

# Negative Advertising and Political Competition\*

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## **Abstract**

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.

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# 1 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.<sup>1</sup> 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 (1980), Cappella and Jamieson (1997), Ansolabehere and Iyengar (1995)) that find negativity alienates the political middle and harms participation.<sup>2</sup> 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 both the economics and political science literature as to the consequences of campaigning for election outcomes, virtually no empirical attention has been devoted to the supply side incentives to produce 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.<sup>3</sup> We conjecture that there is a clear economic rationale for why duopolies are more likely to “go negative”: when the number

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<sup>1</sup>Calculation based on WiscAds 2004 presidential data (Goldstein and Rivlin 2007c)

<sup>2</sup>On the contrary, Freedman and Goldstein (1999) find that exposure to negative advertising mobilizes the electorate, and Finkel and Geer (1998) find no effect of negative ads on turnout.

<sup>3</sup>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.

of competitors is greater than two, engaging in negative ads creates positive externalities to those opponents that are not the object of the 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 literature.

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 (Apple versus Microsoft and Verizon versus AT&T). 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 2 we review the related literature. Section 3 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 4 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 5, 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 Shachar and Nalebuff (1999). We conclude in Section 6.

## 2 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.<sup>4</sup> Shachar 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, De Mello and Da Silveira (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.<sup>5</sup> Based on the findings of these papers, there is no clear consensus on whether negative advertising has a mobilizing or a stimulating effect on turnout.

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<sup>4</sup>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.

<sup>5</sup>See, for example, Ansolabehere et al. (1994), Freedman and Goldstein (?), Freedman et al. (2004), Peterson and Djupe (2005), Lau et al. (2007), Che et al. (2007) and references therein.

A possible explanation that reconciles the mixed evidence has been provided by Lovett and Shachar (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.<sup>6</sup> 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.

### 3 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* (2005, 2009). Unlike in general elections where election results are 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.<sup>7</sup> 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

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<sup>6</sup>Another strand on the empirical literature focus on the impact of media market expansion on voter turnout. See for instance, Della Vigna and Kaplan (2007) and citations therein. While they analyze the effects of media bias, they do not precisely study advertisements.

<sup>7</sup>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.

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 is a monumental data set that 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 1).<sup>8</sup>

This merge leaves us with 104 (118) primary elections with two or more candidates 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).<sup>9</sup>

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.

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<sup>8</sup>See Goldstein and Rivlin (2007a, 2007b) for a detailed description of the WiscAds data.

<sup>9</sup>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

### **Viability 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 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.<sup>10</sup> 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.<sup>11</sup>

As shown in Table 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 races that occurred in 2004 already held another election in 2007 (and will not have their next contest until 2010). In 2008 the most viable candidates that compete in a primary contest is eight, and this is slightly lower in 2004.

### **Demographics:**

Little information is known about the type of candidates who enter U.S. House, U.S. Senate, or gubernatorial *primary* races, and this data collection process 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

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<sup>10</sup>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.

<sup>11</sup>See the Online Appendix for these results.

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.<sup>12</sup>

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.<sup>13</sup>

In Table 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 inclined to hold a law degree.<sup>14</sup>

## 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.<sup>15</sup> 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 an advertisement was

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<sup>12</sup>Specific candidate information and sources are available upon request.

<sup>13</sup>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.

<sup>14</sup>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.

<sup>15</sup>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).

aired during the primary or general election was determined by the date of the primary in each state.<sup>16</sup>

In Table 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.<sup>17</sup> 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.<sup>18</sup> Virtually all advertisements are for 30 second television spots, so 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.<sup>19</sup> 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

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<sup>16</sup>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.

<sup>17</sup>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.

<sup>18</sup>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.

<sup>19</sup>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.

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.<sup>20</sup> It is possible to construct various measures of negativity based on this data. 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.

*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*.

## 4 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.

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<sup>20</sup>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.

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.<sup>21</sup> The result is shown in Figure 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 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.<sup>22</sup> 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 5 breaks out the information in Figure 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 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

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<sup>21</sup>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.

<sup>22</sup>Each of the mean negativity values between duopolies and non-duopolies for both election cycles as displayed in Figure 2 are statistically different from each other at the 1% level.

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.<sup>23</sup> We restrict attention to the two most straightforward categories of negativity, i.e., *Negative1* and *Negative4*.<sup>24</sup>

While we focus on elections that share many institutional features, still, they might be heterogenous with respect to political factors, which affect the value of the seat as well as the electoral prospects, that 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

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<sup>23</sup>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.

<sup>24</sup>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.

towards the incumbent, whose past exposure makes it easier to collect information).<sup>25</sup>

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.<sup>26</sup> 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.<sup>27,28</sup>

Third, we return to Table 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.<sup>29</sup> 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 6 outlines these state policies for the states in our sample.<sup>30</sup> Within our sample, three states have no term limits for gubernatorial candidates. At the same 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 laborious, often including constituent support on a ballot.<sup>31</sup> This state and office level variation in term limits could potentially affect the value of the office, and hence the desire

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<sup>25</sup>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.

<sup>26</sup>While Malhotra and Snowberg's (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.

<sup>27</sup>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.

<sup>28</sup>The correlation between own party HHI and our measure of  $\log(\text{EffN})$  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.

<sup>29</sup>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.

<sup>30</sup>Besley and Case (1995) uses this variation in gubernatorial term limits in their study of electoral accountability and economic policy choices.

<sup>31</sup>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.

to have a particularly negative battle.<sup>32</sup>

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 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 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  $\log(\text{Effective N})$  does not change in 2008, and decreases somewhat in 2004, though our basic economic story remains the same. Columns (3), (4), (7), and (8) replicate these results with a duopoly indicator variable instead of Effective N. The magnitudes here mirror the findings in Figure 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 appears 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 8, we replicate our analysis for the *Negative4* measure, and the same phenomenon holds. The unconditional regressions replicate the effects found in Figure 2 and Table 7, where doubling the number of candidates results in about a 10 percent decrease in the fraction of purely negative advertisements, in both election cycles. Or, from Columns (3), (4), (7), and (8), duopolies 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

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<sup>32</sup>If we instead control for the type of race, our results do not change.

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 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.<sup>33</sup> We also include controls at the election level, including the partisan color of the primary, the total ad volume in the election, and the covariates previous described and shown in Tables 7 and 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.<sup>34</sup>

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 within an election, and we are also careful to use robust standard errors to control for heteroskedasticity).<sup>35</sup> 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 11 and 12.<sup>36</sup>

We continue with the results pertaining to *Negative1*. Table 9 reproduces the main effect we found in the data within an ad-level regression framework. As before, specifications (1) and

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<sup>33</sup>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.)

<sup>34</sup>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.

<sup>35</sup>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.

<sup>36</sup>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.

(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 and Table 5 as well as the coefficients from Tables 7 and 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 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 to play a role after we include these additional controls.<sup>37</sup> 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 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 and Table 5, as well as Table 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 findings are driven by just a few candidates. Therefore, we now verify if we obtain similar findings when the candidate is the unit of observation.<sup>38</sup> 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.

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<sup>37</sup>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.

<sup>38</sup>In this specification, we also weight by the total advertising volume of each candidate, as with the election-level results.

## 5 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 Shachar and Nalebuff (1999)).<sup>39</sup> 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 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 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 ( $\mathbf{N}_i^j = N_i^1, \dots, N_i^L$ ) on election day. Let  $k = 1, \dots, L$  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,

$$\Pi_i (P_i, N_1^i, \dots, N_L^i) = \Pi_{i_0} \frac{P_i^\alpha}{\left( \eta + \sum_j N_j^i \right)^\beta} \quad (1)$$

where  $\alpha, \beta \in (0, 1)$ , and  $\eta$  is a small positive constant.<sup>40</sup> 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

<sup>39</sup>Another strand of the theoretical literature focuses on the informative role of advertising (see for instance Coate (2004A, 2004B), 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.

<sup>40</sup>A small positive value of  $\eta$  guarantees that the expression in (1) is well-defined also when  $\sum_j N_j$  is equal to 0. Other than this,  $\eta$  plays no role in the analysis.

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 of the candidate is to maximize his vote share  $\pi_i(\cdot)$  given his budget constraint  $P_i + N_i^1 + \dots + N_i^L = 1$ , 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

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

and similarly for candidates  $k = 2, 3$ . Thus we see that in (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.

## 6 Concluding Remarks

In this paper we provide a novel 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 novel 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,<sup>41</sup> 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

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<sup>41</sup>See for example Iaryczover and Mattozzi (2010).

consequences should help inform the policy debate on campaign finance reform and also the debate on controlling the amount of negativity in politics.

# Figures

Figure 1: Top 100 Media Markets

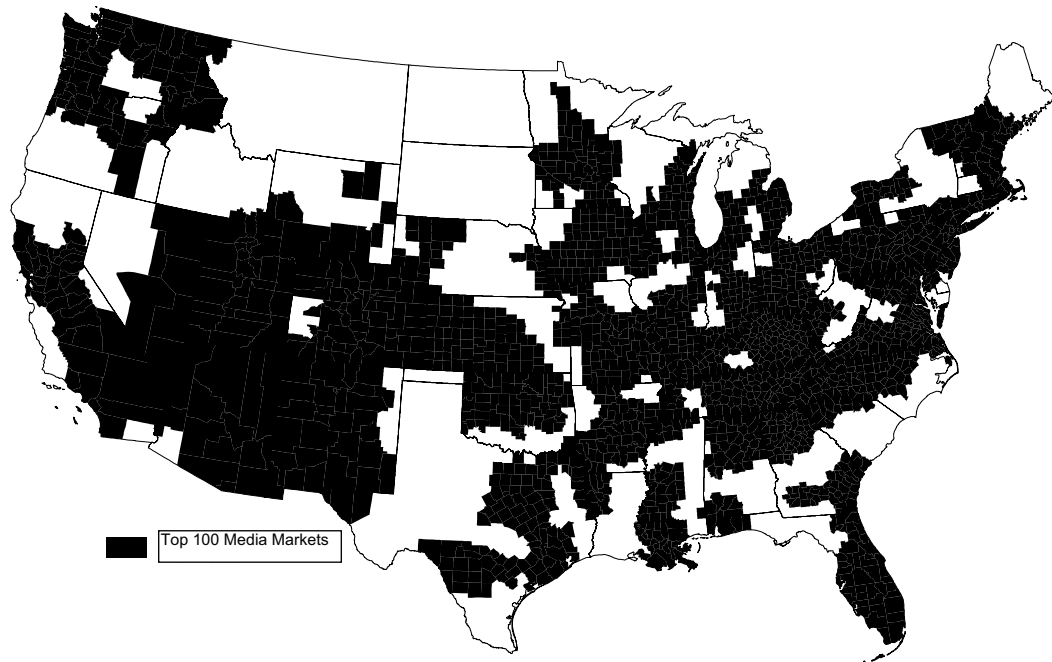
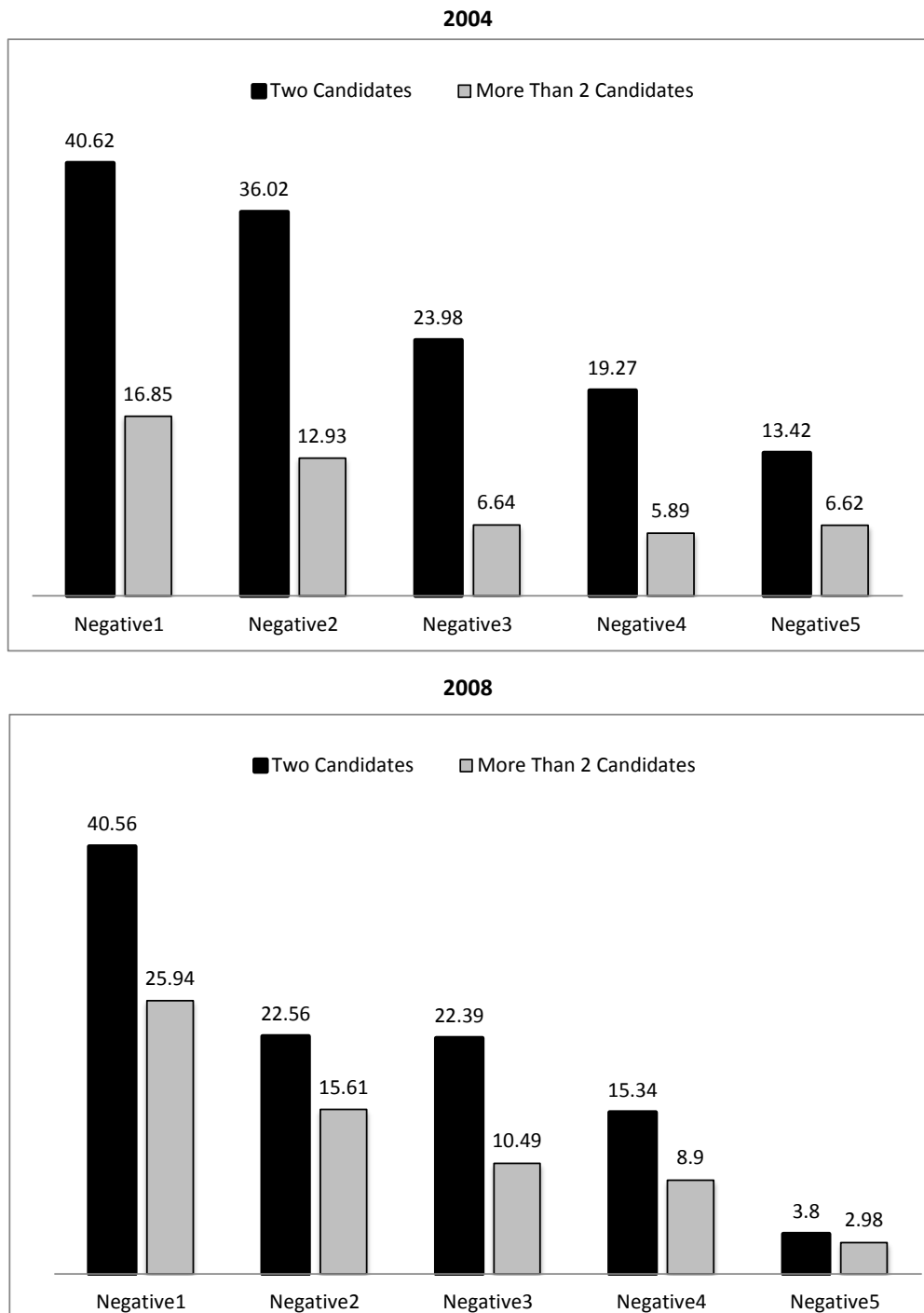


Figure 2: Frequency of Negative Ads with Two Candidates and more than Two Effective Candidates



All means are significantly different at the 1% level

## Tables

Table 1: Ballot N and Effective N

<b>2004</b>					
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
<b>Total</b>	104		<b>Total</b>	104	

<b>2008</b>					
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
<b>Total</b>	118		<b>Total</b>	118	

Table 2: Summary of Office by Effective Number of Candidates

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

Table 3: Candidate Characteristics do Not Differ Across the Duopoly Measure

	2004		2008	
	Non-Duopoly	Duopoly	Non-Duopoly	Duopoly
Male	0.818 (0.387)	0.883 (0.323)	0.817 (0.389)	0.808 (0.397)
White	0.924 (0.267)	0.868 (0.340)	0.893 (0.310)	0.908 (0.291)
College Degree	0.931 (0.254)	0.974 (0.161)	0.980 (0.139)	0.959 (0.120)
Law School	0.382 (0.488)	0.408 (0.495)	0.284 (0.453)	0.347 (0.479)
Political Experience	0.470* (0.501)	0.618* (0.489)	0.529 (0.502)	0.645 (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 4: Breakdown of Ads by Races

	<b>2004</b>		<b>2008</b>	
	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 5: Percent of Negative Advertisements, using Effective N

<b>2004</b>						
<b>Overall</b>						
	Negative1	Negative2	Negative3	Negative4	Negative5	Sample Size
	.2673	.2252	.1385	.1385	.0945	242,448
<b>By Number of Candidates</b>						
	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	
<b>2008</b>						
<b>Overall</b>						
	Negative1	Negative2	Negative3	Negative4	Negative5	Sample Size
	0.338	0.194	0.169	0.124	0.034	177,117
<b>By Number of Candidates</b>						
	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 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 7: Election-Level Effects Using Regression Framework, Negative1

	<b>Dependent Variable = Percent of Ads that EVER Attacked</b>								
Year	2004	2004	2004	2004	2004	2008	2008	2008	2008
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(8)
log(Effective N)	-0.421*** (0.0550)	-0.292*** (0.0667)			-0.248*** (0.0718)	-0.258*** (0.0816)			
Duopoly			0.238*** (0.0375)	0.132*** (0.0451)			0.147*** (0.0498)	0.159*** (0.0573)	
Incumbent in Election		0.165*** (0.0580)		0.178*** (0.0627)		-0.0231 (0.0680)		-0.00871 (0.0681)	
No Term Limits		-0.0616 (0.0397)		-0.0876** (0.0413)		0.0602 (0.0636)		0.0601 (0.0660)	
HHI Opposing Party		0.0640 (0.0667)		0.104 (0.0686)		0.117 (0.0768)		0.136* (0.0765)	
Observations	103	103	103	103	115	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 8: Election-Level Effects Using Regression Framework, Negative4

	Dependent Variable = Percent of Ads that ONLY Attacked								
Year	2004	2004	2004	2004	2004	2008	2008	2008	2008
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(8)
log(Effective N)	-0.235*** (0.0343)	-0.151*** (0.0417)			-0.101** (0.0458)	-0.150*** (0.0517)			
Duopoly			0.134*** (0.0230)	0.0679** (0.0278)			0.0643** (0.0314)	0.105*** (0.0360)	
Incumbent in Election		0.0967*** (0.0363)		0.104*** (0.0386)		0.0164 (0.0431)		0.0229 (0.0427)	
No Term Limits		-0.0574** (0.0248)		-0.0710*** (0.0254)		0.0836** (0.0403)		0.0904** (0.0414)	
HHI Opposing Party		0.0260 (0.0417)		0.0468 (0.0422)		-0.0288 (0.0487)		-0.0210 (0.0480)	
Observations	103	103	103	103	115	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 9: Ad Level Effects Using Regression Framework, Negative1

	<b>Dependent Variable: Negative1 = 1 if the ad EVER attacked an opponent</b>							
	2004 (1)	2004 (2)	2004 (3)	2004 (4)	2008 (5)	2008 (6)	2008 (7)	2008 (8)
log(Effective N)	-0.421*** (0.0955)	-0.334*** (0.0675)			-0.247*** (0.0843)	-0.251*** (0.0943)		
Duopoly			0.238*** (0.0731)	0.185*** (0.0498)			0.146** (0.0646)	0.162** (0.0741)
Incumbent in Election		0.115 (0.0784)		0.101 (0.0778)		0.0253 (0.0945)		0.0387 (0.0964)
HHI Opposing Party		0.0522 (0.0911)		0.0811 (0.0936)		0.182* (0.108)		0.198* (0.104)
No Term Limits		0.0228 (0.0553)		0.0217 (0.0643)		0.242*** (0.0794)		0.261*** (0.0847)
Days Until Election		-0.404*** (0.0637)		-0.400*** (0.0641)		-0.384*** (0.0615)		-0.382*** (0.0614)
Total Ad Volume		0.0559*** (0.0186)		0.0579*** (0.0203)		0.119*** (0.0204)		0.121*** (0.0205)
Republican		0.0714* (0.0414)		0.0771* (0.0446)		0.119* (0.0717)		0.106 (0.0723)
Political Experience		0.0699 (0.0462)		0.0937* (0.0491)		0.0298 (0.0588)		0.0532 (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 10: Ad Level Effects Using Regression Framework, Negative4

	<b>Dependent Variable: Negative4 = 1 if the ad ONLY attacked an opponent</b>							
Year	2004	2004	2004	2004	2008	2008	2008	2008
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
log(Effective N)	-0.235*** (0.0661)	-0.168*** (0.0502)			-0.102* (0.0549)	-0.158** (0.0675)		
Duopoly			0.134*** (0.0483)	0.0910** (0.0380)			0.0644 (0.0406)	0.117** (0.0510)
Incumbent in Election		0.0566 (0.0689)		0.0506 (0.0702)		0.0461 (0.0672)		0.0509 (0.0673)
HHI Opposing Party		0.0454 (0.0604)		0.0606 (0.0584)		0.0116 (0.0673)		0.0173 (0.0662)
No Term Limits		-0.00749 (0.0407)		-0.00902 (0.0458)		0.158*** (0.0535)		0.179*** (0.0588)
Days Until Election		-0.150*** (0.0364)		-0.148*** (0.0369)		-0.121*** (0.0434)		-0.120*** (0.0431)
Total Ad Volume		0.0410*** (0.0126)		0.0419*** (0.0133)		0.0551*** (0.0179)		0.0566*** (0.0172)
Republican		0.0265 (0.0301)		0.0293 (0.0313)		0.0637 (0.0413)		0.0584 (0.0408)
Political Experience		0.0486* (0.0254)		0.0604** (0.0256)		0.00278 (0.0450)		0.0189 (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 11: Ad-level Effects Using Logistic Regression, Negative1

Dependent Variable: Negative1 = 1 if the ad EVER attacked an opponent	2004		2004		2008		2008		2008	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)		
log(Effective N)	-0.438*** (0.103)	-0.377*** (0.0735)			-0.270*** (0.0985)	-0.284** (0.121)				
Duopoly (d)			0.238*** (0.0731)	0.177*** (0.0562)			0.146** (0.0646)		0.173** (0.0821)	
Incumbent in Election (d)		0.0875 (0.0717)		0.0976 (0.0827)		0.0365 (0.114)			0.0567 (0.118)	
HHI Opposing Party		0.0325 (0.112)		0.0803 (0.116)		0.198* (0.118)			0.220* (0.113)	
No Term Limits (d)		0.00915 (0.0605)		-0.0242 (0.0747)		0.260*** (0.0792)			0.277*** (0.0842)	
Days Until Election		-0.433*** (0.0712)		-0.433*** (0.0740)		-0.427*** (0.0697)			-0.425*** (0.0690)	
Total Ad Volume		0.0586*** (0.0227)		0.0545** (0.0257)		0.150*** (0.0328)			0.156*** (0.0335)	
Republican (d)		0.0888** (0.0436)		0.0906* (0.0484)		0.143* (0.0850)			0.129 (0.0856)	
Political Experience (d)		0.0699 (0.0566)		0.0858 (0.0595)		0.0410 (0.0675)			0.0678 (0.0670)	
Observations	242448	242350	242448	242350	177117	157522	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 12: Ad-level Effects Using Logistic Regression, Negative4

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

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

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## 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

$$\max_{(P_1, N_1^2)} \frac{\Pi_{10} \left( \frac{P_1}{\eta + N_2^1} \right)^\alpha}{\Pi_{10} \left( \frac{P_1}{\eta + N_2^1} \right)^\alpha + \Pi_{20} \left( \frac{P_2}{\eta + N_1^2} \right)^\alpha} \text{ s.t. } P_1 + N_1^2 = 1, \quad (3)$$

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

$$\begin{aligned} \max_{P_1} & \frac{1}{1 + \frac{\Pi_{20}}{\Pi_{10}} \left( \frac{P_2(\eta+1-P_2)}{P_1(\eta+1-P_1)} \right)^\alpha} \\ \max_{P_2} & \frac{1}{1 + \frac{\Pi_{10}}{\Pi_{20}} \left( \frac{P_1(\eta+1-P_1)}{P_2(\eta+1-P_2)} \right)^\alpha}. \end{aligned}$$

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

$$\max_{(P_1, N_1^2)} \frac{\Pi_{10} \left( \frac{P_1}{\eta + N_2^1 + N_3^1} \right)^\alpha}{\Pi_{10} \left( \frac{P_1}{\eta + N_2^1 + N_3^1} \right)^\alpha + \Pi_{20} \left( \frac{P_2}{\eta + N_1^2 + N_3^2} \right)^\alpha + \Pi_{30} \left( \frac{P_3}{\eta + (1 - P_1 - N_1^2) + N_3^3} \right)^\alpha} \quad (4)$$

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

The comparison between the vote share of candidate 1 ( $\Pi_1$ ) in (3) and (4) highlights the spillover effect that rises when  $N = 3$ . For example, it is immediate to see that in (3)  $\Pi_1$  is decreasing in  $N_2^1$ . On the contrary, in (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  $\Pi_{10} = \Pi_{20} = \Pi_{30}$ , and  $\left( \frac{P_1}{\eta + N_2^1 + N_3^1} \right)^\alpha + \left( \frac{P_2}{\eta + N_1^2 + N_3^2} \right)^\alpha + \left( \frac{P_3}{\eta + (1 - P_1 - N_1^2) + N_3^3} \right)^\alpha = D$ , we can rewrite (4) as<sup>42</sup>

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<sup>42</sup>Assuming symmetry in the ex-ante market share and budget simplifies the exposition, but it is not needed for our results.

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

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

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

which can be rewritten as,

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

Since  $P = 0$  cannot be optimal in equilibrium,  $\alpha (P_1 / (\eta + N_2^1 + N_3^1))^\alpha > 0$  and can be neglected.

Furthermore, in the symmetric equilibrium,  $D = 3(P / (\eta + 2N))^\alpha$ . Hence,

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

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.