We do know if the ad is refuting previous negativity directed at a candidate, which occurs about 6 percent of the time in the data.

***Negative5*** includes ads that attack for at least half of the airtime and are focused on personal issues rather than policy.

For our purposes, the most relevant categories of negative advertising are *Negative1* (which flags an ad as negative if it contains any negativity whatsoever) and *Negative4* (which only flags an ad as negative if all of its message is negative). Thus *Negative1* is a more inclusive measure than *Negative4*, though we will look at the raw data with all measures.[69]

# IV. Empirical Analysis

We now seek to empirically examine the effect of the number of competitors in a race on the incentive to air negative ads in the data. We expect that increasing the number of competitors beyond two players generates a spillover effect that reduces the return of negative advertising. The spillover effect thus suggests two predictions about the data:

1. Duopoly markets should exhibit a greater tendency for negative advertising than non-duopoly markets.

2. The tendency for negative advertising should decrease monotonically with the number of competitors.

Both predictions are products of the spillover story. Our analysis will be concerned with seeing whether these effects are present in the data and quantifying their magnitude. Assessing the magnitudes will provide a sense of the order of importance of competition as a means of explaining negativity.

[69]The results presented in the paper are substantively similar if we change our measure of negativity to any of the ones listed above.

We start our empirical analysis with the first prediction and plot the proportion of negative ads under the five different measure of negativity for both duopoly and non-duopoly markets again using "Effective N" as the measure of competition.[70] The result is shown in Figure 2.2. The figure reveals a clear consistency with our hypothesis: across all the negativity measures, duopoly markets exhibit a significantly higher probability of airing a negative ad as opposed to non-duopoly markets. The magnitude of this "duopoly effect" is striking: across all measures, duopolies exhibit over twice as high a likelihood of airing a negative ad as compared to non-duopolies in 2004. The lower panel of Figure 2.2 shows that these trends continue to exist in 2008, though non-duopolies exhibit a higher volume of negativity in this election cycle. Still, in 2008, we find that candidates in duopolies are one and a half times as likely to engage in negative advertising as those in non-duopolies.[71] The relative increase in the rate of negative advertising for duopoly markets is larger when one considers the *Negative4* measure as opposed to the *Negative1* measure. This accords with our theory since *Negative4* only counts ads that spend the whole time attacking as negative while *Negative1* counts ads that spend any part of the ad attacking as negative. Thus the reduction in the benefits of using negative advertising for non-duopoly markets should be even larger under *Negative4* advertising as compared to *Negative1* advertising.

Table 2.5 breaks out the information in Figure 2.2 further by showing the proportion of ads that are negative under the five different measures conditional on the number of competitors in each election. Here we see that the trend in the tables is consistent with

[70] An alternative measure of the number of effective candidates could be obtained using polling data collected at an early stage of the campaigns. However, it is hard to find reliable data of polls for all primary elections. A popular resource on trends in American public opinion is PollingReport, which systematically reports all the electoral polling data that have been collected during a US campaign. According to PollingReport we could recover information about only 31 primary races that actually have primary match-up polls. With this small sample size, we still find that duopolies have more than double the probability of going negative when compared to non-duopolies.

[71] Each of the mean negativity values between duopolies and non-duopolies for both election cycles as displayed in Figure 2.2 are statistically different from each other at the 1% level.

prediction 2 - there is a monotone relation on negativity as we add competitors beyond two. Interestingly, for most of the measures, the bulk of the reduction is realized in just doubling the number of players from 2 to 4 players (two person races having between 4 and 10 times the rate of negative ads as four person races). If we restrict attention to advertising that spends the whole time attacking, i.e., *Negative4*, we also see that with just 5 players, the rate of negative advertising virtually goes to zero (note that while the number of races with five or more players is small, the number of advertisements with five or more races is not, the sample size being roughly between 7,800 and 9,800). Thus with just a handful of competitors, we see that the monotone effect of negativity in the number of players can drive negativity to almost zero. This effect is consistent across years, though we do see that there is an elevated unconditional level of negativity in 2008 as compared to 2004 for those ads containing any type of attack, or those labeled “Negative1." We think this could be in part attributed to the negative, lengthy Democratic Presidential primary in 2008, though it should be noted that each election year is intrinsically different. Hence, throughout the analysis, we continue to keep the two years separate.

**Regression Analysis**

The evidence presented above illustrated a revealing empirical relationship between the number of competitors and the incentives for going negative. The steep reduction in the rate of negative advertising that is associated with adding just a few players suggests that our hypothesis is a first order reason for the high rates of negative advertising in political markets overall (since most elections in the United States are head to head duopoly races). In this section we will consider the robustness of these results to the possible presence of omitted variable bias. The possible endogeneity concern is that factors that lead a race to only have a few candidates might also be related to the factors that cause the “tone" of an election to be more negative. While we view entry into a primary race as a highly

idiosyncratic event and hence exogenous to the decision to go negative upon entering (which accords with a common wisdom in political science, see e.g., Brady et al. (2007)), we can nevertheless show that introducing control variables that are likely candidates for explaining negativity at the election level (and might be associated with entry) do not alter the estimated magnitude of the effect of competition on negativity.[72] We restrict attention to the two most straightforward categories of negativity, i.e., *Negative1* and *Negative4*.[73]

While we focus on elections that share many institutional features, still, they might be heterogenous with respect to political factors. This factors may affect the value of the seat as well as the electoral prospects, and consequently might influence entry and perhaps the tone of the campaign. The first control we consider is the presence of an incumbent in the election. If there is an incumbent (own party) running for the seat, then there is presumably a lower chance other candidates can win it, which may decrease the number of potential entrants. In our sample,the average number of candidates is 2.04 and 3.15, conditional on the incumbent running or not running respectively, in 2004. Similar numbers are obtained using the 2008 sample (2.41 and 2.94, respectively). Upon entering, as an incumbent's policy and personal stances are common knowledge, he/she can spend the duration of the campaigning attacking opponents, thus increasing the volume of negative advertising. Furthermore, the presence of an incumbent may affect the propensity of going negative of his/her opponent as well (it could be more likely to observe attacks directed towards the incumbent, whose past exposure makes it easier to collect information).[74]

[72]One might also be concerned that primaries with prospects of a close general election may have more candidates and less negativity, as politicians fear they may alienate their electorate. However, we find that there was no significant difference in entry when the general election was close. For example, the mean "Effective N" was 3.08 for close elections and 3.17 for elections that were less close, where we define "close" as within a 5% margin. Even if we relax this to 10%, we obtain the same result.

[73]We use the "Effective N" measure of competition, however the robustness results that we present would also hold if we had used the Ballot measure of N. See the Online Appendix for these results.

[74]Recall that this study restricts its analysis to primaries, so each election does not have an incumbent and a challenger, as in general elections. In fact, only 24 of the 104 races in the dataset contain an incumbent.

The second control variable uses a unique feature of the political primary process - the existence of the opposing party's primary for the same political seat. If the opposing party is fielding an especially strong candidate, then it makes it less likely that anyone from a candidate's own party will succeed in the general election. Intuitively, if a strong candidate runs in the Democratic primary, this can reduce negativity in the Republican primary, as forward-looking candidates may internalize their general election prospects.[75] To measure this, we construct the opposing party's Herfindahl-Hirschman Index (henceforth, HHI), a measure of concentration of the popular vote share across candidates. As HHI gets large, the popular vote is becoming more concentrated on a small number of candidates. Thus a more concentrated HHI captures the presence of a dominant candidate in the election.[76,77]

Third, we return to Table 2.2, where we saw that gubernatorial races are more susceptible to lower entry. A feature of most gubernatorial races that we attribute to this reduced entry is the existence of term limits, which reduces the average duration of a Governor's careers, and therefore lowers the value of the seat.[78] While U.S. Senate and House races, dating back to the drafting of the U.S. Constitution, do not restrict the number of terms a Congressman can hold, there is variation amongst states in the number of terms a governor can hold. Table 2.6 outlines these state policies for the states in our sample.[79] Within our sample, three states have no term limits for gubernatorial candidates. At the same

[75]While Malhotra and Snowberg (2010) find that each state's presidential primary contest/campaign in the 2008 election did not change the probability a party would win the general election. We are still concerned that in Governor, House, and Senate primary races, candidates may be forward looking.

[76]When the opposing party has no entrants, we set HHI to 0, and when the opposing party's candidate runs unopposed, HHI=1, as in a monopoly.

[77]The correlation between own party HHI and our measure of log(EffN) are -0.6849 and -0.6511 for 2004 and 2008 respectively. We do not control for own party HHI, as this variable is constructed using vote shares, which are likely to be influenced by negativity. On the contrary, it is unlikely that negativity in the own party's primary should affect the election results in the primary of the opposing party.

[78]For example, Diermeier et al. (2005) estimate that term limits induce a large reduction in the value of Congressional seats: 32% for a House seat and 21% for a Senate seat.

[79]Besley and Case (1995) uses this variation in gubernatorial term limits in their study of electoral accountability and economic policy choices.

time, eight states have some limit to the number of terms (or consecutive terms) a candidate can serve. For each of these states, the existence of a term limit is spelled out in the original state constitution. Though some of the specific details have been edited over time, there has been no change in the initial decision to adopt or not adopt term limits within the states in our sample, and changes to the original constitution are laborous, often including constituent support on a ballot.[80] This state and office level variation in term limits could potentially affect the value of the office, and hence the desire to have a particularly negative battle.[81]

We start with the results pertaining to *Negative1*, and regress the share of negative ads in an election on the number of effective candidates and the aforementioned controls (weighting observations by the number of ads to control for heteroskedasticity). Table 2.7 produces the election level results, where the percent of negative advertising is monotonically decreasing in the number of effective competitors. Specifically, Columns (1) and (5) show the regression of negative advertising on the log number of effective candidates, for 2004 and 2008 respectively. Both of these regressions are run without any controls, and the coefficients capture the unconditional moment found in Table 2.5: doubling the number of candidates (say going from 2 to 4) leads to an absolute decline in the probability of going negative of about 40 percent, in 2004, and by 25 percent in 2008. Specifications (2) and (6) then show that the effects from the unconditional regressions (1) and (5) remain approximately the same when we add control variables that might also be related to the likelihood of an advertisement being negative and/or the number of candidates who enter.. The coefficient on log(Effective N) does not change in 2008, and decreases somewhat in 2004, though our basic economic story remains the same. Columns (3), (4), (7), and

[80]The only exception to this is the Governor of Utah, who was formerly limited to serving three terms; all term limit laws were repealed by the Utah Legislature in 2003; Utah, however, is one of the only states where gubernatorial term limits are not set in the constitution.

[81]If we instead control for the type of race, our results do not change.

(8) replicate these results with a duopoly indicator variable instead of Effective N. The magnitudes here mirror the findings in Figure 2.2 with a regression framework, where we see that in 2004, duopolies have about a 25 percent absolute higher probability of airing a negative ad than non-duopolies (or more than double), and in 2008, this is closer to 15%. When including controls, these basic findings remain robust. Indeed, it appers that duopolies exhibit between a 15 and 20 percent more negativity when compared to non-duopolies in U.S. primary contests. The only significant control across specifications is incumbency in 2004. As expected, in the presence of an incumbent, the tone of the campaign is more negative.

Next, we show that our results are not particular to the Negative1 measure. In Table 2.8, we replicate our analysis for the Negative4 measure, and the same phenomenon holds. The unconditional regressions replicate the effects found in Figure 2.2 and Table 2.7, where doubling the number of candidates results in about a 10 percent percent decrease in the fraction of purely negative advertisements, in both election cycles. Or, from Columns (3), (4), (7,) and (8), duoplies exhibit between 6 and 10 percentage points more negativity than non-duopolies in 2004 and 2008 respectively. It should be noted that the "No Term Limit" variable is associated with more negativity in 2008, and less in 2004. We attribute this to the different samples of races, especially the fact that there are different states with and without gubernatorial term limits in the two election years. In particular, we note that there are differences between each election cycle, and despite these differences, the main effect of the number of competitors on negativity remains unchanged.

Next, we exploit the rich structure of the WiscAds data and introduce several additional controls at the ad and candidate levels in order to gain a better sense of any confounding factors. We also explore additional factors that may contribute to explain the propensity of going negative. At the ad level, in addition to the controls previously discussed, we look at the number of days from the primary election that the ad aired, as

the WiscAds data provides us with the specific date each ad airs. The ad level nature of observations gives us the benefit of having more data, allowing us to have a richer specification. Since each primary has a different duration, we standardize this measure normalizing it by the length of the campaign. “Days until Election" is continuous on the interval (0,1), and takes a value equal to one at the farthest day away from the election and 0 at the election day. One would expect that as the election approaches, all candidates may be more likely to engage in negative advertising. At the candidate level, we include an indicator for whether or not the advertiser has political experience, which is defined as having held an elected office at the state level or higher (i.e. state Senate). Recall that in Table 2.3, the only difference between duopolies and non-duopolies in terms of candidate characteristics is that candidates in duopolies are more likely to have held a political office in the past.[82] We also include controls at the election level, including the partisan affiliation of the primary, the total ad volume in the election, and the covariates previous described and shown in Tables 2.7 and 2.8. First, we may worry that one party historically has more negative primaries than the other, and may also attract more candidates in a certain time period (i.e., if it is the dominant party), so we also control for whether or not the race was Republican. Second, we control for the total volume of advertising in an election, where we take the natural log of this number, as elections with more ads will likely increase the probability that each ad is negative.[83]

In the next set of results, we employ a linear probability model for the event that an advertisement in the data is negative (where we are careful to cluster the ad level observations at the election level to control for any unobserved shock that correlates observations

[82]We also run specifications including all the demographics we have collected. As expected, the results do not change. Furthermore, none of the additional demographics seems to influence the tone of the campaign. (See the Online Appendix for more details.)

[83]If we control for the total number of ads at the candidate level (rather than election election), the results still hold (see Online Appendix). Similarly, if incumbency is a dummy variable equal to 1 if the ad is aired by the incumbent, the results still hold. We chose to control for political experience instead, as incumbency is a subset of this variable.

within an election, and we are also careful to use robust standard errors to control for heteroskedasticity).[84] Our basic marginal effects do not change in an economically significant way when we use a logit instead of a linear probability model as illustrated in Tables 2.11 and 2.12.[85]

We continue with the results pertaining to *Negative1*. Table 2.9 reproduces the main effect we found in the data within an ad-level regression framework. As before, specifications (1) and (5) show the regression of negative advertising on the log number of effective candidates, and specifications (3) and (7) show the regression of negativity on a duopoly indicator variable. Both of these regressions are run without any controls, and the coefficients capture the unconditional moment found in Figure 2.2 and Table 2.5 as well as the coefficients from Tables 2.7 and 2.8: doubling the number of candidates leads to an absolute decline in the probability of going negative of between 25 and 40 percent, and duopolies have between a 15 and 25 percent absolute higher probability of airing a negative ad than non-duopolies (or almost double).

Specifications (2), (4), (6) and (8) in Table 2.9 then show that the effects from the unconditional regressions (1), (3), (5), and (7) remain approximately the same when we add all the control variables that have been discussed that might also be related to the likelihood of an advertisement being negative or entry. The significant controls across specifications are the partisan color of the primary, the total ad volume, and the time to election. The latter variable's estimated coefficient is significant and negative in specifications (2), (4), (6) and (8), meaning that as we get closer to the election day the probability of going negative increases. Interestingly, the presence of an incumbent in the election no longer seems

[84] Our use of clustered standard errors throughout the paper is a conservative strategy for the standard errors. Given our data has a "long panel" dimension (many advertisements within each race), imposing more model structure would allow us to improve upon standard errors. It is reassuring that such additional modelling structure is not needed for our main substantive results to hold.

[85] If we include media market level fixed effects to absorb any variation that may affect the demand for negativity at the market level in the ad-level regressions, our substantive results are unaltered.

to play a role after we include these additional controls.[86] In specifications (2), (4) and (6) we see that Republicans are more likely to attack in primaries than Democrats. Also, elections with a higher total quantity of advertising allocate a larger fraction of those ads towards being negative. In specification (4), we see that additional political experience increases the inclination for a candidate to run a negative ad, though we do not see this same relationship in column (2) or in 2008. The coefficient of interest, however, remains similar in magnitude throughout.

Finally we note that these results are again not particular to the *Negative1* measure. In Table 2.10, we show the corresponding analysis for the *Negative4* measure, and the same phenomenon holds, as well as the consistency with the previous results at the election level. The unconditional regressions replicate the effects found in Figure 2.2 and Table 2.5, as well as Table 2.8 and the controls do not fundamentally change the order of magnitude of the effect.

When we estimate the above specifications using each ad as unit of observation, we essentially weight ads aired by candidates that made an extensive use of advertising more heavily. If candidates who advertise more are also more prone to engage in negative advertising, then our finding are driven by just a few candidates. Therefore, we now verify if we obtain similar findings when the candidate is the unit of observation.[87] This final set of results is reported in Tables 8-A and 9-A of the Online Appendix and substantively similar to the results previously discussed.

[86] When we instead control for the incumbency status of the advertiser, we obtain the same insignificant coefficient for incumbency, and it does not alter the sign and magnitude of the estimated coefficient for Effective N.

[87] In this specification, we also weight by the total advertising volume of each candidate, as with the election-level results.

# V. The Spillover Effect

To aid the understanding of the spillover effect, we now consider an illustrative model to describe the mechanism underlying it. To illustrate the spillover effect in a model of political competition, we appeal to the literature that views voter mobilization as the primary objective of campaigning (see e.g., Snyder (1989) and Shacar and Nalebuff (1999)).[88] In the same spirit as these papers, we black-box the underlying mechanism by which voters' choices are affected by campaigning, and posit a model in which candidates engage in positive (negative) advertising to mobilize (demobilize) their own (opponent's) supporters. The model is revealing in that there is no "spillover" directly built into the technology that mobilizes voters - by negatively advertising against your opponent, you only persuade his supporters to stay home rather than to vote for someone else (which differentiates this setting from the more obvious spillover story among firms, where negative advertising against your opponent causes some of its customers to flock to to a different firm). The key effect we show is that when $L$ is greater than two, engaging in negative ads nevertheless creates positive externalities to those opponents that are not the object of the attack. On the contrary, positive ads benefit only the advertiser. Therefore, it is the strategic nature of the interaction that creates a spillover effect and reduces the incentive to use negative advertising when facing more than one opponent. We emphasize that our model is not the only way to capture the spillover effect, but just one revealing way to illustrate it.

We begin by assuming that candidates simultaneously choose how to allocate their budget between two different forms of campaigning to increase their support on election

[88] Another strand of the theoretical literature focuses on the informative role of advertising (see for instance Coate (2004A,B), Galeotti and Mattozzi (2009), Polborn and Yi (2006), and Prat (2002)). In particular, Polborn and Yi (2006) differentiate between positive and negative advertising. In the context of incomplete information, they show that balancing negative and positive advertising provides voters with the most information. They argue that negative advertisements show a different side of the candidate that a voter will not be exposed to without this type of technology.

day. Specifically, each candidate $i$ chooses positive advertising ($P_i$) to increase the number of his own voters that go to the polls, and negative advertising to keep candidate $j$'s supporters home ($\mathbf{N}_i^j = N_i^1, \ldots, N_i^L$) on election day. Let $k = 1, \ldots, L$ denote a candidate and $\Pi_{k_0}$ her political support in the absence of a campaign. We assume that the number of votes that candidate $i$ receives after the campaign is equal to,

$$\Pi_i \left( P_i, N_1^i, \ldots, N_L^i \right) = \Pi_{i_0} \frac{P_i^\alpha}{\left( \eta + \sum_j N_j^i \right)^\beta} \tag{2.1}$$

where $\alpha, \beta \in (0,1)$, and $\eta$ is a small positive constant.[89] Note that $P_i^\alpha / (\eta + \sum_j N_j^i)^\beta$ is increasing and concave in $P_i$ and decreasing and convex in $N_j^i$. This assumption captures the idea that the number of $i$'s supporters that are mobilized is directly affected by both the amount of $i$'s positive ads and the amount of negative ads that $i$ receives from her opponents, and the marginal mobilization effect of an ad is decreasing. The functional form we use is merely illustrative, and the example can be expanded to allow for more general voter mobilization technologies.

Letting $\pi_k$ denote candidate $k$'s political market share (vote share) we have that

$$\pi_i = \frac{\Pi_{i_0} \frac{P_i^\alpha}{\left( \eta + \sum_j N_j^i \right)^\beta}}{\sum_{k=1}^{L} \Pi_{k_0} \frac{P_k^\alpha}{\left( \eta + \sum_j N_j^k \right)^\beta}}.$$

Each candidate has the same war chest, which we normalize to be equal to 1. The objective

[89] A small positive value of $\eta$ guarantees that the expression in (2.1) is well-defined also when $\sum_j N_j$ is equal to 0. Other than this, $\eta$ plays no role in the analysis.

of the candidate is to maximize his vote share $\pi_i(\cdot)$ given his budget constraint $P_i + N_i^1 + \ldots + N_i^L = 1$, which is a plausible assumption in primaries. Note that it will always be the case that $N_i^i = 0$ for all $i$.

To see how the model generates a spillover effect, let's consider a three person race. After substituting in the budget constraint, the problem for candidate $k = 1$ is

$$\max_{(P_1, N_1^2)} \frac{\Pi_{1_0} \left( \frac{P_1}{\eta + N_2^1 + N_3^1} \right)^{\alpha}}{\Pi_{1_0} \left( \frac{P_1}{\eta + N_2^1 + N_3^1} \right)^{\alpha} + \Pi_{2_0} \left( \frac{P_2}{\eta + N_1^2 + N_3^2} \right)^{\alpha} + \Pi_{3_0} \left( \frac{P_3}{\eta + \left(1 - P_1 - N_1^2\right) + N_2^3} \right)^{\alpha}} \tag{2.2}$$

and similarly for candidates $k = 2, 3$. Thus we see that in (2.2), $\Pi_1$ decreases in $N_2^1$ and $N_3^1$ (the negative advertising of its opponents against candidate one), but it increases in $N_2^3$ and $N_3^2$ (the negative advertising of candidate 1's opponents against each other). Since the terms $N_2^3$ and $N_3^2$ would not enter candidate 1's objective function in a two person race, they capture the spillover effects caused by adding competitors to a race.

The spillover effect directly translates to the equilibrium solution of the model. We focus on the symmetric case where $\alpha = \beta$ and $\Pi_{i_0}$ is equal across candidates $i$. In a $L = 3$ person race, the unique symmetric equilibrium is

$$P_i = \frac{2 + 2\eta}{3} \text{ and } N_i^j = \frac{1 - \eta}{6} \text{ for all } i.$$

However the unique symmetric equilibrium in an $L = 2$ person race is

$$P_i = \frac{1 + \eta}{2} \text{ and } N_i^j = \frac{1 - \eta}{2}.$$

The details of the derivations are in the appendix. This result shows that when $\eta$ is small, a candidate is almost indifferent between engaging in positive or negative advertising in

a two-candidate race, but strictly prefers positive advertising in a three person race. In words, a competitor in a three-candidate race is more likely to engage in positive rather than in negative advertising.

# VI. Concluding Remarks

In this paper we provide an explanation for the high volume of negative advertising that is generally found in the U.S. political market. When the number of competitors in a market is greater than two, engaging in negative ads creates positive externalities to those opponents that are not the object of the attack. However political competition in the U.S. is largely characterized by “duopolies" (races with only two viable competitors, i.e. Republican versus Democrat), where this spillover effect is not present, thus creating a greater incentive for negative advertising. This suggests that, perhaps including a viable third party in U.S. contests may decrease the amount of attack advertising.

Using a dataset about primary elections in 2004 and 2008 merged with the WiscAds data, we find that duopolies are two to four times more likely to use negativity in an advertisement than non-duopolies. In addition, adding just a handful of competitors drives the rate of negativity found in the data quite close to zero. These results show that the data are not just consistent with our theory in a directional sense, but the magnitude of the results suggest that this economic mechanism appears to have first order implications for why political markets are associated with producing more negativity than product markets (since political contests in the United States are more likely to be characterized by head to head duopoly competition than product markets). Note that there could be other confounding factors that contribute to explain the larger use of negative ads in politics when compared to everyday product markets. For example, political markets are “winner take all markets" where it is winning a plurality of votes rather than the absolute

market share that matters, and hence the convexity of the objective function could partly fuel the incentive to go negative. Furthermore, the time horizon is different: whereas firms repeatedly interact without a definite end in sight, competitors in a political campaign face a finite horizon that ends with the election day, and hence it may be harder to cooperate on staying positive. Lastly, whereas the FTC regulates deceptive advertising by businesses, it does not have any jurisdiction over political ads, perhaps giving politicians more legal leeway to air attack ads. However, we can abstract from these aspects, and isolate the role played by the number of competitors, by considering only political races that share similar institutional features but have different number of competitors.

Our results contain policy implications for the regulation of political contests. Consider for example campaign finance reform. If relaxing spending caps decreases the number of candidates entering races,[90] then an unintended consequence of such a policy would be an increase in the negative tone of the campaign advertising. Understanding the presence of such unintended consequences should help inform the policy debate on campaign finance reform and also the debate on controlling the amount of negativity in politics.

[90]See for example Iaryczover and Mattozzi (2010).

# Figures

Figure 2.1: Top 100 Media Markets

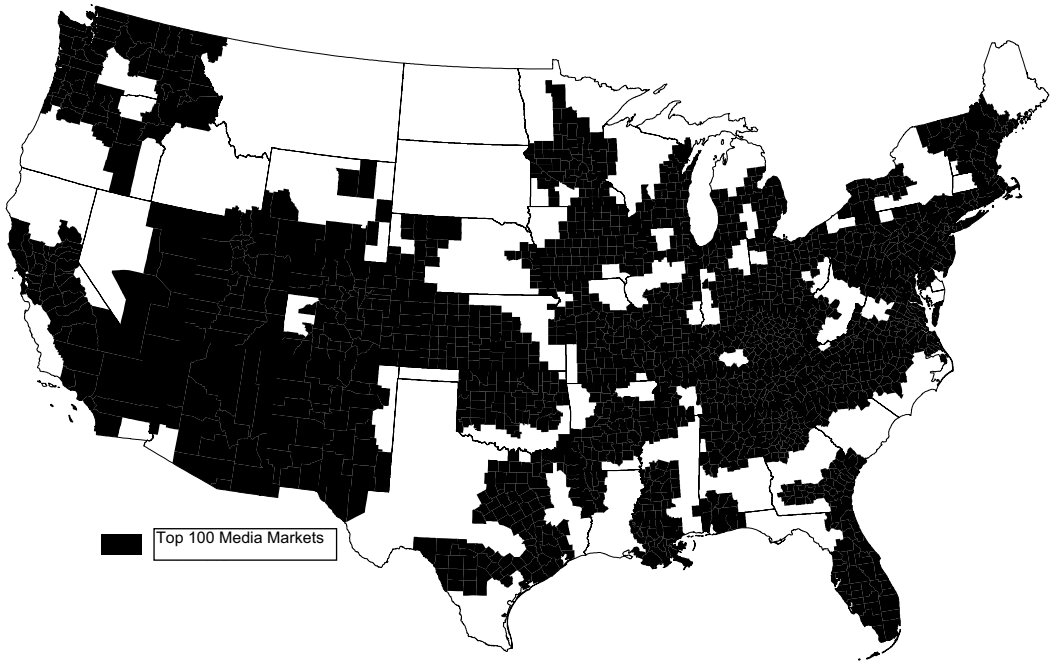
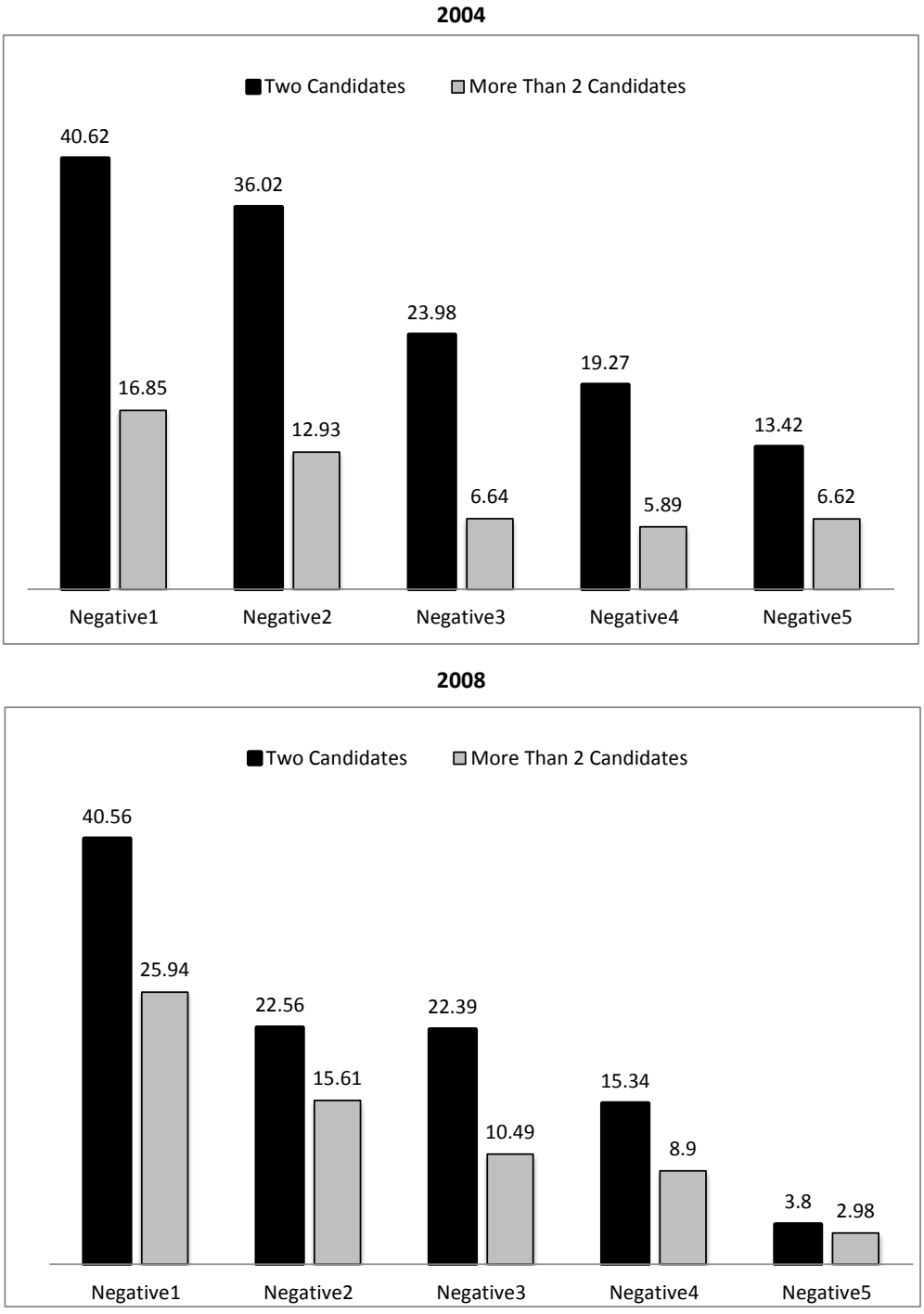


Figure 2.2: Frequency of Negative Ads with Two Candidates and more than Two Effective Candidates




All means are significantly different at the 1% level

# Tables

Table 2.1: Ballot N and Effective N

**2004**

| Ballot N | Frequency | CDF | Effective N | Frequency | CDF |
|---|---|---|---|---|---|
| 1 | 0 | 0 | 1 | 1 | 0.96 |
| 2 | 38 | 36.54 | 2 | 49 | 48.08 |
| 3 | 25 | 60.58 | 3 | 28 | 75 |
| 4 | 15 | 75 | 4 | 16 | 90.38 |
| 5 | 4 | 78.85 | 5 | 6 | 96.15 |
| 6 | 8 | 86.54 | 6 | 3 | 99.03 |
| 7 | 3 | 89.42 | 7 | 1 | 100 |
| 8 | 6 | 95.19 | 8 | 0 | 100 |
| 9 | 2 | 97.11 | 9 | 0 | 100 |
| 10 | 3 | 100 | 10 | 0 | 100 |
| **Total** | 104 | | **Total** | 104 | |

**2008**

| Ballot N | Frequency | CDF | Effective N | Frequency | CDF |
|---|---|---|---|---|---|
| 1 | 0 | 0 | 1 | 3 | 2.54 |
| 2 | 46 | 38.98 | 2 | 58 | 51.69 |
| 3 | 29 | 63.56 | 3 | 30 | 77.11 |
| 4 | 17 | 77.97 | 4 | 21 | 94.91 |
| 5 | 12 | 88.14 | 5 | 4 | 98.3 |
| 6 | 7 | 94.07 | 6 | 1 | 99.15 |
| 7 | 4 | 97.46 | 7 | 0 | 99.15 |
| 8 | 1 | 98.31 | 8 | 1 | 100 |
| 9 | 1 | 99.16 | 9 | 0 | 100 |
| 10 | 1 | 100 | 10 | 0 | 100 |
| **Total** | 118 | | **Total** | 118 | |

Table 2.2: Summary of Office by Effective Number of Candidates

| | **2004** | | | | **2008** | | | |
|---|---|---|---|---|---|---|---|---|
| Candidates | Senate | House | Governor | Races | Senate | House | Governor | Races |
| 2 | 10 | 30 | 9 | 49 | 12 | 40 | 6 | 58 |
| | 20.4% | 61.2% | 18.4% | | 20.7% | 69.0% | 10.3% | |
| 3 | 7 | 18 | 3 | 28 | 7 | 23 | 0 | 30 |
| | 25.0% | 64.3% | 10.7% | | 23.3% | 76.7% | 0.0% | |
| 4 | 5 | 9 | 2 | 16 | 2 | 18 | 1 | 21 |
| | 31.3% | 56.3% | 12.5% | | 9.5% | 85.7% | 4.8% | |
| 5 | 3 | 3 | 0 | 6 | 1 | 3 | 0 | 4 |
| | 50.0% | 50.0% | 0.0% | | 25.0% | 75.0% | 0.0% | |
| 6 | 0 | 3 | 0 | 3 | 0 | 1 | 0 | 1 |
| | 0.0% | 100.0% | 0.0% | | 0.0% | 100% | 0.0% | |
| 7 | 1 | 2 | 0 | 3 | 0 | 0 | 0 | 0 |
| | 33.3% | 66.7% | 0% | | 0% | 0% | 0% | |
| 8 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 |
| | 0.0% | 0.0% | 0.0% | | 0.0% | 100% | 0.0% | |
| **Total Races** | 25 | 63 | 15 | 103 | 22 | 86 | 7 | 115 |

Table 2.3: Candidate Characteristics do Not Differ Across the Duopoly Measure

| | **2004** | | **2008** | |
|---|---|---|---|---|
| | Non-Duopoly | Duopoly | Non-Duopoly | Duopoly |
| Male | 0.818 | 0.883 | 0.817 | 0.808 |
| | (0.387) | (0.323) | (0.389) | (0.397) |
| White | 0.924 | 0.868 | 0.893 | 0.908 |
| | (0.267) | (0.340) | (0.310) | (0.291) |
| College Degree | 0.931 | 0.974 | 0.980 | 0.959 |
| | (0.254) | (0.161) | (0.139) | (0.120) |
| Law School | 0.382 | 0.408 | 0.284 | 0.347 |
| | (0.488) | (0.495) | (0.453) | (0.479) |
| Political Experience | 0.470* | 0.618* | 0.529 | 0.645 |
| | (0.501) | (0.489) | (0.502) | (0.482) |
| Observations | 131 | 76 | 125 | 86 |

Note: sources of demographic variables available upon request.
Mean of each variable with standard deviation in parentheses.
Duopoly defined using the “Effective N" measure.
* Significantly different at the 5% level.

Table 2.4: Breakdown of Ads by Races

| | **2004** | | **2008** | |
|---|---|---|---|---|
| | Number of Ads | Percent of Total Ads | Number of Ads | Percent of Total Ads |
| U.S. Senate | 102,051 | 42.09 | 44,484 | 23.53 |
| U.S. House | 42,560 | 17.55 | 83,765 | 44.31 |
| Governor | 97,850 | 40.36 | 60,797 | 32.16 |
| Total | 242,461 | | 189,046 | |

Table 2.5: Percent of Negative Advertisements, using Effective N

**2004**

**Overall**

| | Negative1 | Negative2 | Negative3 | Negative4 | Negative5 | Sample Size |
|---|---|---|---|---|---|---|
| | .2673 | .2252 | .1385 | .1385 | .0945 | 242, 448 |

**By Number of Candidates**

| | Negative1 | Negative2 | Negative3 | Negative4 | Negative5 | Sample Size |
|---|---|---|---|---|---|---|
| 2 | 0.4062 | 0.3602 | 0.2398 | 0.1927 | 0.1342 | 100,736 |
| 3 | 0.2779 | 0.2271 | 0.1273 | 0.1135 | 0.114 | 59,949 |
| 4 | 0.0865 | 0.0547 | 0.0226 | 0.0208 | 0.0281 | 73,957 |
| 5 or more | 0.1058 | 0.0852 | 0.014 | 0.0014 | 0.0607 | 7,806 |
| P-value | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | |

**2008**

**Overall**

| | Negative1 | Negative2 | Negative3 | Negative4 | Negative5 | Sample Size |
|---|---|---|---|---|---|---|
| | 0.338 | 0.194 | 0.169 | 0.124 | 0.034 | 177,117 |

**By Number of Candidates**

| | Negative1 | Negative2 | Negative3 | Negative4 | Negative5 | Sample Size |
|---|---|---|---|---|---|---|
| 2 | 0.406 | 0.226 | 0.224 | 0.153 | 0.038 | 95,369 |
| 3 | 0.351 | 0.221 | 0.137 | 0.115 | 0.047 | 38,339 |
| 4 | 0.174 | 0.102 | 0.082 | 0.073 | 0.008 | 33,598 |
| 5 or more | 0.088 | 0.088 | 0.058 | 0.042 | 0.039 | 9,811 |
| P-value | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | |

Notes: All variables Negative1 through Negative 5 are dummies for whether or not the ad is “Negative" given the following specifications. Negative1 includes all ads that are attack ads or contrast ads. Negative2 encompasses all ads that attack for at least half of the airtime. Negative3 looks at attack ads and all contrast ads that end with an attack. Negative4 includes all ads that are only attack ads. Negative5 accounts for ads that attack for at least half of the airtime and are focused on personal issues rather than policy. P-value is the probability that percent of negative ads is equal across N.

Table 2.6: Governor Term Limits

| State | Term Length | Term Limit | Specific Term Description | Year Term Limit Most Recently Amended |
|---|---|---|---|---|
| DE | 4 years | Y | 3 Terms | 1831 |
| IN | 4 years | Y | 2 Consecutive terms (8 out of every 12 years) | 1972 |
| KY | 4 years | Y | 2 Consecutive terms (8 out of every 12 years) | 1992 |
| LA | 4 years | Y | 2 Consecutive terms (8 out of every 12 years) | 1986 |
| MS | 4 years | Y | 2 Consecutive terms (8 out of every 12 years) | 1986 |
| MO | 4 years | Y | 2 Terms | 1970 |
| NC | 4 years | Y | 2 Consecutive terms (8 out of every 12 years) | 1971 |
| WV | 4 years | Y | 2 Terms | 1970 |
| NH | 2 years | None | NA | – |
| UT | 4 years | None | NA | 2003 |
| WA | 4 years | None | NA | – |

Table 2.7: Election-Level Effects Using Regression Framework, Negative1

| **Dependent Variable = Percent of Ads that EVER Attacked** | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Year | 2004 | 2004 | 2004 | 2004 | 2008 | 2008 | 2008 | 2008 |
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| log(Effective N) | -0.421*** | -0.292*** | | | -0.248*** | -0.258*** | | |
| | (0.0550) | (0.0667) | | | (0.0718) | (0.0816) | | |
| Duopoly | | | 0.238*** | 0.132*** | | | 0.147*** | 0.159*** |
| | | | (0.0375) | (0.0451) | | | (0.0498) | (0.0573) |
| Incumbent in Election | | 0.165*** | | 0.178*** | | -0.0231 | | -0.00871 |
| | | (0.0580) | | (0.0627) | | (0.0680) | | (0.0681) |
| No Term Limits | | -0.0616 | | -0.0876** | | 0.0602 | | 0.0601 |
| | | (0.0397) | | (0.0413) | | (0.0636) | | (0.0660) |
| HHI Opposing Party | | 0.0640 | | 0.104 | | 0.117 | | 0.136* |
| | | (0.0667) | | (0.0686) | | (0.0768) | | (0.0765) |
| Observations | 103 | 103 | 103 | 103 | 115 | 115 | 115 | 115 |

Standard errors in parentheses. OLS Regressions weighted by total ad volume in election.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 2.8: Election-Level Effects Using Regression Framework, Negative4

| | **Dependent Variable = Percent of Ads that ONLY Attacked** | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Year | 2004 | 2004 | 2004 | 2004 | 2008 | 2008 | 2008 | 2008 |
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| log(Effective N) | -0.235*** | -0.151*** | | | -0.101** | -0.150*** | | |
| | (0.0343) | (0.0417) | | | (0.0458) | (0.0517) | | |
| Duopoly | | | 0.134*** | 0.0679** | | | 0.0643** | 0.105*** |
| | | | (0.0230) | (0.0278) | | | (0.0314) | (0.0360) |
| Incumbent in Election | | 0.0967*** | | 0.104*** | | 0.0164 | | 0.0229 |
| | | (0.0363) | | (0.0386) | | (0.0431) | | (0.0427) |
| No Term Limits | | -0.0574** | | -0.0710*** | | 0.0836** | | 0.0904** |
| | | (0.0248) | | (0.0254) | | (0.0403) | | (0.0414) |
| HHI Opposing Party | | 0.0260 | | 0.0468 | | -0.0288 | | -0.0210 |
| | | (0.0417) | | (0.0422) | | (0.0487) | | (0.0480) |
| Observations | 103 | 103 | 103 | 103 | 115 | 115 | 115 | 115 |

Standard errors in parentheses. OLS Regressions weighted by total ad volume in election.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 2.9: Ad Level Effects Using Regression Framework, Negative1

| **Dependent Variable: Negative1 = 1 if the ad EVER attacked an opponent** | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Year | 2004 | 2004 | 2004 | 2004 | 2008 | 2008 | 2008 | 2008 |
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| log(Effective N) | -0.421*** | -0.334*** | | | -0.247*** | -0.251*** | | |
| | (0.0955) | (0.0675) | | | (0.0843) | (0.0943) | | |
| Duopoly | | | 0.238*** | 0.185*** | | | 0.146** | 0.162** |
| | | | (0.0731) | (0.0498) | | | (0.0646) | (0.0741) |
| Incumbent in Election | | 0.115 | | 0.101 | | 0.0253 | | 0.0387 |
| | | (0.0784) | | (0.0778) | | (0.0945) | | (0.0964) |
| HHI Opposing Party | | 0.0522 | | 0.0811 | | 0.182* | | 0.198* |
| | | (0.0911) | | (0.0936) | | (0.108) | | (0.104) |
| No Term Limits | | 0.0228 | | 0.0217 | | 0.242*** | | 0.261*** |
| | | (0.0553) | | (0.0643) | | (0.0794) | | (0.0847) |
| Days Until Election | | -0.404*** | | -0.400*** | | -0.384*** | | -0.382*** |
| | | (0.0637) | | (0.0641) | | (0.0615) | | (0.0614) |
| Total Ad Volume | | 0.0559*** | | 0.0579*** | | 0.119*** | | 0.121*** |
| | | (0.0186) | | (0.0203) | | (0.0204) | | (0.0205) |
| Republican | | 0.0714* | | 0.0771* | | 0.119* | | 0.106 |
| | | (0.0414) | | (0.0446) | | (0.0717) | | (0.0723) |
| Political Experience | | 0.0699 | | 0.0937* | | 0.0298 | | 0.0532 |
| | | (0.0462) | | (0.0491) | | (0.0588) | | (0.0583) |
| Observations | 242448 | 242350 | 242448 | 242350 | 177117 | 157522 | 177117 | 157522 |

Notes: Robust standard errors clustered at the election level in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.
Effective N and duopoly measure created by only including “viable candidates" who received more than 5% of final vote share.
Political Experience equals one if the candidate who ran the advertisement has held an office of state Congress or greater.
Days until election is continuous on (0,1), it equals 1 at the farthest day from the election and 0 at election day.
Total Ad Volume is equal to the logged number of total ads run in the election.

Table 2.10: Ad Level Effects Using Regression Framework, Negative4

| **Dependent Variable: Negative4 = 1 if the ad ONLY attacked an opponent** | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Year | 2004 | 2004 | 2004 | 2004 | 2008 | 2008 | 2008 | 2008 |
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| log(Effective N) | -0.235*** | -0.168*** | | | -0.102* | -0.158** | | |
| | (0.0661) | (0.0502) | | | (0.0549) | (0.0675) | | |
| Duopoly | | | 0.134*** | 0.0910** | | | 0.0644 | 0.117** |
| | | | (0.0483) | (0.0380) | | | (0.0406) | (0.0510) |
| Incumbent in Election | | 0.0566 | | 0.0506 | | 0.0461 | | 0.0509 |
| | | (0.0689) | | (0.0702) | | (0.0672) | | (0.0673) |
| HHI Opposing Party | | 0.0454 | | 0.0606 | | 0.0116 | | 0.0173 |
| | | (0.0604) | | (0.0584) | | (0.0673) | | (0.0662) |
| No Term Limits | | -0.00749 | | -0.00902 | | 0.158*** | | 0.179*** |
| | | (0.0407) | | (0.0458) | | (0.0535) | | (0.0588) |
| Days Until Election | | -0.150*** | | -0.148*** | | -0.121*** | | -0.120*** |
| | | (0.0364) | | (0.0369) | | (0.0434) | | (0.0431) |
| Total Ad Volume | | 0.0410*** | | 0.0419*** | | 0.0551*** | | 0.0566*** |
| | | (0.0126) | | (0.0133) | | (0.0179) | | (0.0172) |
| Republican | | 0.0265 | | 0.0293 | | 0.0637 | | 0.0584 |
| | | (0.0301) | | (0.0313) | | (0.0413) | | (0.0408) |
| Political Experience | | 0.0486* | | 0.0604** | | 0.00278 | | 0.0189 |
| | | (0.0254) | | (0.0256) | | (0.0450) | | (0.0432) |
| Observations | 242448 | 242350 | 242448 | 242350 | 177117 | 157522 | 177117 | 157522 |

Notes: Robust standard errors clustered at the election level in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.
Effective N and duopoly measure created by only including “viable candidates" who received more than 5% of final vote share.
Political Experience equals one if the candidate who ran the advertisement has held an office of state Congress or greater.
Days until election is continuous on (0,1), it equals 1 at the farthest day from the election and 0 at election day.
Total Ad Volume is equal to the logged number of total ads run in the election.

Table 2.11: Ad-level Effects Using Logistic Regression, Negative1

| **Dependent Variable: Negative1 = 1 if the ad EVER attacked an opponent** | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Year | 2004 | 2004 | 2004 | 2004 | 2008 | 2008 | 2008 | 2008 |
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| log(Effective N) | -0.438*** | -0.377*** | | | -0.270*** | -0.284** | | |
| | (0.103) | (0.0735) | | | (0.0985) | (0.121) | | |
| Duopoly (d) | | | 0.238*** | 0.177*** | | | 0.146** | 0.173** |
| | | | (0.0731) | (0.0562) | | | (0.0646) | (0.0821) |
| Incumbent in Election (d) | | 0.0875 | | 0.0976 | | 0.0365 | | 0.0567 |
| | | (0.0717) | | (0.0827) | | (0.114) | | (0.118) |
| HHI Opposing Party | | 0.0325 | | 0.0803 | | 0.198* | | 0.220* |
| | | (0.112) | | (0.116) | | (0.118) | | (0.113) |
| No Term Limits (d) | | 0.00915 | | -0.0242 | | 0.260*** | | 0.277*** |
| | | (0.0605) | | (0.0747) | | (0.0792) | | (0.0842) |
| Days Until Election | | -0.433*** | | -0.433*** | | -0.427*** | | -0.425*** |
| | | (0.0712) | | (0.0740) | | (0.0697) | | (0.0690) |
| Total Ad Volume | | 0.0586*** | | 0.0545** | | 0.150*** | | 0.156*** |
| | | (0.0227) | | (0.0257) | | (0.0328) | | (0.0335) |
| Republican (d) | | 0.0888** | | 0.0906* | | 0.143* | | 0.129 |
| | | (0.0436) | | (0.0484) | | (0.0850) | | (0.0856) |
| Political Experience (d) | | 0.0699 | | 0.0858 | | 0.0410 | | 0.0678 |
| | | (0.0566) | | (0.0595) | | (0.0675) | | (0.0670) |
| Observations | 242448 | 242350 | 242448 | 242350 | 177117 | 157522 | 177117 | 157522 |

Marginal effects; Robust standard errors clustered at the election level in parentheses

(d) for discrete change of dummy variable from 0 to 1

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 2.12: Ad-level Effects Using Logistic Regression, Negative4

| **Dependent Variable: Negative4 = 1 if the ad ONLY attacked an opponent** | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Year | 2004 | 2004 | 2004 | 2004 | 2008 | 2008 | 2008 | 2008 |
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| log(Effective N) | -0.225*** | -0.162*** | | | -0.114* | -0.157** | | |
| | (0.0573) | (0.0450) | | | (0.0654) | (0.0671) | | |
| Duopoly (d) | | | 0.134*** | 0.0734** | | | 0.0644 | 0.101** |
| | | | (0.0483) | (0.0324) | | | (0.0406) | (0.0414) |
| Incumbent in Election (d) | | 0.0174 | | 0.0245 | | 0.0441 | | 0.0545 |
| | | (0.0419) | | (0.0475) | | (0.0642) | | (0.0683) |
| HHI Opposing Party | | 0.00819 | | 0.0339 | | 0.00390 | | 0.00940 |
| | | (0.0633) | | (0.0663) | | (0.0656) | | (0.0668) |
| No Term Limits (d) | | -0.00421 | | -0.0227 | | 0.129*** | | 0.139*** |
| | | (0.0271) | | (0.0322) | | (0.0382) | | (0.0401) |
| Days Until Election | | -0.112*** | | -0.118*** | | -0.110*** | | -0.109*** |
| | | (0.0385) | | (0.0384) | | (0.0361) | | (0.0361) |
| Total Ad Volume | | 0.0328*** | | 0.0333** | | 0.0603*** | | 0.0635*** |
| | | (0.0119) | | (0.0146) | | (0.0192) | | (0.0189) |
| Republican (d) | | 0.0276 | | 0.0296 | | 0.0618 | | 0.0562 |
| | | (0.0220) | | (0.0253) | | (0.0415) | | (0.0409) |
| Political Experience (d) | | 0.0367 | | 0.0443* | | 0.0113 | | 0.0251 |
| | | (0.0247) | | (0.0266) | | (0.0381) | | (0.0381) |
| Observations | 242448 | 242350 | 242448 | 242350 | 177117 | 157522 | 177117 | 157522 |

Marginal effects; Robust standard errors clustered at the election level in parentheses
(d) for discrete change of dummy variable from 0 to 1
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

# Appendix

We first show that if $\alpha = \beta$ and $L = 2$ then $P_i$ and $N_i^j$ approach $\frac{1}{2}$ when $\eta$ is arbitrarily small. The problem for candidate $k = 1$ is

$$\max_{(P1,N_1^2)} \frac{\Pi_{1_0}\left(\frac{P_1}{\eta+N_2^1}\right)^\alpha}{\Pi_{1_0}\left(\frac{P_1}{\eta+N_2^1}\right)^\alpha + \Pi_{2_0}\left(\frac{P_2}{\eta+N_1^2}\right)^\alpha} \qquad \text{s.t. } P_1 + N_1^2 = 1, \tag{2.3}$$

and similarly for candidate $k = 2$. By substituting in the budget constraints we get

$$\max_{P_1} \frac{1}{1+\frac{\Pi_{2_0}}{\Pi_{1_0}}\left(\frac{P_2(\eta+1-P_2)}{P_1(\eta+1-P_1)}\right)^\alpha}$$
$$\max_{P_2} \frac{1}{1+\frac{\Pi_{1_0}}{\Pi_{2_0}}\left(\frac{P_1(\eta+1-P_1)}{P_2(\eta+1-P_2)}\right)^\alpha}.$$

Note that the objectives are globally concave in $P_1$ and $P_2$, respectively. Furthermore they attain a unique maximum at

$$P_i = \frac{1+\eta}{2} \text{ and } N_i^j = \frac{1-\eta}{2}.$$

This result shows that when $\eta$ is small a candidate is almost indifferent between engaging in positive or negative advertising in a two-candidate race. We next show that this is not the case in a three-candidate race. Namely, $P_i > N_i^j$ when $L = 3$, even if $\alpha = \beta$. After substituting in the budget constraint, the problem for candidate $k = 1$ is

$$\max_{(P_1,N_1^2)} \frac{\Pi_{1_0}\left(\frac{P_1}{\eta+N_2^1+N_3^1}\right)^\alpha}{\Pi_{1_0}\left(\frac{P_1}{\eta+N_2^1+N_3^1}\right)^\alpha + \Pi_{2_0}\left(\frac{P_2}{\eta+N_1^2+N_3^2}\right)^\alpha + \Pi_{3_0}\left(\frac{P_3}{\eta+\left(1-P_1-N_1^2\right)+N_2^3}\right)^\alpha} \tag{2.4}$$

and similarly for candidates $k = 2, 3$.

The comparison between the vote share of candidate 1 ($\Pi_1$) in (2.3) and (2.4) highlights the spillover effect that rises when $N = 3$. For example, it is immediate to see that in (2.3) $\Pi_1$ is decreasing in $N_2^1$ . On the contrary, in (2.4) $\Pi_1$ still decreases in $N_2^1$ and $N_3^1$, but it increases in $N_2^3$ and $N_3^2$, which are the spillover effects of negative ads made by candidate 2 against candidate 3, and vice-versa.

By letting $\Pi_{1_0} = \Pi_{2_0} = \Pi_{3_0}$, and $\left(\frac{P_1}{\eta+N_2^1+N_3^1}\right)^\alpha + \left(\frac{P_2}{\eta+N_1^2+N_3^2}\right)^\alpha + \left(\frac{P_3}{\eta+\left(1-P_1-N_1^2\right)+N_2^3}\right)^\alpha = D$, we can rewrite (2.4) as[91]

$$\max_{\left(P_1,N_1^2\right)} \frac{\left(\frac{P_1}{\eta+N_2^1+N_3^1}\right)^\alpha}{D\left(\cdot\right)}.$$

Taking the first order condition with respect to $P_1$ we obtain,

$$\frac{\alpha\left(\frac{P_1}{\eta+N_2^1+N_3^1}\right)^\alpha \frac{1}{P_1} D - \alpha\left(\left(\frac{P_1}{\eta+N_2^1+N_3^1}\right)^\alpha \frac{1}{P_1} + \left(\frac{P_3}{\eta+\left(1-P_1-N_1^2\right)+N_2^3}\right)^\alpha \frac{1}{\eta+\left(1-P_1-N_1^2\right)+N_2^3}\right)\left(\frac{P_1}{\eta+N_2^1+N_3^1}\right)^\alpha}{D^2} = 0,$$

which can be rewritten as,

$$\frac{\alpha\left(\frac{P_1}{\eta+N_2^1+N_3^1}\right)^\alpha \left(\frac{1}{P_1} D - \left(\frac{P_1}{\eta+N_2^1+N_3^1}\right)^\alpha \frac{1}{P_1} - \left(\frac{P_3}{\eta+\left(1-P_1-N_1^2\right)+N_2^3}\right)^\alpha \frac{1}{\eta+\left(1-P_1-N_1^2\right)+N_2^3}\right)}{D^2} = 0.$$

Since $P = 0$ cannot be optimal in equilibrium, $\alpha\left(P_1/(\eta + N_2^1 + N_3^1)\right)^\alpha > 0$ and can be neglected. Furthermore, in the symmetric equilibrium, $D = 3\left(P/(\eta + 2N)\right)^\alpha$. Hence,

$$\left(\frac{P}{\eta+2N}\right)^\alpha \left(\frac{2}{P} - \frac{1}{\eta+1-P}\right) = 0.$$

[91] Assuming symmetry in the ex-ante market share and budget simplifies the exposition, but it is not needed for our results.

Therefore, $P_i = \frac{2+2\eta}{3}$ and $N_i^j = \frac{1-\eta}{6}$ for all $i$. It is easy to also show that the second first order condition with respect to $N_1^2$ is satisfied.

# Online Appendix

Table 2.1.A: Who Enters?

| | 2004 | | 2008 | |
|---|---|---|---|---|
| | Non-Advertiser | Advertiser | Non-Advertiser | Advertiser |
| Male | 0.835 | 0.841 | 0.840 | 0.812 |
| | (0.372) | (0.367) | (0.368) | (0.392) |
| White | 0.892 | 0.903 | 0.863 | 0.911 |
| | (0.311) | (0.296) | (0.345) | (0.286) |
| College Degree | 0.905 | 0.947 | 0.984 | 0.971 |
| | (0.294) | (0.225) | (0.124) | (0.168) |
| Law School | 0.241* | 0.396* | 0.414 | 0.330 |
| | (0.429) | (0.490) | (0.494) | (0.471) |
| Political Experience | 0.348* | 0.527* | 0.479* | 0.586* |
| | (0.478) | (0.501) | (0.501) | (0.494) |
| Observations | 204 | 211 | 156 | 223 |

Note: sources of demographic variables available upon request.
Mean of each variable with standard deviation in parentheses.
* Significantly different at the 10% level.

Table 2.2.A: Election-level Effects Using Regression Framework, Ballot N (Negative1)

| **Dependent Variable = Percent of Ads that EVER Attacked** | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Year | 2004 | 2004 | 2004 | 2004 | 2008 | 2008 | 2008 | 2008 |
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| log(Ballot N) | -0.245*** | -0.184*** | | | -0.107* | -0.0856 | | |
| | (0.0359) | (0.0398) | | | (0.0579) | (0.0633) | | |
| Duopoly | | | 0.208*** | 0.110** | | | 0.0838 | 0.0403 |
| | | | (0.0506) | (0.0518) | | | (0.0584) | (0.0662) |
| Incumbent in Election | | 0.211*** | | 0.219*** | | 0.0667 | | 0.0781 |
| | | (0.0544) | | (0.0602) | | (0.0712) | | (0.0729) |
| NoTermLimits | | -0.105*** | | -0.143*** | | 0.0149 | | -0.00779 |
| | | (0.0356) | | (0.0373) | | (0.0651) | | (0.0629) |
| HHI Opposing Party | | -0.00460 | | 0.0980 | | 0.0943 | | 0.104 |
| | | (0.0710) | | (0.0716) | | (0.0841) | | (0.0888) |
| Observations | 104 | 104 | 104 | 104 | 118 | 118 | 118 | 118 |

Standard errors in parentheses. OLS Regressions weighted by total ad volume in election.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 2.3.A: Election-level Effects Using Regression Framework, Ballot N (Negative4)

| **Dependent Variable = Percent of Ads that ONLY Attacked** | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Year | 2004 | 2004 | 2004 | 2004 | 2008 | 2008 | 2008 | 2008 |
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| log(Ballot N) | -0.134*** | -0.102*** | | | -0.0982** | -0.112** | | |
| | (0.0223) | (0.0246) | | | (0.0430) | (0.0445) | | |
| Duopoly | | | 0.119*** | 0.0738** | | | 0.100** | 0.0976** |
| | | | (0.0306) | (0.0313) | | | (0.0431) | (0.0466) |
| Incumbent in Election | | 0.119*** | | 0.119*** | | 0.115** | | 0.114** |
| | | (0.0336) | | (0.0364) | | (0.0501) | | (0.0514) |
| No Term Limits | | -0.0781*** | | -0.0996*** | | 0.0765* | | 0.0498 |
| | | (0.0220) | | (0.0226) | | (0.0458) | | (0.0443) |
| HHI Opposing Party | | -0.0153 | | 0.0365 | | -0.0858 | | -0.0975 |
| | | (0.0439) | | (0.0433) | | (0.0591) | | (0.0626) |
| Observations | 104 | 104 | 104 | 104 | 118 | 118 | 118 | 118 |

Standard errors in parentheses. OLS Regressions weighted by total ad volume in election.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 2.4.A: Ad Level Effects Using Regression Framework, Ballot N (Negative1)

| **Dependent Variable: Negative1 = 1 if the ad EVER attacked an opponent** | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Year | 2004 | 2004 | 2004 | 2004 | 2008 | 2008 | 2008 | 2008 |
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| log(Ballot N) | -0.245*** | -0.189*** | | | -0.108 | -0.148* | | |
| | (0.0728) | (0.0404) | | | (0.0933) | (0.0757) | | |
| Duopoly | | | 0.208 | 0.116 | | | 0.0843 | 0.111 |
| | | | (0.128) | (0.0697) | | | (0.0898) | (0.0851) |
| Incumbent in Election | | 0.171** | | 0.174** | | 0.0927 | | 0.0950 |
| | | (0.0721) | | (0.0821) | | (0.0829) | | (0.0861) |
| HHI Opposing Party | | 0.0175 | | 0.117 | | 0.180 | | 0.167 |
| | | (0.0949) | | (0.103) | | (0.111) | | (0.113) |
| No Term Limits | | -0.0514 | | -0.0903 | | 0.287*** | | 0.248*** |
| | | (0.0609) | | (0.0760) | | (0.0974) | | (0.0907) |
| Days Until Election | | -0.407*** | | -0.404*** | | -0.358*** | | -0.356*** |
| | | (0.0638) | | (0.0646) | | (0.0641) | | (0.0642) |
| Total Ad Volume | | 0.0546*** | | 0.0511** | | 0.165*** | | 0.159*** |
| | | (0.0202) | | (0.0232) | | (0.0275) | | (0.0266) |
| Republican | | 0.0463 | | 0.0459 | | 0.0902 | | 0.0857 |
| | | (0.0393) | | (0.0488) | | (0.0699) | | (0.0715) |
| Political Experience | | 0.0533 | | 0.0692 | | 0.0364 | | 0.0603 |
| | | (0.0520) | | (0.0541) | | (0.0613) | | (0.0608) |
| Observations | 242461 | 242363 | 242461 | 242363 | 188957 | 169362 | 188957 | 169362 |

Notes: Robust standard errors clustered at the election level in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.
Ballot N and duopoly measure created by only including all candidates on the ballot.
Political Experience equals one if the candidate who ran the advertisement has held an office of state Congress or greater.
Days until election is continuous on (0,1), it equals 1 at the farthest day from the election and 0 at election day.
Total Ad Volume is equal to the logged number of total ads run in the election.

Table 2.5.A: Ad Level Effects Using Regression Framework, Ballot N (Negative1)

| **Dependent Variable: Negative1 = 1 if the ad ONLY attacked an opponent** | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Year | 2004 | 2004 | 2004 | 2004 | 2008 | 2008 | 2008 | 2008 |
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| log(Ballot N) | -0.134*** | -0.109*** | | | -0.0981 | -0.163** | | |
| | (0.0490) | (0.0320) | | | (0.0921) | (0.0679) | | |
| Duopoly | | | 0.119 | 0.0858** | | | 0.1000 | 0.164** |
| | | | (0.0798) | (0.0432) | | | (0.101) | (0.0773) |
| Incumbent in Election | | 0.0831 | | 0.0771 | | 0.145* | | 0.134* |
| | | (0.0624) | | (0.0662) | | (0.0775) | | (0.0726) |
| HHI Opposing Party | | 0.0179 | | 0.0698 | | -0.0196 | | -0.0479 |
| | | (0.0620) | | (0.0606) | | (0.0733) | | (0.0772) |
| No Term Limits | | -0.0351 | | -0.0568 | | 0.254*** | | 0.217*** |
| | | (0.0391) | | (0.0445) | | (0.0772) | | (0.0653) |
| Days Until Election | | -0.151*** | | -0.150*** | | -0.0916* | | -0.0894* |
| | | (0.0361) | | (0.0366) | | (0.0463) | | (0.0464) |
| Total Ad Volume | | 0.0411*** | | 0.0397** | | 0.113*** | | 0.112*** |
| | | (0.0138) | | (0.0151) | | (0.0306) | | (0.0290) |
| Republican | | 0.00947 | | 0.00659 | | 0.0308 | | 0.0312 |
| | | (0.0282) | | (0.0312) | | (0.0457) | | (0.0451) |
| Political Experience | | 0.0386 | | 0.0480* | | 0.00576 | | 0.0279 |
| | | (0.0282) | | (0.0284) | | (0.0480) | | (0.0467) |
| Observations | 242461 | 242363 | 242461 | 242363 | 188957 | 169362 | 188957 | 169362 |

Notes: Robust standard errors clustered at the election level in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.
Ballot N and duopoly measure created by only including all candidates on the ballot.
Political Experience equals one if the candidate who ran the advertisement has held an office of state Congress or greater.
Days until election is continuous on (0,1), it equals 1 at the farthest day from the election and 0 at election day.
Total Ad Volume is equal to the logged number of total ads run in the election.

Table 2.6.A: Candidate-level Effects Using Regression Framework, Ballot N (Negative1)

| **Dependent Variable = Percent of Ads EVER Attacking by each Advertising Candidate** | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Year | 2004 | 2004 | 2004 | 2004 | 2008 | 2008 | 2008 | 2008 |
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| log(Ballot N) | -0.245*** | -0.173*** | | | -0.109** | -0.0462 | | |
| | (0.0308) | (0.0356) | | | (0.0470) | (0.0589) | | |
| Duopoly | | | 0.208*** | 0.101** | | | 0.0868* | 0.0206 |
| | | | (0.0419) | (0.0453) | | | (0.0473) | (0.0605) |
| Incumbent in Election | | 0.195*** | | 0.197*** | | 0.0676 | | 0.0741 |
| | | (0.0504) | | (0.0545) | | (0.0651) | | (0.0665) |
| NoTermLimits | | -0.0967*** | | -0.130*** | | 0.0392 | | 0.0304 |
| | | (0.0324) | | (0.0331) | | (0.0625) | | (0.0617) |
| HHI Opposing Party | | -0.0262 | | 0.0693 | | 0.132 | | 0.134 |
| | | (0.0664) | | (0.0653) | | (0.0813) | | (0.0838) |
| Republican | | 0.0335 | | 0.0348 | | 0.0219 | | 0.0199 |
| | | (0.0325) | | (0.0344) | | (0.0483) | | (0.0484) |
| Political Experience | | 0.0608* | | 0.0763** | | 0.0869 | | 0.0954* |
| | | (0.0317) | | (0.0330) | | (0.0588) | | (0.0576) |
| Observations | 211 | 208 | 211 | 208 | 214 | 183 | 214 | 183 |

Standard errors in parentheses. OLS Regressions weighted by total ad volume of each candidate.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 2.7.A: Candidate-level Effects Using Regression Framework, Ballot N (Negative4)

| **Dependent Variable = Percent of Ads ONLY Attacking by each Advertising Candidate** | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Year | 2004 | 2004 | 2004 | 2004 | 2008 | 2008 | 2008 | 2008 |
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| log(Ballot N) | -0.134*** | -0.0981*** | | | -0.0989*** | -0.0930** | | |
| | (0.0181) | (0.0207) | | | (0.0335) | (0.0404) | | |
| Duopoly | | | 0.119*** | 0.0744*** | | | 0.101*** | 0.0985** |
| | | | (0.0243) | (0.0260) | | | (0.0335) | (0.0414) |
| Incumbent in Election | | 0.105*** | | 0.0996*** | | 0.131*** | | 0.124*** |
| | | (0.0293) | | (0.0314) | | (0.0446) | | (0.0455) |
| No Term Limits | | -0.0709*** | | -0.0895*** | | 0.0822* | | 0.0621 |
| | | (0.0189) | | (0.0190) | | (0.0428) | | (0.0422) |
| HHI Opposing Party | | -0.0149 | | 0.0341 | | -0.0519 | | -0.0696 |
| | | (0.0386) | | (0.0376) | | (0.0557) | | (0.0573) |
| Republican | | -0.000190 | | -0.00202 | | -0.0153 | | -0.0144 |
| | | (0.0189) | | (0.0198) | | (0.0331) | | (0.0331) |
| Political Experience | | 0.0351* | | 0.0440** | | 0.0368 | | 0.0486 |
| | | (0.0184) | | (0.0190) | | (0.0403) | | (0.0394) |
| Observations | 211 | 208 | 211 | 208 | 214 | 183 | 214 | 183 |

Standard errors in parentheses. OLS Regressions weighted by total ad volume of each candidate.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 2.8.A: Candidate-level Effects Using Regression Framework Negative1

| **Dependent Variable = Percent of Ads EVER Attacking by each Advertising Candidate** | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Year | 2004 | 2004 | 2004 | 2004 | 2008 | 2008 | 2008 | 2008 |
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| log(Effective N) | -0.421*** | -0.313*** | | | -0.222*** | -0.214*** | | |
| | (0.0477) | (0.0758) | | | (0.0596) | (0.0791) | | |
| Duopoly | | | 0.238*** | 0.146*** | | | 0.116*** | 0.114** |
| | | | (0.0319) | (0.0548) | | | (0.0411) | (0.0540) |
| Incumbent in Election | | 0.200*** | | 0.210*** | | -0.0892 | | -0.0739 |
| | | (0.0639) | | (0.0721) | | (0.0658) | | (0.0657) |
| No Term Limits | | -0.0859 | | -0.118* | | 0.0703 | | 0.0699 |
| | | (0.0606) | | (0.0616) | | (0.0636) | | (0.0673) |
| HHI Opposing Party | | 0.0566 | | 0.0875 | | 0.184** | | 0.205** |
| | | (0.0690) | | (0.0702) | | (0.0797) | | (0.0794) |
| Republican | | 0.102*** | | 0.0986** | | 0.0512 | | 0.0340 |
| | | (0.0391) | | (0.0404) | | (0.0488) | | (0.0481) |
| Political Experience | | 0.0259 | | 0.0563 | | 0.0495 | | 0.0682 |
| | | (0.0381) | | (0.0379) | | (0.0540) | | (0.0548) |
| Observations | 210 | 177 | 210 | 177 | 211 | 180 | 211 | 180 |

Standard errors in parentheses. OLS Regressions weighted by total ad volume of each candidate.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 2.9.A: Candidate-level Effects Using Regression Framework Negative4

| **Dependent Variable = Percent of Ads ONLY Attacking by each Advertising Candidate** | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Year | 2004 | 2004 | 2004 | 2004 | 2008 | 2008 | 2008 | 2008 |
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| log(Effective N) | -0.235*** | -0.126*** | | | -0.0674* | -0.102** | | |
| | (0.0280) | (0.0405) | | | (0.0370) | (0.0495) | | |
| Duopoly | | | 0.134*** | 0.0334 | | | 0.0243 | 0.0534 |
| | | | (0.0186) | (0.0292) | | | (0.0253) | (0.0337) |
| Incumbent in Election | | 0.181*** | | 0.204*** | | -0.0424 | | -0.0350 |
| | | (0.0341) | | (0.0384) | | (0.0412) | | (0.0410) |
| No Term Limits | | -0.0625* | | -0.0764** | | 0.0798** | | 0.0793* |
| | | (0.0324) | | (0.0328) | | (0.0398) | | (0.0420) |
| HHI Opposing Party | | 0.0217 | | 0.0387 | | 0.0453 | | 0.0553 |
| | | (0.0369) | | (0.0374) | | (0.0499) | | (0.0496) |
| Republican | | 0.0436** | | 0.0392* | | 0.000414 | | -0.00785 |
| | | (0.0209) | | (0.0215) | | (0.0306) | | (0.0300) |
| Political Experience | | 0.0129 | | 0.0273 | | 0.0217 | | 0.0305 |
| | | (0.0203) | | (0.0202) | | (0.0339) | | (0.0342) |
| Observations | 210 | 177 | 210 | 177 | 211 | 180 | 211 | 180 |

Standard errors in parentheses. OLS Regressions weighted by total ad volume of each candidate.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 2.10.A: Ad Level Effects Using Regression Framework, Controlling for Demographics

| | **Negative1** | | | | **Negative4** | | | |
|---|---|---|---|---|---|---|---|---|
| Year | 2004 | 2004 | 2008 | 2008 | 2004 | 2004 | 2008 | 2008 |
| log(Effective N) | -0.312*** | | -0.263** | | -0.160*** | | -0.172** | |
| | (0.0674) | | (0.101) | | (0.0503) | | (0.0685) | |
| Duopoly | | 0.171*** | | 0.178** | | 0.0838** | | 0.134** |
| | | (0.0525) | | (0.0781) | | (0.0354) | | (0.0518) |
| Incumbent in Election | 0.129 | 0.121 | 0.00650 | 0.0196 | 0.0612 | 0.0591 | 0.0423 | 0.0457 |
| | (0.0813) | (0.0856) | (0.102) | (0.104) | (0.0684) | (0.0715) | (0.0705) | (0.0700) |
| HHI Opposing Party | 0.0608 | 0.0869 | 0.179 | 0.193* | 0.0544 | 0.0691 | 0.00953 | 0.0133 |
| | (0.0956) | (0.0960) | (0.116) | (0.110) | (0.0619) | (0.0601) | (0.0675) | (0.0654) |
| No Term Limits | -0.0132 | -0.0281 | 0.244*** | 0.269*** | -0.0149 | -0.0240 | 0.149*** | 0.175*** |
| | (0.0612) | (0.0700) | (0.0807) | (0.0863) | (0.0407) | (0.0427) | (0.0493) | (0.0541) |
| Days Until Election | -0.404*** | -0.400*** | -0.383*** | -0.381*** | -0.148*** | -0.146*** | -0.122*** | -0.121*** |
| | (0.0622) | (0.0627) | (0.0631) | (0.0631) | (0.0352) | (0.0355) | (0.0449) | (0.0447) |
| Total Ad Volume | 0.0545*** | 0.0557*** | 0.123*** | 0.126*** | 0.0392*** | 0.0397*** | 0.0514*** | 0.0530*** |
| | (0.0193) | (0.0207) | (0.0216) | (0.0214) | (0.0131) | (0.0140) | (0.0175) | (0.0162) |
| Republican | 0.0726* | 0.0815* | 0.121 | 0.107 | 0.0228 | 0.0269 | 0.0551 | 0.0488 |
| | (0.0390) | (0.0416) | (0.0743) | (0.0742) | (0.0306) | (0.0323) | (0.0413) | (0.0404) |
| Male | -0.000830 | -0.0133 | 0.0643 | 0.0704 | 0.0297 | 0.0239 | 0.0535* | 0.0594** |
| | (0.0434) | (0.0467) | (0.0892) | (0.0877) | (0.0374) | (0.0371) | (0.0302) | (0.0291) |
| White | -0.0375 | -0.0632 | -0.0470 | -0.0294 | -0.0582 | -0.0712 | 0.0723 | 0.0797 |
| | (0.112) | (0.122) | (0.139) | (0.142) | (0.105) | (0.110) | (0.0497) | (0.0508) |
| College | -0.159 | -0.189 | 0.244*** | 0.281*** | 0.0218 | 0.00657 | 0.128*** | 0.162*** |
| | (0.187) | (0.180) | (0.0561) | (0.0634) | (0.0241) | (0.0221) | (0.0404) | (0.0435) |
| Political Experience | 0.0639 | 0.0812 | 0.0418 | 0.0670 | 0.0504* | 0.0590** | -0.00299 | 0.0150 |
| | (0.0502) | (0.0513) | (0.0585) | (0.0581) | (0.0263) | (0.0263) | (0.0419) | (0.0395) |
| Observations | 241689 | 241689 | 155243 | 155243 | 241689 | 241689 | 155243 | 155243 |

Notes: Robust standard errors clustered at the election level in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 2.11.A: Ad Level Effects Using Regression Framework, With Advertiser Incumbency and Candidate Ad Volume

| | **Negative1** | | | | **Negative4** | | | |
|---|---|---|---|---|---|---|---|---|
| Year | 2004 | 2004 | 2008 | 2008 | 2004 | 2004 | 2008 | 2008 |
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| log(Effective N) | -0.327*** | | -0.228** | | -0.151** | | -0.136** | |
| | (0.0896) | | (0.0899) | | (0.0594) | | (0.0531) | |
| Duopoly | | 0.186*** | | 0.149* | | 0.0792* | | 0.108** |
| | | (0.0677) | | (0.0759) | | (0.0423) | | (0.0420) |
| Incumbent | 0.0430 | 0.0413 | -0.140 | -0.135 | 0.0544* | 0.0568* | 0.00620 | 0.00105 |
| | (0.0628) | (0.0695) | (0.113) | (0.117) | (0.0306) | (0.0327) | (0.0906) | (0.0895) |
| HHI Opposing Party | 0.0995 | 0.122 | 0.121 | 0.134 | 0.0630 | 0.0767 | -0.0222 | -0.0211 |
| | (0.119) | (0.116) | (0.109) | (0.105) | (0.0751) | (0.0737) | (0.0642) | (0.0627) |
| NoTermLimits | -0.0148 | -0.0283 | 0.232*** | 0.246*** | -0.0244 | -0.0330 | 0.163*** | 0.180*** |
| | (0.0696) | (0.0776) | (0.0665) | (0.0693) | (0.0447) | (0.0472) | (0.0490) | (0.0490) |
| Days Until Election | -0.414*** | -0.412*** | -0.408*** | -0.407*** | -0.153*** | -0.152*** | -0.129*** | -0.128*** |
| | (0.0622) | (0.0626) | (0.0595) | (0.0597) | (0.0356) | (0.0360) | (0.0438) | (0.0437) |
| Total Cand Volume | 0.0577*** | 0.0639*** | 0.121*** | 0.124*** | 0.0369** | 0.0397** | 0.0632*** | 0.0630*** |
| | (0.0218) | (0.0238) | (0.0207) | (0.0206) | (0.0143) | (0.0153) | (0.0207) | (0.0189) |
| Republican | 0.0702* | 0.0834* | 0.126* | 0.116 | 0.0255 | 0.0310 | 0.0572 | 0.0533 |
| | (0.0397) | (0.0455) | (0.0695) | (0.0707) | (0.0298) | (0.0332) | (0.0421) | (0.0412) |
| Male | -0.0305 | -0.0519 | 0.0347 | 0.0358 | 0.00615 | -0.00322 | 0.0372 | 0.0399 |
| | (0.0490) | (0.0493) | (0.0929) | (0.0918) | (0.0388) | (0.0372) | (0.0307) | (0.0289) |
| White | -0.0908 | -0.126 | -0.0949 | -0.0774 | -0.0963 | -0.113 | 0.0325 | 0.0417 |
| | (0.0990) | (0.106) | (0.117) | (0.118) | (0.0981) | (0.101) | (0.0433) | (0.0434) |
| College | -0.152 | -0.191 | 0.285*** | 0.320*** | 0.0216 | 0.00493 | 0.133*** | 0.166*** |
| | (0.171) | (0.159) | (0.0711) | (0.0638) | (0.0267) | (0.0249) | (0.0434) | (0.0388) |
| Observations | 241689 | 241689 | 155243 | 155243 | 241689 | 241689 | 155243 | 155243 |

Notes: Robust standard errors clustered at the election level in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

# Chapter 3

### Local Economic Growth from Primary Election Spending (with Rebecca Lessem)

## I. Introduction

While many scholars have asked how government expenditures can increase employment and income, it is difficult to produce causal estimates in this vein, as areas with the greatest need receive the highest levels of aid. Recent literature uses a variety of instrumental variables strategies to address this endogeneity problem in determining the effects of government spending on employment and income growth.[92] In comparison, we look at the effect on local economies from an exogenous shock to consumption expenditures from non-government spending, using the variation in duration, timing, and expenditures associated with Presidential primary campaigns. In 2008, $348 million was spent by Presidential primary campaigns in different states, for hotels, food, advertising, and other campaign expenditures. This exogenous spending allows us to ask what happens to income growth when money enters a state economy.

Primary elections are held sequentially in different states and each election cycle varies in duration. While the ordering of states has changed over time, many states are seldom

[92] See Wilson (2011); Shoag (2010); Serrato and Wingender (2010); Chodorow-Reich et al. (2011); Ramey (2011,a).

reached, as the nomination is often determined long before each state has its turn to vote for a nominee. For example, in 2004 Senator Kerry clinched the Democratic nomination in May, whereas in 2008 President Obama did not receive the nomination until June. In particularly long primary elections, states that are not normally exposed to primary campaigns receive an exogenous increase in revenues for local businesses. We exploit this variation in whether or not a state receives campaign spending in each year. In an additional specification, we also exploit variation in spending between years and the over the months within an election cycle, where when there are more candidates in a race, there is generally more spending as well.

We use the variation in the duration and timing of primaries to examine two relevant questions in public finance, macroeconomics, and economic development: (1) Does injecting money into a state's economy increase personal income in that state? and (2) What is the return to individual income in a state when candidates increase primary expenditures by a dollar? Specifically, we study how income growth is affected by the presence of a primary in a given state and quarter. Since most states were not exposed to primary campaigning in some cycles and were in others, we are able to identify this effect from states that changed treatment status over the years, asserting that the duration as well as the timing of the primary campaign is exogenous to changes in the state's local economic conditions. We study this for overall income levels, as well as for income in specific sectors, expecting different effects across sectors due to the nature of primary election spending.

To conduct this analysis, we create a novel dataset of primary and caucus dates from 1976-2008, where we determine if a state held a primary based on the date where only one candidate remained in each party. We pair this primary data with information on personal income levels from the Bureau of Economic Analysis (BEA). For 2004 and 2008, we additionally obtain information on the expenditure levels of candidates from the Center for

Responsive Politics, to calculate the local fiscal multiplier of campaign expenditures.[93]

We find that the presence of a primary increases overall income, as well as income in service-related sectors from 1976-2008. In 2004 and 2008, doubling campaign expenditures increases overall income growth by about .05 percent, and this effect is twice as large in the accommodations sector. Our results are robust to controlling for battleground states, the number of primaries in a state, states with primaries on the same day as many other states, as well as to including state fixed effects.

The existence of primary elections provides an interesting environment in which to study local economic development. Recently, scholars have expressed interest in the American Recovery and Reinvestment Act (ARRA) spending. Wilson (2011) and Chodorow-Reich et al. (2011) use instrumental variable strategies and find that $125,000 creates one job per year and $100,000 creates 3.8 jobs per year, respectively. Chodorow-Reich et al. (2011) finds that these jobs resulting from Medicaid spending are concentrated in the state and local government, health, and education sectors. Asking a similar question though not addressing ARRA specifically, Serrato and Wingender (2010) find that government spending has a local multiplier of 1.88 and an additional job costs $30,000 per year, using an instrumental variables strategy and data on federal spending. Similarly, Shoag (2010) uses the idiosyncratic component of state-managed defined benefit pensions to predict government spending. Shoag finds that $1 of state government spending raises in-state income by $2.12, and that $35,000 of spending generates one additional job.

Our paper studies the effect of spending on a different set of sectors than is normally assessed. While most of the ARRA funds were centered around infrastructure investment, energy efficiency, unemployment assistance, and state and local government stabilization (111th Congress 2009), primary spending also likely benefits the local economy in the service-related sectors. Another feature of our work that distinguishes it from previ-

[93]Data on campaign expenditures are only available for these two years.

ous papers is that transfers do not all come directly from the federal government. Primary campaigns are sometimes funded through federal matching,[94] but candidates vying for their party's presidential nomination rely on money from individual donors and from Political Action Committees. In addition, the media provides additional spending in the local economy during a primary. A final difference is that we avoid the natural endogeneity concerns that federal spending is allocated to states in the most need of growth. As the goal of a primary campaign is to clinch the nomination, candidates do not inject money into the states with the worst economic conditions, but instead campaign in states sequentially, following the primary calendar. Since individual victories create momentum to propel a candidate to his next contest, candidates battle in each contest before looking forward, in hopes that they will ultimately be the nominee.[95] Candidates also have incentive to not over-spend in the primary, as they want to save any potential funds for the general election battle, conditional on winning.

Our paper additionally adds to the literature investigating the incentives for states to hold early primaries. This is particularly important as states like Michigan and Florida moved their primaries into January in 2008, and this was rejected by the Democratic National Convention (DNC). After this, Democratic candidates agreed to refrain from campaigning in these states, and the delegates were not counted in the candidates' totals. This did not deter Florida from moving its primary up in the order again in 2012, which was this time rejected by the RNC, costing the state half of its delegates (Grice 2012). Thus, moving a primary contest too early can be costly. States early in the primary process are presumed to have a disproportionate effect by building candidate viability, attracting donors and volunteers, and creating momentum (Abramowitz 1989; Abramson et al.

[94]See Section 6 for more on federal funding percentages.

[95]See Abramowitz (1989); Abramson et al. (1992); Mutz (1998); Adkins and Dowdle (2001); Callander (2007); Strumpf (2002); Klumpp and Polborn (2006), for more on the necessity of momentum in primary contests.

1992; Mutz 1998). Some work examines the policy benefits of early contests. Taylor (2010) finds no effect, and Knight and Schiff (2010) find that early contests have a 20% greater influence than later contests in 2004. Similarly, Malhotra and Snowberg (2011) find that the order matters less compared to pivotal, or competitive primary contests in 2008. Theoretical work demonstrates that voters can use early contests as cues in determining their vote choices.[96] This paper instead investigates other potential benefits of having an early nomination contest.[97]

The remainder of the paper is organized as follows: Section II describes the construction of the dataset, and Section III provides descriptive statistics. Section IV explains the identification and empirical strategies, and the results are shown in Section V. Section VII concludes.

# II. Data

We create a dataset, where we first hand collect a comprehensive set of dates, locations, and specific institutional details of primary races dating back to 1976. We then combine this with state-level personal income data from the Bureau of Economic Analysis (BEA). For 2004 and 2008, we also include new itemized campaign expenditure data from the Center for Responsive Politics (CRP).[98] Together, we create a comprehensive Presidential primary and local economic database to date.

[96]See Morton and Williams (2001); Callander (2007); Serra (2011); Ali and Kartik (2006)

[97]An additional literature we contribute to looks at other effects of the primary structure on general election outcomes. The primary process may constrain candidates from converging to the position of the median voter, as they will take on more extreme positions to satisfy (non-strategic) primary voters who are less moderate than the general population Geer (1988); Norrander (1989). Malhotra and Snowberg 2011 study the effects of early contests more broadly, including candidate's difficulties of returning to the center in the general after trying to attract primary voters.

[98]See CRP (2011) for more information on the dataset.

## II.1 Primary Information

We collect a thorough database of information on the dates of each primary or caucus in each state from 1976, which is the first year the Democratic National Committee (DNC) and Republic National Committee (RNC) held conventions in their current forms. We obtain this information from the Green Papers (for primaries), as well as Frontloading HQ (for caucuses), and confirm these with state election boards when the two are not consistent. In states where the Republican and Democratic parties hold primaries on separate days, we count these separately, as the campaigns have the opportunity to visit the state twice. In cases where a state's delegates are determined by only state party officials (and not in caucuses or primaries with individual voters), we count this as a case where the state did not have a "primary." In cases where states hold a "beauty contest" nomination, where individual voters choose their favorite candidate but there are no delegates at stake, we count this as having a "primary," as some candidates find it important to win a symbolic victory in these states to gain momentum.[99,100]

Next, we collect information on the date at which the nomination was clinched for each party in each year. We award a candidate the nomination when he is only one candidate left in the contest, i.e. the primary campaigning has ended. This is sometimes months before the convention date. Table 3.1 contains the nomination was clinched over time. In cases where the incumbent was not challenged in the primary, such as 1984 for Ronald Reagan, we code the primary for that party as "no primary."[101] This will enable

[99]States holding these "beauty contests" usually chose their candidate based on conventions and state party officials' decisions. After 2000, there are some instances where there were no delegates at stake, after a state had moved up in the primary process and one of the national committees considered this unconstitutional , i.e. Michigan and Florida in 2008. These two states still had campaigning from the Republicans, so we include them in this context alone.

[100]The primary dates by party for each state and year combination from 1976 to 2008 are available upon request.

[101]All incumbents do not have the luxury of having no opposition in the primary election. For example, President Carter's low approval ratings gave the DNC justification to push other candidates, including Edward Kennedy, to challenge him in the primary contest.

us to control for not only the existence of a primary campaign, but also the intensity of the campaigning in a sense, as there will likely be more campaigning if both parties have primary contests in a state and year.[102]

Additionally, in certain situations there could be spending for the primary and the general election at the same time. For example, in 2004, when President George W. Bush was the incumbent, he immediately began campaigning for the general election because he had no competition in the primary. During this same time period, Democrats were competing for their party's nomination. Likewise, Senator McCain could start to campaign for the general election once he clinched the nomination in March of 2008, whereas the Democratic primary continued for three additional months. We want to be sure that we are measuring the effect of primary elections, not general election spending. Thus, we collect data on the battleground states for each election cycle, asserting the common fact that candidates only campaign in battleground states in Presidential general elections (Stromberg 2008; Ashworth and Clinton 2007; Huber and Arceneaux 2007).[103] We label a state as a battleground state if the difference in the likelihood the Democratic candidate wins and the Republican candidate wins is ever within 10 percentage points in prediction market (using Intrade prediction markets) or polling data (specifically, pollster.com and David Leip's polling report). In earlier elections when polls are not available (i.e., 1976-1992), we instead look at the races whose end vote share end up within 10 percentage points of one another.[104]

[102]Of course, there can be cases when there were more candidates in a race at a time when there was only one party involved in the contest, i.e. a very competitive Democratic primary with high entry and a Republican primary with less entry and competition.

[103]For 2004 and 2008, we additionally collect the amount of general election spending during the primary as well. See Section 2.3 for more on spending.

[104]A list of each state and the years in which the state was competitive in the general election is available upon request.

## II.2 Income

The BEA income data give total personal income in each quarter and state, for each sector of the economy. Total income is defined as total earnings (therefore excluding government transfers). This was turned into per-capita values using population data from the US census. In the analysis, we focus on the sectors where we would expect large effects from primary spending (services), and compare them to ones where we would not expect to see much of an effect (finance and insurance, for example). The BEA data are divided into 2 periods: 1974-2001, and 1990-2009. The sector definitions changed across the two periods. Therefore, for the sector-level analysis, we do the analysis separately for each period.

## II.3 Campaign Expenditures

We obtain campaign expenditures data for the 2004 and 2008 primary election cycles from the Center for Responsive Politics (CRP), which collects and compiles data from the Federal Elections Commission. These data contain information on each expenditure made by campaigns for House and Presidential races, Political Action Committees (PACs), and state parties, where each expense contains a date, location (down to zip code), and information on what the expense entailed (i.e. hotel). We narrow this dataset to include only expenses made in pursuit of the primary nomination by the Presidential candidate's official campaign, i.e. "Barack Obama for President, 2008." We do not include PAC spending as it is difficult to understand for which campaign the PAC is spending its funds (i.e. Presidential or House).

These data also include information on the division of the campaign in which the expense was made, where we create two different measures of expenditures. Campaign expenditures consist of all money spent by the candidate and his direct staff on travel,

hotel rooms, and meals, as well as local polling, Get out the Vote campaigns (GOTV), and campaign events. In addition, we allow campaign expenditures to include what the campaign calls “administrative expenditures," including all money spent on the offices within a state and its staffers, where these funds are largely spent on catering for meetings, rent, utilities, cable, and internet in these campaign offices, administrative supplies (associated largely with IT costs), and staffer travels (rental cars, housing, flights, etc.). Total expenditures include all expenses listed under our campaign expenditures measure and money spent on broadcast, radio, and print advertising, as well as other media-related costs, such as media consultants, production costs of advertisements, and miscellaneous costs related to getting out the message. We expect that campaign expenditures are a good proxy for the candidate’s travel and the campaigns’ direct expenses. However, the administrative portion of the campaign expenditures are likely a lower bound for the amount of money staffers spend in the state they reside during the campaign. For example, if campaign staff goes to a restaurant in the evening, this will not be covered as a campaign expense, especially if the meal includes alcohol. We also think this spending amount is a lower bound for total exogenous spending in the area, since national news and media crews tend to follow and cover the primary schedule state by state.

Finally, the total expenditures are likely to include some expenses that do not directly affect a state’s local economy at the time of a primary, though they are expenses made for the primary campaign. For example, the production of an advertisement run in Iowa could be done in California, and thus included in this measure. The production could also be done in Iowa, however, and it is not feasible, given the data, to distinguish the two. Thus, for the remainder of the paper, we choose to focus on the campaign spending measure in favor of the total expenditures measure.

# III. Descriptive Statistics

Our identification strategy relies on variation in the existence of primary campaigns in states over time. Figure 3.1 shows the number of states with primaries in each year. We separate this by party to demonstrate two sources of variation. First, since not all states have a primary in each year, there will be variation in whether or not there is a primary for each state and year. Furthermore, the existence of a primary differs by party. Therefore, there can also be variation in the number of primaries in a state. Since each party's candidates campaign separately, we would expect more spending if both parties have host primaries in a specific state. Figure 3.1 shows that there is variation in the number of states with primaries over time. This also varies significantly across parties, with much more variation in the Republican primary schedule.

Figure 3.2 shows the average length of the primary election (in days) for each party over time.[105] Again, for each party, we see significant fluctuations over time. We also plot per capita income in each year, to ensure that the duration of primaries is not correlated with the state of the economy. Per capita incomes increases over time with an approximately constant slope, whereas the length of primaries fluctuates over time. In addition, there is a common belief that incumbents have difficulty getting re-elected during recessions, making competition in elections correlated with the economic factors. However, since we are studying primaries and in each case where an incumbent was in office, he ran again for the nomination, we do not think this issue is relevant. Furthermore, in this time period the incumbent was only challenged once in the primary.[106]

Figures 3.1 and 3.2 show that states are switching primary status over time. Elaborating on these points, Figure 3.3 shows which states switched primary status between

[105] Length is defined as the number of days between the first primary (Iowa) and when the nominee was clearly selected.

[106] President Carter was the only incumbent to not run unopposed, though he still won the nomination in the end.

2004 and 2008. Comparing just these 2 election cycles, we see that there are many states that had primaries in 2008 but not 2004, due to both the fact that there was no Republican primary in 2004 and the length and competitiveness of the 2008 Democratic primary.

For 2004 and 2008, we use campaign expenditures to estimate the effect of spending on local economies. In general, we see that of the states that did not have a primary in 2004 and did have one in 2008, these states tended to have more spending in 2008. Figure 3.3 shows the states that held a primary in 2008 and not in 2004; Figure 3.4 shows the percentage change in expenditures between the two election cycles. We see first that states like Pennsylvania and Utah, that were reached in the lengthy democratic campaign in 2008, had over 20 percent more primary spending in this election cycle than they did in 2004, when the process culminated before the state was reached. We also see an increase in spending from 2004 to 2008 for early states like IA, SC, and NH, where the increased number of candidates and the fact that both parties held primaries increased the spending in those states. Conversely, the state election boards in Michigan and Florida moved their Presidential primary contests up in the order, with elections set in January 2008. The Democratic National Committee challenged these moves, and in turn, Democratic candidates opted to not campaign in these states. Thus, spending in these states actually decreased from their later primary day in 2004.

There are cases where state boundaries provide a neighboring state with additional spending when there is not a primary in that state. For example, New Jersey benefited from New York's early primary on a day independent of all other primary contests in 2004. This is because candidates spent money renting cars, purchasing hotel rooms, and eating some meals in New Jersey, though they were officially campaigning in NY. When compared to 2008, even though NJ held its own primary, it did this on a day when many other states also held primaries, as did NY. This made spending higher in the previous election cycle. Table 3.2 similarly shows the distribution of spending for primaries in 2004

and 2008 by quarter, where states with primaries have higher spending in the current or next period than areas without primaries. However, this distinction is again not a perfect predictor of primary spending for the spillover reasons just mentioned. For our preliminary analysis using dummy variables for the presence of a primary, we include the quarter prior to the primary in case candidates are campaigning in a state significantly before the election occurs.

We study how the existence of primary election spending affects income growth in a state. We do this by sector of the economy, to focus on the areas that we expect to be most affected by primary spending. Table 3.3 shows the average contribution of certain sectors to total income in 2008. Accommodations is one sector where we expect to see the largest effects, and it account for around 5% of total income.

# IV. Identification and Empirical Analysis

In this section, we show how we use the variation in the data to estimate the effects of primary spending on local economic development. We start by explaining how we use the existence of a primary before the nomination has been determined (when only one candidate remains in the contest and there is no more campaigning) to determine changes in income growth. We next assert that spending is orthogonal to a state's economic condition at the time of campaigning and explain how we use variation in expenditures to see how primary spending can increase economic growth.

Denote a time period as $t$, and let $P_{it}$ be a dummy variable indicating whether or not there is a primary in state $i$ at time $t$. Denote the average per capita income in sector $s$ in state $i$ at time $t$ as $y_{ist}$. Denote state fixed effects as $\mu_i$ and time fixed effects as $\gamma_t$. Then

income is given by

$$y_{ist} = \beta_{0s} + \beta_{1s} P_{it} + \mu_{is} + \gamma_{ts} + \epsilon_{ist} \tag{3.1}$$

We take differences of equation (3.1), so the state and time fixed effects drop out:

$$\Delta y_{ist} = \beta_{1s} \Delta P_{it} + \epsilon_{ist} \tag{3.2}$$

We estimate equation (3.2). We look at how changes in the primary dummy variable affect growth in different sectors. This is identified by comparing states with primaries to those that do not have primaries.

In this part of the analysis, we drop all states that have primaries in every period. In these states, it is harder to argue that the existence of a primary is exogenous, in that the state expects to receive primary spending in each year. We only include states with variation in whether or not there is a primary, in that they do not know each year whether or not they will receive primary spending.

In the second part of the analysis, we look at how spending on primaries affects income growth. Denote spending in a state as $e_{it}$. Then

$$y_{ist} = \beta_{0s} + \beta_{1s} e_{it} + \mu_{is} + \gamma_{ts} + \epsilon_{ist}$$

Taking differences,

$$\Delta y_{ist} = \beta_{1s} \Delta e_{it} + \epsilon_{ist} \tag{3.3}$$

The parameter $\beta_{1s}$ tells us how changes in spending affect income in each sector. This provides a more precise estimate of the effect of spending on income growth since we also have variation in spending in each state and year. Our identification largely comes from states that were reached in 2008 and were not reached in 2004. However, we argue that the amount spent is orthogonal to a state's economic growth, as even if a state is consistently reached (and is reached in both 2004 and 2008), there is still uncertainty about the degree of spending in each year. For example, some years provide competition between candidates in both parties, while others have competition from only one. In addition, there is large variation in the number of entrants within each party between years, and at times, favored candidates do not win the early states, turning the tide of the election, and increasing the competitiveness. In addition, other states whose ordered changed put them onto an election day with another state, like New York, decreasing its expenditures between the two cycles. Thus, our variation comes from states that had both increased and decreased expenditures over the two election years. In addition, we exploit variation in spending over the course of the primary election cycle, using data from 2003-2004 and 2007-2008.

# V. Results

The results are divided into three sections. In the first part of the analysis, we use a dummy variable for whether or not there was a primary in a state in each time period.

This analysis covers from 1974-2008. In the second part, we test how the amount of money spent by candidates in each state during a primary campaign affects individual income. This analysis is for the 2004 and 2008 election cycles. The third subsection looks at a sector that we do not expect to be affected by primary spending ex ante.

## V.1 Primary Indicators

In this section, we use a dummy variable for whether or not there was a primary in a state to determine if primary campaigns increase income growth in each sector.[107] We define a state as having primary spending if there is a primary in the current quarter or in the next quarter. This is acknowledging that candidates sometimes spend a long amount of time campaigning in a state that could span multiple months.

We additionally construct a set of control variables that could relate to the intensity of spending. Each year, there can be a primary in both the Democratic and Republican parties. Therefore, we control for whether or not there are 2 primaries in a state in a given period, expecting this to increase the effect of the primary. In addition, the structure of the primary calendar is such that there is often one day with many of the elections, typically called "Super Tuesday." We control for whether or not an election in a state is on this day each year.[108] One concern is that in states with late primaries, early spending for the general election when one party's nominee has been determined and the other has not, particularly in battleground states, could bias the results. To account for this, we control for whether or not a state is a battleground state in periods after one party's candidate has been chosen. We additionally include quarter fixed effects to account for any seasonal trends in income growth.

[107] We are not including the results for all sectors available in the data. These are available upon request.

[108] Our "Super Tuesday" control is defined as the day each year that has the most primary elections in a given state.

Table 3.4 contains the results for total earned income, accommodations, services, and retail trade. We use the services sector measure for 1974-2001, as for this time period there is no further disaggregation of the services sector. For the later time period, we show accommodations as the service sectors potentially likely to be affected by primary spending. We expect that primary campaign spending will directly affect the accommodations sector, as increases in hotel room, catering, food services, and additional expenses the campaigns incur flow straight into this sector. Additionally, we examine data for both periods separated for retail trade, as the definitions changed slightly between the two periods provided.

The finding in the first four columns of Table 3.4 is that, in general, primary spending increases total income, and this effect is amplified when both the Democratic and Republican Parties host a primary in the state. Specifically, hosting a primary increases total income growth by approximately .004 percentage points. When we compare this to average state income growth, which is approximately 0.013, this seems like a relatively large increase. Similarly, hosting a primary increases income in the services and accommodations sectors by .006 and .005 percentage points, respectively (where the means are .021 and .011, respectively). Additionally, hosting both a Republican and Democratic primary, on average, increases total as well as services income by an additional .004 percentage points.

Having a primary on Super Tuesday decreases the overall effect in Columns (1)-(3). This is expected because candidates devote less resources to each state if there are multiple primaries on the same day. Income growth is higher in battleground states, most likely due to simultaneous campaigning for the general election. The service sector shows no effect for battleground states, while in the accommodations sector, income growth is actually lower when the state is a battleground state. Perhaps this is because canidates campaigning early for the general election often will try to separate themselves from the

ongoing primary campaign in the opposite party. For example, if the Democratic primary continues until June, Republicans may start campaigning in battleground states that has already selected its primary candidate. For the first three sectors shown in Table 3.4, the effect of primary spending is larger than for overall income. This is expected, since these are the sectors where we think primary spending has the largest influence.

In Table 3.4, we actually find a negative effect in the retail trade sector for the later time period (1990-2009). While this seems puzzling at first, retail purchases should only be influenced by campaign spending if (1) the candidates' staff buy from local shops that would not get the business in the absence of the campaign or (2) locals are working overtime to meet the demand of the inflow of people. Large retail stores, like Walmart, may be less affected by primary spending, as they are a national chain, and we have no reason to believe that they will need to hire more workers or pay workers overtime when the campaign comes to town. Since it is not clear that the campaigns actually shop at "Mom and Pop" stores when making purchases (where the increased spending effects directly increase income), and instead may favor larger corporations, it does not directly follow that retail trade income should rise from primary campaign spending. In the earlier time period, we do find that there is a higher affect of spending on retail trade income when both Democrats and Republicans hold primaries, though we find that the affect of primary spending on income growth is not statistically different from zero.

In an alternate specification, we also include state fixed effects in Equation 3.2. In the initial setting, the state fixed effects dropped out of the regressions because we study income growth. In this next specification, we allow for state fixed effects in growth rates. This changes the identification of the dummy variable for primary elections. Without state fixed effects, the coefficient on the primary election variable was identified by comparing the income growth in states with and without primaries. By including state fixed effects, the coefficient is identified by comparing income growth in a given state when the

primary variable changes values. The results with state fixed effects are in Table 8 in the Appendix. These changes do not substantively change the results.

## V.2 Expenditures

This section examines how growth in campaign expenditures affects income in the sectors above, where the data restricts us to look only at the 2004 and 2008 election cycles. We use quarterly data on campaign expenditures in a given state to estimate Equation (3.3), and are interested in the coefficient on the growth rate in expenditures, $\beta_{1s}$. In this analysis, we continue to control for battleground status of the state (once only one candidate remains in one party), and we additionally control for lagged spending growth, with the thought that an increase in spending last quarter may have a lasting effect on income in some sectors. We no longer control for different attributes of the primary, as the spending amounts will capture the existence of a “Super Tuesday" or times in which both Democrats and Republicans hold primaries in the same period.

Table 3.5 reports the coefficient and standard errors for $\beta_{1s}$ in Equation 3.3 or the coefficient on the growth rate in expenditures, which we interpret as an elasticity. We find that campaign spending modestly increase quarterly growth, where doubling campaign expenditures between quarters results in a .05% increase in a state’s total income from the previous quarter, adjusting for seasonal increases in income. If we compare this to some of the literature reporting elasticities on government spending on income, our results are much smaller. For example, Serrato and Wingender (2010) find that increasing federal spending by 10% increases income by 5.2%. However, these results are not directly comparable, as government spending is targeted to areas in the greatest need, while primary spending is targeted to areas with the most median voters in a hosting state. In our results, we see the largest effects in the accommodations and retail sectors, where doubling

expenditures results in a .1% and .06% increase in income, respectively. Again, we find larger effects in the accommodations sector than we do for total income. However, the results for the retail sector have changed from the previous results using a primary dummy variable and a time frame of 1990-2009. The increased growth in the retail sector may in party be influenced by the many technological and startup needs of the campaign offices' expenses that happened from 2004-2008 moreso than in the previous period. In addition, given a larger effort of grass roots campaigning from 2004-2008, staffers likely spent more time in less populated areas, forcing them to promote local economies more than in the longer time period. For the accommodations and retail sectors, lagged spending seems to have a lasting, positive effect on income growth. The battleground dummies again vary by sector, though in a way that is consistent with the previous results.

Early states like Iowa, New Hampshire, and South Carolina may come to expect or even rely on the visits by potential Presidential candidates. However, they do not know the specific amount, as a different number of candidates enter each cycle, incumbents can choose to run for re-election, reducing the amount of spending by essentially limiting to a one-party primary. To ensure that the traditionally early races are not driving our results, we drop Iowa, New Hampshire, and South Carolina from the expenditures results, and as shown in Table 3.5 Columns (5)-(8), they remain robust.[109] Synonymous to the previous results, we also include state fixed effects, where the comparison now comes from changes in spending growth within the same state. These results are in Table 9 in the Appendix.

[109]If we restrict the sample further to include only the states that change primary status between the two election cycles (or only estimating the extensive margin), are results remain substantitively similar, though our standard errors become larger.

### V.3 An Unrelated Sector

Next, we look at one sector where we do not expect to see much of an effect from primary spending: finance and insurance. Table 3.6 shows the results for this sector using the primary indicator variable. There seems to be some effect in the earlier period, though overall, there is no effect statistically distinguishable from zero on the primary spending indicator variable. In Table 3.7 we look at the same sector, but instead using the expenditures data. We again find that there is no effect statistically different from zero. We again replicate these including state fixed effects, and the results are in Tables 10-11 in the Appendix.

## VI. Where is the Money Coming from?

A discussion of the economic benefit of primaries would be incomplete without considering the sources of these funds. This section aims to provide a description of the origination of campaign finances in U.S. Presidential primary contests. In particular, concern may arise that campaign contributions from individuals within a state are approximately equal to campaign spending in that same state. If, for example, Iowa residents are contributing at a higher rate than the rest of the country (especially at the time of the primary), funds may simply be moving amongst Iowa citizens.

Campaign spending is different than traditional government spending because campaigns are financed through three sources: individual level contributions, federal matching funds, and Political Action Committee (PAC) contributions. Individual level contributions in presidential races are generally considered consumption goods, where an individual donates to a campaign if it increases his/her utility (Ansolabehere et al. 2003). Thus, individuals who enjoy following politics, as well as those with more resources, tend

to contribute more money to candidates and do this more frequently (Brady et al. 1995). While we do not precisely know the counterfactual, we postulate that this money would not be spent in the absence of primaries, as those who contribute in primaries tend to be more high-income individuals whose budgets allow for some flexibility in spending. An additional source of "individual" funds is candidate's personal expenditures, which we think would not be spent to the same extent in the absence of a race.

Second, partial public funding is available to Presidential primary candidates in the form of matching payments.[110] Once eligibility is established, Presidential candidates may receive public funds to match contributions from individual contributors, up to $250 per individual. Again, these funds differ from the traditional federal spending in that they are not targeted at aiming an impoverished area, but instead are entrusted to viable Presidential candidates with intentions of getting out their messages, and ultimately to help voters make the most informed message possible. There has been little variation in the total federal funds allocated for Presidential primary contests over our sample period (1976-2008).

Third, candidates receive money from PACs, though this money frequently comprises less of a candidate's budget than individual contributions. While PAC contributions, as well as overall contributions, have increased significantly since 1980 FEC (2010),[111] candidates still receive most of their money from individuals and matching funds, as partisan PACs generally wait until a candidate has clinched the nomination to stand behind him. For example, in 2008, candidates raised a total of $534 million from individuals, only $63 million from PACs, and $21 million from federal matching funds. Similarly, in 2004, candidates raised $130 million from individual contributors, $10 million from PACs, and $27

[110] For specific rules on obtaining these funds, see `www.fec.gov`.

[111] Also, see the CRP `http://www.opensecrets.org/pres08/totals.php?cycle=2008` for more trends on giving and expenditures.

from federal funds.[112]

Recognizing that the majority of campaign spending comes from individuals, we analyze the sources of the donations. Figures 3.5 and 3.6 do this for 2004 and 2008, respectively. We create a measure, entitled Campaign Ratio by dividing total campaign-related expenses (i.e., money spent specifically on the travel-related activities for campaigning, not on ads, media, consultants, etc.) in a given state by that state's total individual-level campaign contributions. Thus, the greater the measure, the more relative money that is coming from out of state than being spent in state. In Figure 3.5, we see that in early states like Iowa, New Hampshire, South Carolina, Missouri, Arkansas, and Virginia, there is the greatest ratio of spending to contributions. States like Texas, Washington, and California had some of the lowest ratios in 2004. Similarly, Figure 3.6 shows that Iowa, New Hampshire, Wisconsin, Missouri and Iowa have the highest amount of money spent on primary campaign expenditures compared to their states' total contribution volume by state residents. However, South Carolina and Kansas still saw more money spent in their states than their residents contributed. In general, what we see is a transfer of funds from individuals in some states with many contributors to states early in the primary process, or on days with their own contest.

# VII. Conclusion

This paper takes a traditional public finance and macro question asking what government spending does for a local economy, and instead looks at primary campaign spending as an exogenous shock to some sectors of a state's economy. We find that this money modestly increases income growth in a state. Specifically, the service sectors see the largest effects, where the accommodations and health sectors seem to be the source of this. At the same

[112]Calculation from FEC data in the respective years.

time, we find no effect in the finance and insurance sector, corroborating our story that primary elections are not correlated with other factors relating to the state's economy.

While other papers have investigated the ability of early primaries to influence policy, as candidate's attempt to appease early state's preferences in order to clench the nomination early (Malhotra and Snowberg 2011), our paper is the first to show the economic value of hosting a primary race. We also find that when there are few candidates in the race, it is more valuable to have a primary race that occurs independently of other states, making a Super Tuesday primary less valuable in terms of spending and economic growth. This paper provides additional incentives for states to move their primaries up in the ordering, though to do so strategically.

# Figures

Figure 3.1: Number of primaries over time

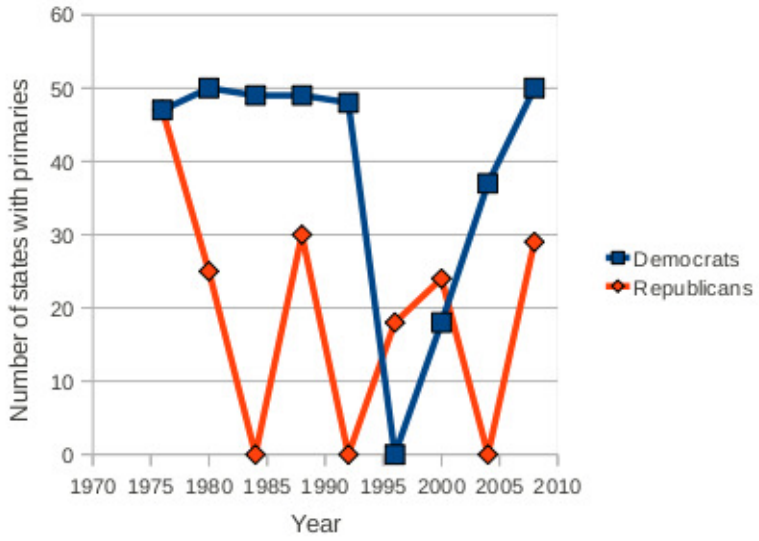


Figure 3.2: Primary Length

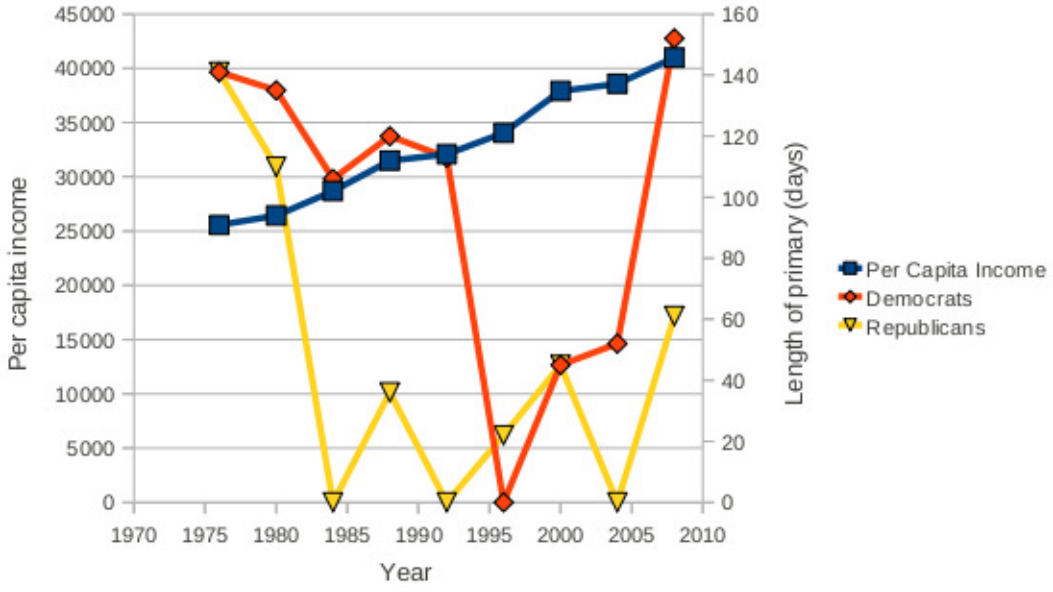


Figure 3.3: Primary Status Between 2004 and 2008



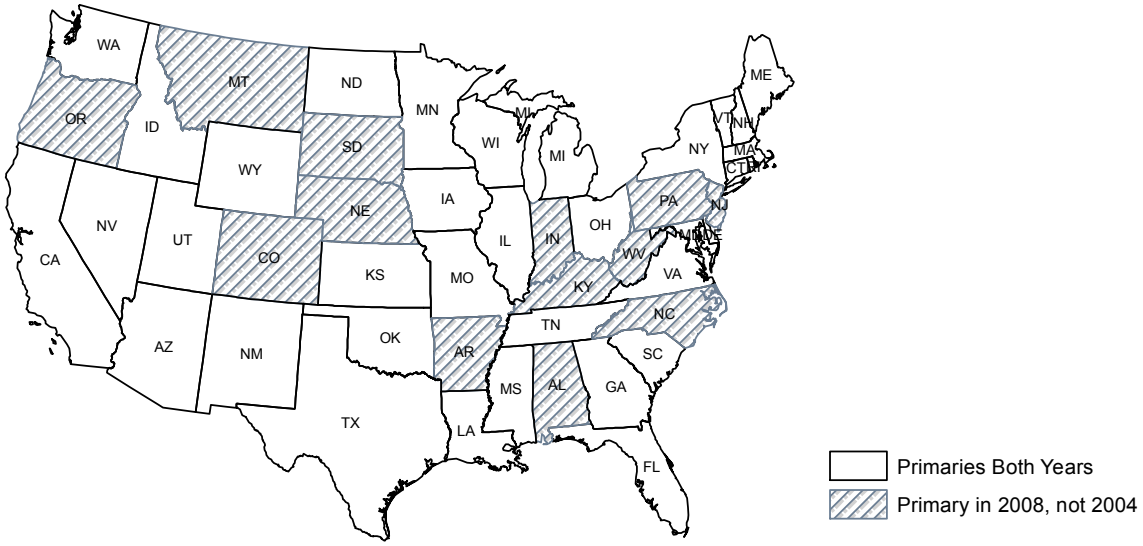


Figure 3.4: Changes in Expenditures from 2004-2008

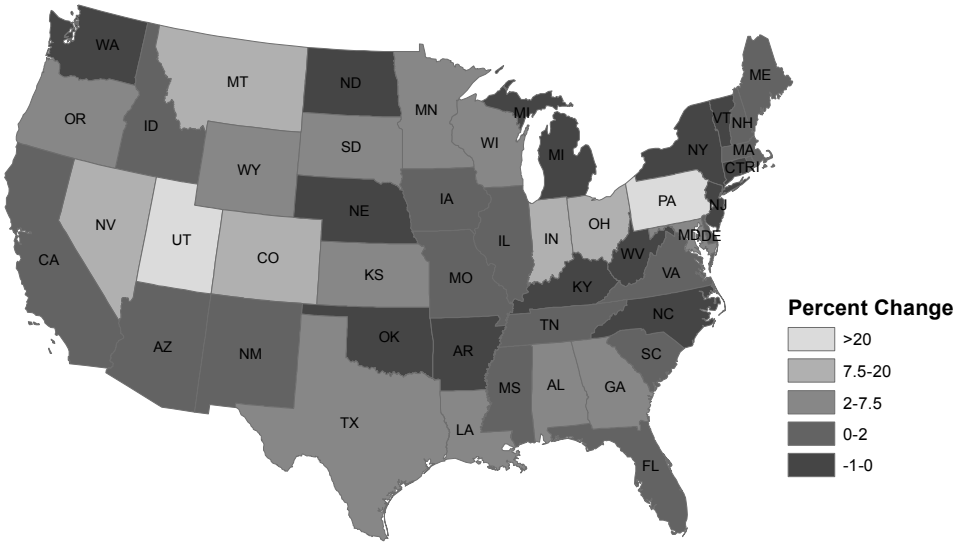


Figure 3.5: Campaign Expenditures and Costs in 2004

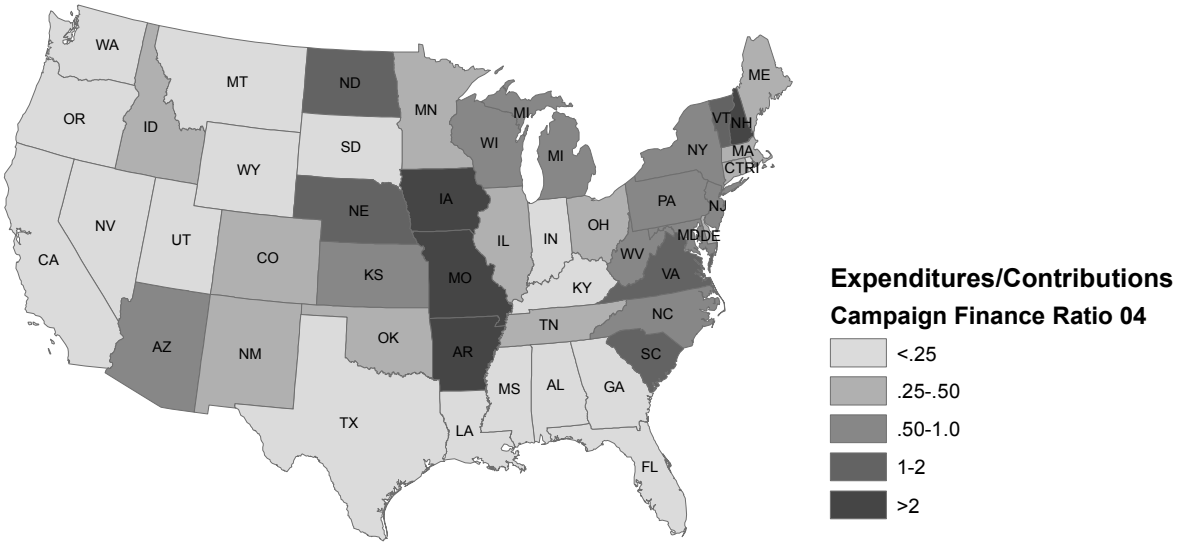
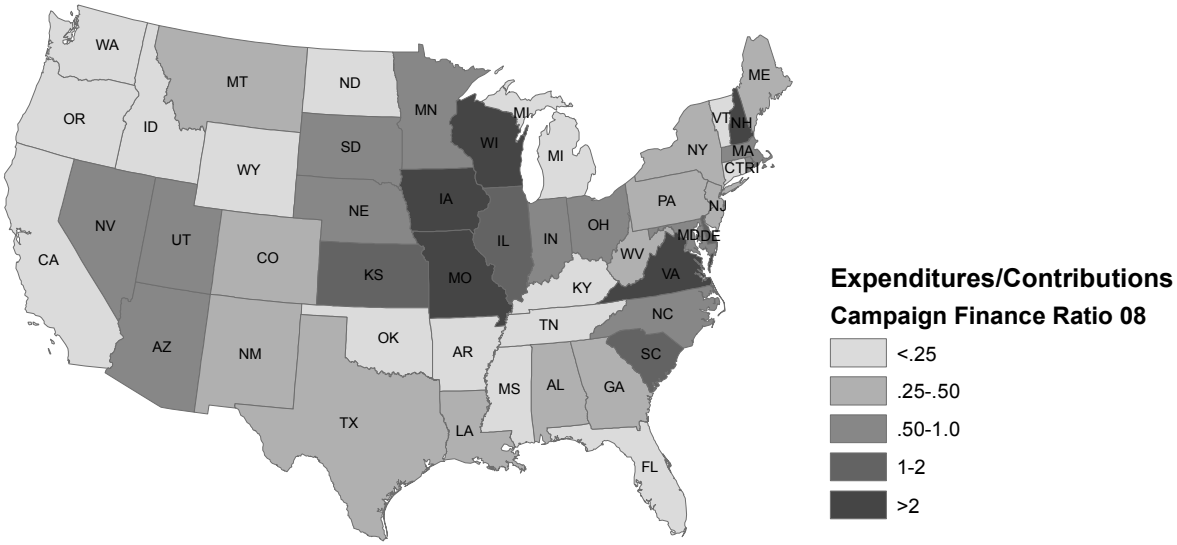


Figure 3.6: Campaign Expenditures and Costs in 2008



# Tables

Table 3.1: Dates when only one candidate remains by party

| | Date R Clinched | Republican Nominee | Date D Clinched | Democratic Nominee |
|---|---|---|---|---|
| 1976 | 8 June | Gerald Ford | 8 June | Jimmy Carter |
| 1980 | 1 May | Ronald Reagan | 4 June | Jimmy Carter |
| 1984 | No Contest | Ronald Reagan | 5 June | Walter Mondale |
| 1988 | 15 March | George H.W. Bush | 7 June | Michael Dukakis |
| 1992 | No Contest | George H.W. Bush | 2 June | Bill Clinton |
| 1996 | 5 March | Bob Dole | No Contest | Bill Clinton |
| 2000 | 9 March | George W. Bush | 9 March | Al Gore |
| 2004 | No Contest | George W. Bush | 11 March | John Kerry |
| 2008 | 4 March | John McCain | 3 June | Barack Obama |

Notes: President Carter had a very low approval rating and was forced by the DNC to run in the primary in 1980. No Contest means that there were no contendors against the incumbent president.

Table 3.2: Spending by Primary Existence

| Primary Status | Total Spending | Campaign Spending |
|---|---|---|
| Primary in current period | | |
| Average | 1,507,529 | 703,237 |
| Median | 423,584 | 222,641 |
| 25th Percentile | 86,755 | 55,653 |
| 75th Percentile | 1,487,526 | 721,901 |
| Observations | 89 | 89 |
| Primary in next period | | |
| Average | 1,733,553 | 638,328 |
| Median | 276,206 | 138,157 |
| 25th Percentile | 33,115 | 27,522 |
| 75th Percentile | 1,336,009 | 679,948 |
| Observations | 89 | 89 |
| Primary in neither period | | |
| Average | 861,762 | 372,993 |
| Median | 99,962 | 35,286 |
| 25th Percentile | 16,191 | 4,207 |
| 75th Percentile | 533,750 | 255,636 |
| Observations | 624 | 624 |

Table 3.3: Contribution of each sector to total income (2008)

| Sector | Percent of total income |
|---|---|
| Accommodations | 4.60% |
| Retail trade | 9.13% |
| Finance and insurance | 8.51% |

Table 3.4: Primary spending increases income and income in service sectors

| | Income | Services | Accommodations | Retail trade | |
|---|---|---|---|---|---|
| | 1974-2009 | 1974-2001 | 1990-2009 | 1974-2001 | 1990-2009 |
| Primary spending | 0.00391*** | 0.00607*** | 0.00498* | 0.000551 | -0.00277* |
| | (0.000857) | (0.00119) | (0.00271) | (0.00127) | (0.00142) |
| Democrat and Republican spending | 0.00440*** | 0.00534*** | -0.00647 | 0.00822*** | -0.000636 |
| | (0.00130) | (0.00182) | (0.00441) | (0.00208) | (0.00285) |
| Primary on Super Tuesday | -0.00549*** | -0.0170*** | -0.0118** | -0.00709** | -0.00950** |
| | (0.00199) | (0.00341) | (0.00492) | (0.00320) | (0.00396) |
| Battleground state | 0.00185** | 0.00124 | -0.00298** | 0.00288*** | 0.00127 |
| | (0.000808) | (0.000975) | (0.00138) | (0.000861) | (0.00122) |
| Observations | 5586 | 4370 | 2997 | 4370 | 3002 |

Robust standard errors in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$
Includes quarter dummies

Table 3.5: Campaign Expenditures Modestly Increase Income Growth

| **Dependent Variable= Per Capita Income Growth** | | | | | | |
|---|---|---|---|---|---|---|
| | All states | | | Drops early states (IA, NH, SC) | | |
| | (1) | (2) | (3) | (4) | (5) | (6) |
| | Income | Accom. | Retail | Income | Accom. | Retail |
| Spending Growth | 0.000546*** | 0.00145*** | 0.000646*** | 0.000521*** | 0.00137*** | 0.000625*** |
| | (0.000157) | (0.000254) | (0.000211) | (0.000159) | (0.000256) | (0.000215) |
| Lagged Spending Growth | 0.0000993 | 0.000928*** | 0.000565** | 0.0000959 | 0.000873** | 0.000546** |
| | (0.000188) | (0.000347) | (0.000254) | (0.000190) | (0.000349) | (0.000257) |
| Battleground State | -0.00000928 | -0.00962*** | -0.00346** | -0.000120 | -0.0100*** | -0.00360** |
| | (0.00141) | (0.00211) | (0.00166) | (0.00143) | (0.00215) | (0.00169) |
| Observations | 700 | 700 | 700 | 658 | 658 | 658 |

Robust standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Includes quarter dummies. State-quarter observations.

Table 3.6: Minimal effect of primary spending in finance sector

| | Finance and insurance | |
|---|---|---|
| | 1974-2001 | 1990-2009 |
| Primary spending | 0.00819** | -0.000307 |
| | (0.00386) | (0.00342) |
| Democrat and Republican spending | -0.000690 | -0.00152 |
| | (0.00501) | (0.00581) |
| Primary on Super Tuesday | -0.00960 | 0.0147* |
| | (0.00501) | (0.00581) |
| Battleground state | 0.00512 | 0.00664** |
| | (0.00368) | (0.00306) |
| Observations | 4367 | 3002 |

Robust standard errors in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$
Includes quarter dummies

Table 3.7: Minimal effect of primary spending in finance sector

| **Dependent Variable= Per Capita Income Growth** | | |
|---|---|---|
| | All states | Drops IA, NH, SC |
| | Finance | Finance |
| | (1) | (2) |
| Spending Growth | -0.000759 | -0.000809 |
| | (0.000526) | (0.000535) |
| Lagged Spending Growth | -0.00134** | -0.00130** |
| | (0.000583) | (0.000589) |
| Battleground state | -0.00861** | -0.00892** |
| | (0.00393) | (0.00406) |
| Observations | 700 | 658 |

Robust standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$
Includes quarter dummies. State-quarter observations.

# I. Results with State Fixed Effects

Table 8: Effects on quarterly income

| | Income | Services | Accommodations | Retail trade | |
|---|---|---|---|---|---|
| | 1974-2009 | 1974-2001 | 1990-2009 | 1974-2001 | 1990-2009 |
| Primary spending | 0.00404*** | 0.00614*** | 0.00524** | 0.000585 | -0.00264** |
| | (0.000627) | (0.000826) | (0.00248) | (0.000968) | (0.00111) |
| Democrat and Republican spending | 0.00423*** | 0.00524*** | -0.00628** | 0.00825*** | -0.000531 |
| | (0.00116) | (0.00165) | (0.00296) | (0.00191) | (0.00247) |
| Primary on Super Tuesday | -0.00544** | -0.0167*** | -0.0126*** | -0.00739*** | -0.0100** |
| | (0.00224) | (0.00327) | (0.00435) | (0.00231) | (0.00435) |
| Battleground state | 0.00205*** | 0.00134 | -0.00266** | 0.00293*** | 0.00149 |
| | (0.000752) | (0.000945) | (0.00113) | (0.000797) | (0.000982) |
| Observations | 5586 | 4370 | 2997 | 4370 | 3002 |

Robust standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$
Includes quarter dummies

Table 9: Campaign Expenditures Modestly Increase Income Growth

| **Dependent Variable= Per Capita Income Growth** | | | | | | |
|---|---|---|---|---|---|---|
| | All states | | | Drops early states (IA, NH, SC) | | |
| | (1) | (2) | (3) | (4) | (5) | (6) |
| | Income | Accom. | Retail | Income | Accom. | Retail |
| Spending Growth | 0.000528*** | 0.00142*** | 0.000639*** | 0.000497*** | 0.00133*** | 0.000613*** |
| | (0.000135) | (0.000265) | (0.000206) | (0.000135) | (0.000262) | (0.000208) |
| Lagged Spending Growth | 0.0000519 | 0.000896*** | 0.000533*** | 0.0000435 | 0.000837*** | 0.000510** |
| | (0.000179) | (0.000239) | (0.000191) | (0.000180) | (0.000238) | (0.000192) |
| Battleground state | -0.000444 | -0.0115*** | -0.00405** | -0.000736 | -0.0120*** | -0.00425** |
| | (0.00143) | (0.00212) | (0.00163) | (0.00147) | (0.00216) | (0.00169) |
| Observations | 700 | 700 | 700 | 658 | 658 | 658 |

Robust standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Includes quarter dummies. State-quarter observations.

Table 10: Minimal effect of primary spending in finance sector

| | Finance and insurance | |
|---|---|---|
| | 1974-2001 | 1990-2009 |
| Primary spending | 0.00823*** | -0.000224 |
| | (0.00218) | (0.00185) |
| Democrat and Republican spending | -0.000909 | -0.00192 |
| | (0.00464) | (0.00385) |
| Primary on Super Tuesday | -0.00908 | 0.0149* |
| | (0.00659) | (0.00759) |
| Battleground state | 0.00528 | 0.00660*** |
| | (0.00401) | (0.00238) |
| Observations | 4367 | 3002 |

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Includes quarter dummies

Table 11: Minimal effect of primary spending in finance sector

| **Dependent Variable= Per Capita Income Growth** | | |
|---|---|---|
| | All states | Drops IA, NH, SC |
| | Finance | Finance |
| | (1) | (2) |
| Spending Growth | -0.000784 | -0.000854 |
| | (0.000678) | (0.000690) |
| Lagged Spending Growth | -0.00135** | -0.00134** |
| | (0.000557) | (0.000556) |
| Battleground state | -0.0103** | -0.0110** |
| | (0.00442) | (0.00453) |
| Observations | 700 | 658 |

Robust standard errors in parentheses.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Includes quarter dummies. State-quarter observations.

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