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Negative Advertising and Political Competition*

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June 15, 2015

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. To investigate the empirical relevance of the "fewness" of competitors in explaining the volume of negative advertising, we collected information about all candidates running for a US non-presidential primary contest in 2002, 2004, and 2008. The nature of primaries provides us with a cross section of independent races and large variation in the number of entrants. We merge these data with specific information on the political advertisements aired during the campaigns from the Wisconsin Advertising Project. We find that the magnitude of the "duopoly effect" is striking: duopolies are over twice as likely to air a negative ad when compared to non-duopolies, and the tendency for negative advertising decreases in the number of competitors. The estimates are robust to various specification checks and the inclusion of potential confounding factors at the race, candidate, and advertisement levels.

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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 is usually considered par for the course in any political contest. What is more striking 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.[1] 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. The fear that negative ads potentially 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 messages, the belief is that candidates will be less inclined to air attack ads.

While there has been much interest in both the economics and political science literature as to the consequences of campaigning for election outcomes (for a review of the literature see Lau et al. (2007) and references therein), 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, 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

[1] Calculation based on WiscAds 2004 presidential data (Kenneth Goldstein & Joel Rivlin 2007*c*).

pure duopolies are rarely observed in the consumer product market.[2] 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 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. This idea 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 (e.g., Apple versus Microsoft).[3] Using the words of Konrad (2000), sabotage is a "small number" phenomenon.

Based on these considerations, this paper aims to make an empirical contribution to a growing theoretical literature on the impacts of sabotage on contests. Konrad (2000) considers sabotage in rent-seeking contests among lobbies and theoretically shows that the dispersion effect in sabotage makes it more relevant when the number of lobbies is small; sabotage disappears if the number of contestants is sufficiently large. In an organizational contest, this spillover effect can manifest itself when employees are competing for a promotion. In fact, they can work not only to improve their own performance, but also to sabotage their opponents' performances because promotion is often based on relative rather than absolute performance and the winner takes all. Chen (2003) demonstrates that in a tournament model sabotage is decreasing in the number of contestants.[4] To the best of our knowledge, the empirical link between the incentives to produce negative activities and the number of competitors has not been previously explored in the industrial organization, labor, or political economy empirical literature. Data on electoral races are well suited to empirically study competitors' incentives to sabotage their opponents' performance because winning the election is based on relative rather than absolute performance and the winner takes all. Further, political attacks provide a clean measure of negative activities,

[2]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.

[3]Another example stems from a comparison of local markets, where there are fewer competitors, and national markets, which have more competitors. For example, Walmart is often attacked in local markets in favor of local stores but is not directly attacked in the national forum.

[4]Another prediction of Chen (2003) is that in the presence of negative activities the contestant with a relatively higher ability in productive activity is subject to more total attacks and might not have the highest promotion chances.

while it is hard to collect individual level data on sabotage from organizations.[5]

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.[6] The local nature of these primary contests provides us with a cross section of independent races that exhibit 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 2002 and 2004 elections, which cover 85% of the U.S. population, and the same information for all U.S. media markets in 2008.[7] 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 contain 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 finding

[5]Since sabotage in organizations is typically associated with punishable activities, the lack of reliable data from organizations led researches to exploit either controlled laboratory data (e.g., Harbring and Irlenbush (2011) and Carpenter et al. (2010)), or data from a sport tournament (see for example Balafoutas et al. (2012) and references therein).

[6]While we have data for Presidential primary contests with variation in the number of candidates within party and variation in negative campaigning over time and across states, we choose to omit Presidential races from this analysis for three reasons. First, across the three Presidential election cycles in the time span we cover (2000, 2004, and 2008), there were only five elections with more than two candidates at some point. Of these, all but one contest (Democrat 2008) were determined by March, leaving little variation in advertising campaigns. Second, Presidential races are inherently different than local primary contests as they garner much more national attention and contain more group and party advertising. Third, with such a small number of contests, office-level fixed effects would absorb too many degrees of freedom to soak up the differences in Presidential offices and Congressional, Senate, and gubernatorial offices.

[7]In some specifications, we also exploits information on ads aired during the 2000 election cycle in 75 media markets.

is that duopolies have over twice as high a likelihood of airing a negative ad as compared to non-duopolies, and the tendency for negative advertising decreases in the number of competitors. The magnitude suggests that even just a handful of competitors can all but eliminate the incentives to "go negative" as compared to the duopoly case. This result remains robust to a variety of measures of negativity, measures of the number of candidates and empirical strategies (such as linear, non-linear, and propensity score estimators), and when including 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.

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 a novel dataset on primary contests, which includes information on candidate characteristics, and advertising patterns; this section also familiarizes the reader with the WiscAds data. 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, we provide additional evidence that could rule out alternative explanations to the spillover effect which might be consistent with our findings. We conclude in Section 5.

2 Relevant Literature

This paper is broadly related to a vast empirical literature in economics and political science that examines political advertising and the effects of campaigning on voter behavior.[8] Regarding negative advertising, the conventional wisdom is consistent with the conclusions of a strand of studies that find negativity alienates the political middle and harms participation (Crotty and Jacobson (1980); Cappella and Jamieson (1997); Ansolabehere and Iyengar (1995)). Other works

[8]To name a few, Shachar and Nalebuff (1999), Coate and Conlin (2004) and references therein focus on the effect of advertising on turnout. 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.

reach the opposite conclusion, that is exposure to negative advertising mobilizes the electorate (Freedman and Goldstein (1999)), or negative ads have no impact on turnout (Finkel and Geer (1998)). To a greater extent, Lau et al. (2007) recently examined the research literature and conclude that while negative campaigning tends to be more memorable and stimulate knowledge about the campaign, there is no robust evidence on the detrimental effects on the political system. The lack of consensus on the effects of negative advertising on the electorate has lately prompted researchers to provide alternative explanations that could reconcile the mixed evidence, departing from the observation that not all voters react in the same way to the tone of the campaign. Whether negative campaigns have substantial effects on voter impressions may depend on the timing of exposure to negativity (Krupnikov (2011)); the relevance of the message, the degree of civility and the tolerance level of the voter (Fridkin and Kenney (2011)); the voter's prior knowledge (Lovett and Shachar (2011)); the voter's gender (Galasso and Nannicini (2013)).[9]

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 (2011) 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.[10,11] 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.

This paper is also related to another growing strand of empirical literature focusing on the

[9] A further strand of literature studies the effects of advertising in general on voter turnout and vote choice. Huber and Arceneaux (2007) and Krasno and Green (2008) use the WiscAds data in their studies of voter persuasion and turnout, respectively, in the 2000 Presidential General Election.

[10] Peterson and Djupe (2005) investigate the supply side of negativity in the 1998 Senate primary elections. However, they look at newspaper content and not the candidates' own advertising incentives, asserting that more candidates results in more negative newspaper coverage.

[11] Other empirical papers focusing on the supply side (i.e., candidate behavior) are Gordon and Hartmann (2014, 2013), 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.

broader interaction of media and politics.[12] While all of these papers analyze the effects of media bias and link these effects to politics, none of them precisely study advertisements.

This paper also aims to contribute to the growing literature on the importance of primary elections in the US. Hirano and Snyder (2014) document that 60% of voters live in Congressional Districts where one party generally dominates the general election. They find that primary contests are competitive races for these advantaged parties, which then raises the quality of the elected official. Further, Snyder and Ting (2011) support this finding. They conclude that primaries are the best at picking quality candidates when extreme districts exist. Hirano and Snyder (2012) document the correlation between the existence of primary contests and a shift from party-based voting to candidate-based voting. All three of these works have pushed the envelope to understand what primary contests do, especially focusing on data collection. Each of these papers document a lack of primary election data, and the data collection involved with this paper helps to increase the field's knowledge of primaries.

Finally, our study of negative advertising in political contests can be related to a broader literature on comparative advertising. A comparative advertisement in an oligopolistic industry occurs when one firm explicitly informs consumers about characteristics of the products of another firm. Comparative advertising has been subject to various regulations that differ across countries (see Barigozzi and Peitz (2004) for an excellent review of the legal and economic background). The general view is that comparative advertising provides an avenue for firms to differentiate their products which thereby enhances their market power. This is a force that needs to balanced against the potentially beneficial effects of information disclosure that comparative advertising provides. There is a small but growing body of research on theoretical models that study the incentives for using comparative advertising (discussed in the above review). However these papers have exclusively focused on duopoly markets, which is an understandable restriction given the strategic complexity that multiple competitors poses for comparative advertising as our analysis has highlighted. Nevertheless there are some robust theoretical conclusions that could be examined with our data. For example, Anderson and Renault (2009) show that in a duopoly where consumers are imperfectly informed about quality, a firm having lower perceived quality (i.e., the newcomer) will have incentives to disclose information about the high quality firm (i.e.,

[12] See Prat and Stromberg (2011) and citations therein for a complete review of this literature.

the incumbent) through comparative advertising. Such predictions have been further examined empirically (see e.g., Anderson, Ciliberto, and Liaukonyte (2013)) and could be examined in our data if we restrict analysis to duopoly races. This is a potential avenue for future research.

3 Data Description

In order to explore the empirical relevance of the spillover effect, we assemble a new dataset that contains information on all entrants of the primary races in the United States spanning from 2000 to 2008 (with the exclusion of 2006, when ad data were not collected at all).[13]

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, encyclopedic source.[14] 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.

By matching candidates' names with advertisers' names in the 2002, 2004 and 2008 election cycles, we combine 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

[13] In 1996 the TNSMI/Campaign Media Analysis Group(CMAG) coded only ads aired during the presidential primaries. The "Stand by Your Ad" act (SBA, henceforth), who may have additionally changed the climate of negative advertising, was enacted mid primary season in 2002. When we enlarge the sample to all ads in 2002 (even Pre-SBA) and include a dummy for Pre-SBA, the spillover effect remain robust. The point estimates are reported in Table B.8.

[14] For 2000 and 2002 data, Jim Snyder graciously provided a comprehensive list of all races similar to the work we had done for 2004 and 2008. He uses variations of these data in several papers (Shigeo Hirano & James Snyder 2014, James M. Jr. Snyder & Michael Ting 2011, Shigeo Hirano & James Snyder 2012).

the campaigns and the advertising strategy of each candidate. Note that CMAG does not provide information about the identity of the advertiser in the 2000 electoral cycle, but only the content and the race in which the ad was aired. When using the election as the merging identifier in 2000, we can still link the average tone of the campaign with the number of competitors in the race, but we cannot exploit candidate-specific information.[15]

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). Ads data from races in 2000 span only the top 75 media markets.[16] This merge leaves us with 343 primary elections with two or more candidates on the ballot and active campaign advertising over the period 2002-2008. The number of races is 416 if we also consider the 2000 election cycle.

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 advertisement levels. 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. In case ii) we give equal weight to all candidates, whereas in case iii) we place more weight on the candidates who advertised more and obtain similar findings. Thus, these three setups allow reassure us that the amount of advertising does not influence our results.

[15] When we include 2000 races in our sample, the empirical analysis is conducted at the election or single ad level (i.e., the candidate cannot be used as unit of observation and we cannot control for candidate-specific attributes).

[16] See Goldstein and Rivlin (2007*a*, 2007*b*) for a detailed description of the WiscAds data.

We now describe each part of the dataset and the sources we used to construct it. In addition, the Data Appendix (Appendix A) provides details on the sample composition, information regarding the specific source of each variable used in this study (Table A.1), and the calculation of each variable (Table A.2).

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 a number of alternative measures of the number of candidates in a race by ignoring candidates who earned less than 5 percent, 10 percent, and 15 percent of the popular vote in the election.[17] We shall refer to these measures as $N_{\pi \geq 5\%}$, $N_{\pi \geq 10\%}$, $N_{\pi \geq 15\%}$, respectively.

Table 1 shows the effect on the distribution of the number of candidates across races for the aforementioned definitions of N.[18] Each Effective N measure puts more mass of the distribution on races with two, three, or four candidates (since elections with five or more candidates are getting re-classified into one of these groups). The more compressed distribution accords with general knowledge that primary races with five or more credible candidates vying for votes are quite rare.[19] Further, when determining who poses a competitive threat in election with plurality rule, perhaps an important factor to take into account is the vote margin between the top (expected) candidate and the second candidate. Also a fixed percentage rule may have some limitations if we are comparing duopolies vs. non-duopolies. For instance, consider the case of a candidate who receives, in the end, 20 percent of the vote against one opponent is

[17] Ideally we would determine the effective candidates 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 in 2004. When using this information, we do not observe remarkable differences in the distribution of N as compared to the one obtained using final vote shares.

[18] We also have this information in Figure 1 in Appendix A.

[19] If we revise this measure to candidates who earned more than 2% 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.

unlikely to ever have been a plausible winner in a duopoly race. On the contrary, a candidate who receives 20 percent in say a 4-candidates primary may very well have been the front-runner at some point in time. Based on this consideration, we then construct an alternative measure that is expressed as percentage points of the winner's final vote share. For instance, the fourth measure we consider only includes candidates who earned within 10 percentage points of the winner's final vote share, which we denote $N_{\text{gap}\leq 10}$. When using the latter measure based on the margin of victory, we are also effectively imposing a sample selection, as only close races will be included, and the number of races decreases as the Effective N measure becomes more restrictive. For ease of exposition, the remainder of the paper will mainly focus on the $N_{\pi\geq 10\%}$ measure in favor of the ballot measure. All results that follow are robust to using the Ballot N measure or Effective N measures.

In our sample, about 90% of the electoral contests have at least two viable candidates in the race. Races for gubernatorial and Senate seats tend to be associated with lower entry. The majority of races are from U.S. House races.[20]

Demographics:

Little information is known about the types 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 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.[21],[22]

Lawyers are the most common profession in our data for all years, followed by businessmen.

[20] See Data Appendix Table A.3 for details.

[21] Specific candidate information and sources are outlined in Appendix A.

[22] We are missing political experience information for 67 of our candidates over the three years of our WiscAds data.

Approximately two thirds of candidates are between 45 and 60 years of age. In addition, just over 80% of the candidates in our data are men, and about 90% of the candidates are white. Thus, we see that the modal advertiser is a white male between 45 and 60 years old, and is an attorney or businessman.[23]

In Table 2 Columns (1) and (2) report the summary statistics of the advertisers' demographics and political experience across duopolies and non-duopolies to ensure that different market structures do not attract intrinsically different types of competitors. The demographics are quite similar across races, despite the number of competitors. Only political experience (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.[24]

We also collect information on the demographics of candidates running 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. In Columns (3) and (4) of Table 2, we find that the only differences are that advertisers are slightly more inclined to hold a law degree, and advertisers are more likely to have political experience.[25]

Advertising Data

Throughout the entire 2002 and 2004 election seasons, over 1.7 million television spots were aired in favor of gubernatorial, U.S. Senate, and U.S. House candidates in the top 100 markets.[26] Similarly, in 2008, our data records 1,342,341 advertisements aired throughout the entire 2007-2008 election season.[27] Of the total ads broadcasted, 697,610 aired during the primary campaigns

[23]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.

[24]As it is a standard practice, we follow Jacobson (1980) in accounting for prior political experience in our models as a proxy for quality or performance of politicians. Recent work has started to collect these data (Hirano & Snyder 2014, Snyder & Ting 2011, Hirano & Snyder 2012).

[25]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.

[26]558,989 ads were aired in 2004 and 1,187,389 ads were aired in 2002.

[27]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

for these elections, which are the focus of this paper due to their variation in the number of candidates. In the 2000 election season, 74,122 (471,756) ads we aired during primary (general) elections in the top 75 media markets. Whether an advertisement was aired during the primary or general election was determined by the date of the primary in each state.[28]

In Table A.4 of the Data Appendix, we report the total ads aired by viable candidates. We observe 635,296 total ads in campaigns for 2002, 2004 and 2008 races with 2 or more "effective" candidates, of which 28% are from Senate elections, 27% from House elections, and 45% from gubernatorial elections.[29] 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.[30] 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.

The CMAG data provide 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 contain 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.[31] 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.[32]

media ($43 million) and print media ($21 million). See CRP (2008) for more details.

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

[29] In 2000, 74,122 ads were aired in primary campaigns with 2 or more effective candidates. Of those, 21% were aired in gubernatorial races, 31% were aired in House races, and 47% were aired in Senate races.

[30] 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.

[31] 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.

[32] 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

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 include 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.[33] It is possible to construct various measures of negativity based on this data. Four 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):

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

Mostly Attack includes ads that attack for at least half of the airtime.

Attack at End includes only those ads that end with an attack.

Attack Only includes all ads that only attack the opponent.

For our purposes, the most relevant categories of negative advertising are *Contrast* (which flags an ad as negative if it contains any negativity whatsoever) and *Attack Only* (which only flags an ad as negative if all of its message is negative). Thus *Contrast* is a more inclusive measure than *Attack Only*. We make the assumption that negative advertising is candidate specific, meaning each ad attacks one particular candidate. While it is plausible that a candidate can run an ad attacking all other competitors in the race, we do not find occurrences of this when spot-checking the ad data content explicitly. In primary contests, there are occasional ads that say a variant of "Candidate X is the only one to support Policy Y," though this would not be coded as a negative ad.

in these contests.

[33] 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.

4 The Spillover Effect

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. As shown by Konrad (2000), 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 determine whether these effects are present in the data and quantify the magnitude of the effect. Assessing the magnitude will provide a sense of the importance of competition as a means of explaining negativity.

We start our empirical analysis with the first prediction and plot the proportion of negative ads aired in 2002, 2004 and 2008 under the five different measure of negativity for both duopoly and non-duopoly markets again using $N_{\pi \geq 10\%}$ as the measure of competition.[34] 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. Figure 3 shows that these trends continue to exist when modifying the measure of "Effective N" as well as looking at the Ballot N measure, when focusing on the Contrast and Attack Only measures. Still, we find that candidates in duopolies are at least twice as likely to engage in negative advertising as those in non-duopolies across all

[34] As mentioned above, 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 Polling Report, which systematically reports all the electoral polling data that have been collected during a US campaign. Using Polling Report, 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.

measures of Effective N, and one and a half times as likely when using the Ballot N measure.[35]

Table A.5 in the Data Appendix breaks out the information in Figure 2 further by showing the proportion of ads that are negative under the four different measures conditional on the number of competitors in each election by measure of "Effective N." Here we see that the trend in the tables is again consistent with our prediction. When broken down further by "Effective N" measures, negativity decreases monotonically with the number of candidates. 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 2 and 4 times the rate of negative ads as four person races). If we restrict attention to advertising that spends the whole time attacking, i.e., Attack Only, we also see that with just 5 or more players, the rate of negative advertising virtually goes to zero. 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. Similarly, Table A.6 report the unconditional effect of the number of candidates on negativity when we regress indicators of three, four, and at least five candidates on negativity.

When we simply regress a duopoly indicator on negativity, the estimated coefficients capture the unconditional moment found in Figures 2 and 3. The point estimates are reported in Table A.7. For instance, when using $N_{\pi \geq 10\%}$ and Contrast as a measure of negativity, the propensity of airing a negative ad is 23 percentage points higher in duopoly than in non-duopoly political markets. In other words, races with only two viable candidates have, on average, an 80% higher chance of exhibiting negative ads (the mean value of negativity is 29% in this sample, see Table A.5). Further, in Table A.6 we see that the steep reduction in the rate of negative advertising that is associated with adding just a few or even one viable player 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).

Next we will consider the robustness of these results to the possible presence of omitted variable bias. The potential 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 may view entry into a primary race as exogenous to the decision to

[35]Each of the mean negativity values between duopolies and non-duopolies for all election cycles as displayed in Figures 2 and 3 are statistically different from each other at the 1% level. Further, we obtain a similar histogram when we use ads aired in the 2000 election cycle (i.e., Figure 2 in Appendix A).

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.

4.1 Empirical Specification

When presenting the results, we mainly restrict attention to the two most straightforward categories of negativity, i.e., Contrast and Attack Only, and focus on the $N_{\pi \geq 10\%}$ measure of competition for ease of exposition. However we show that the results would also hold if we had used the Ballot N measure or the other measures of "Effective N" defined above. Specifically, we employ a linear probability model for the event that an advertisement in the data is negative using the following equation:

$$\text{Negative}_{i,j,t} = \alpha_0 + \alpha_1 Duopoly_{j,t} + \boldsymbol{\delta X_{i,j,t}} + \epsilon_{i,j,t}. \tag{1}$$

In our main specifications, $\text{Negative}_{i,j,t}$ equals one if the ad run by candidate i in election j at time t was negative (based on the four definitions in Section 3), and zero otherwise. Our main coefficient of interest is α_1, which captures the "duopoly effect" as *Duopoly* is a dummy variable equal to one if there are only two candidates in the election. In some specifications, instead of the *Duopoly* dummy variable, we employ a set of indicators for $N = 2$, $N = 3$ and $N = 4+$ or $ln(N)$. We further include a vector of covariates in $\boldsymbol{X_{i,j,t}}$, including: *Governor, Republican, Political Experience, Incumbent, election cycle dummies, and Days until Election.* These are each explained below. We are careful to cluster the ad level observations at the election level to control for any unobserved shocks that correlate observations within an election, and we are also careful to use robust standard errors to control for heteroskedasticity.[36]

While we focus on elections that share many institutional features, they might be heterogeneous with respect to political factors, which affect the value of the seat as well as the electoral prospects. These factors might influence entry and the tone of the campaign. The first control

[36]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 with many advertisements within each race, imposing more model structure would allow us to improve upon standard errors. It is reassuring that such additional modeling structure is not needed for our main substantive results to hold.

we consider is the presence of an incumbent in the election (or alternatively whether the ad is aired by the incumbent). If there is an incumbent running for the seat, then there is presumably a lower chance other candidates can win the race, which may decrease the number of potential entrants. In our sample, the average number of candidates is 3.1 and 4.3, conditional on the incumbent running or not running respectively. Upon entering, as an incumbent's policy and personal stances are common knowledge, she can spend the duration of the campaigning attacking opponents. This would increase the volume of negative advertising for races with incumbents. Furthermore, the presence of an incumbent may affect the propensity of going negative of her opponent as well. For example, it could be more likely to observe attacks directed towards the incumbent, whose past exposure makes it easier to collect information on which to generate an attack.[37]

Second, we consider the possibility that gubernatorial races are susceptible to lower entry. A feature of most gubernatorial races that we attribute to this reduced entry is the existence of term limits, which reduce the average duration of Governors' careers, and therefore lower the value of the seat.[38] In addition, the difference in the scope of accountability (state versus national) may deter entry, so we add a control variable for whether or not the race is gubernatorial.

Third, 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 majority party in Congress). For this reason, we control for whether or not the race was Republican.

Fourth, we exploit the rich structure of the WiscAds data and introduce one additional control that may contribute to explain the propensity of going negative. One would expect that as the election approaches, all candidates may be more likely to engage in negative advertising. The WiscAds data provide us with the specific date each ad airs, allowing us to control for the timing of the ad in a rich specification at the advertisement level. 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.[39]

[37]Recall that this study restricts its analysis to primaries, so each election does not always have an incumbent and a challenger, as in general elections.

[38]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.

[39]In Table B.1 of Appendix B we show that our results are robust to omitting this measure. In alternate specifications, we also control for the total volume of advertising in an election, where we take the natural log

Fifth, 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 in a state's legislature or higher. Recall that in Table 2, 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.[40,41]

Finally, one may be concerned that if the openness of a primary election has an effect on N as well as polarization, this in turn could be a relevant factor shaping the tone of the campaign we should take into account. However, McCarty Et. Al. (2014) document that the link between the openness of a primary system and the ideology of the state legislators elected is quite weak. Similarly, Hirano Et. Al. (2010) have recently found little evidence that primary competition is related to partisan polarization in Senate roll call voting. To control for this type of state-level policy, we provide an additional specification with state fixed effects to soak up any time invariant factors that dispose some states to different tones and different entry strategies.

In sum, the vector of covariates is, *X=(Incumbent, Governor, Days Until Election, Republican, Political Experience)*. Further, we include a dummy for the election cycle, and 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. We also allow for state fixed effects to capture for example any regulation of primaries' nominations (which did not change in the time period we consider) and may affect the entry decision, as well as the tone, in a race.

4.1.1 Baseline Results

We start with the results with a duopoly indicator across different measures of viable N, where we employ a linear probability model for the event that an advertisement in the data is negative from Equation 1. The obtained results for the Contrast measure are reported in Panel A of Table 3. The magnitudes here mirror the findings in Figure 2 with a regression framework, where we see that duopolies have a 25 percent absolute higher probability of airing a negative ad

of this number, as elections with more ads will likely increase the probability that each ad is negative. However, since ad volume and tone are simultaneously determined, we do not include these in our main specifications. These results are available in Table B.2 of Appendix B.

[40]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 Appendix B Table B.3 for these results.

[41]These findings remain robust if we separate the data by election year (2000, 2002, 2004 and 2008). These results are reported in Table 4.

than non-duopolies (or almost double on average). This suggests that the unconditional means in Table A.7 remain approximately the same when we add control variables that might also be related to the likelihood of an advertisement being negative and the number of candidates who enter. The main significant control across specifications is the time before the election the ad aired.[42] As the election approaches, meaning the time to the election decreases, the campaign becomes more negative.[43] Next, we show that our results are not particular to the Contrast measure. In Panel B, we replicate our analysis for the other negativity measures, and the same phenomenon holds: duoplies exhibit between 9 and 15 percentage points more negative ads than non-duopolies.[44]

In Table 4 Column (1), we further break down N, and replicate the results with indicators for N equal to three and four (or higher) using the same set of controls. Races with two candidates are the excluded group. The estimates of the spillover effect show that the steep reduction in the rate of negative advertising is associated with adding just one viable player. In Columns (2) to (9) we further show that the duopoly effect is present in all election cycles (2000-2008). In all Table 4 columns we do not control for political experience, since this information is unavailable for 2000, as the WiscAds data do not contain candidate identifiers in this year.

Instead of using indicator variables of the number of candidates, we consider the logarithm of Effective N in Table B.5. Our point estimates show that the percent of negative advertising is decreasing in the number of effective competitors in all specifications. Since N is expressed in logarithms, our estimates imply that doubling the number of candidates results in about a 20 - 45 percent decrease in the fraction of negative advertisements depending on the measure of N we consider (the effect is largest for the $N_{\pi \geq 10\%}$ measure of Effective N, and smallest for the Ballot N measure). Further, doubling the number of candidates results in about a 10 - 18 percent decrease in the fraction of purely negative advertisements (Attack Only).

Before turning to the next section, a few remarks are in order. When we estimate the above specifications using each ad as the unit of observation, we essentially weight more the ads aired

[42] The point estimates in Table B.1 show that the spillover effect is robust to the exclusion of this control variable.

[43] The effect size is smallest in Column (5) where we use the $N_{\text{gap} \leq 10}$ since there are fewer elections, 66 duopolies, 22 non-duopolies, and all the races are close. These races are, on average, within 3.7 percentage points. This decrease in variation in the data to exploit our dummy variable could explain the smaller effect size as well as the increased standard error.

[44] Our results remain consistent if we instead use a logistic regression; these results are in Table B.4 of Appendix B.

by candidates that made an extensive use of advertising. 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 verify these findings using the election and the candidate as the unit of observation. In the former case we focus on the overall tone of the campaign at the election level. In the latter case we focus on a candidate's ratio of negative to total advertising. [45] The results we obtain remain consistent in both cases and are reported in Table B.6 and B.7, respectively. This suggests that the amount of advertising does not influence our results. Finally, our basic marginal effects do not change in an economically significant way, and are somewhat strengthened, when we use a logit instead of a linear probability model as illustrated in Appendix B Table B.4.[46]

For the remainder of the analysis, we focus on the $N_{\pi \geq 10\%}$ measure for ease of exposition, though all results remain consistent if we use the remainder of the measures.

4.1.2 Robustness

We now consider alternative explanations to the spillover effect that could be consistent with our findings and provide additional evidence that could rule them out. When doing so, we include the same covariates as in Table 3 unless otherwise specified.

1. Does the negative tone increase in the absence of an incumbent?

We first conduct our analysis by both dropping all races where an incumbent is running and including only races where incumbents are running to see if the results remain consistent with those obtained when controlling for incumbency. This exercise is motivated by an alternative story that could be consistent with our findings but not based on the spillover effect. Specifically, incumbents in the U.S. often cruise to reelection (and, at least, to re-nomination by their party), and these uncontested races are all excluded from our data set. Instead, we include races where the incumbents draw at least one effective challenger (the average number of challengers of an incumbent, conditional on there being a challenger, is 1.1) and they have presumably some weakness a challenger can easily attack them on (as there is a negative selection from the set of all incumbents in competitive primaries). For example, Hirano and Snyder (2014) document that incumbents in scandals are more likely to face a serious primary challenger compared to other

[45] In this specification, we also weight by the total advertising volume of each candidate.

[46] All linear probability models in the paper are similar to the marginal effects from a logit specification.

incumbents. Hence, a challenger in these races may campaign much more negatively, though not because the spillover effect is absent. On the other hand, the incumbent may counter-attack, especially if she does not have much positive content to tell about herself.

A simple test of this story would be to split the sample into races including and excluding incumbents. In Columns (1)-(2) of Table 5, we find that the estimated effect is still significantly different from zero and of similar magnitude in the two subsamples: having only two competitors results in an increase of 16 percentage points in the likelihood of going negative in races with incumbents, versus 20 percent in the races without an incumbent. Thus, we can say that while the spillover effect is robust across incumbency, it seems that races without incumbents may have a larger spillover effect. We attribute this to the potential added competitiveness in primary races without incumbents.

2. Do districts with a clear dominant party play a role?

Primaries differ from general elections in the way that winning them is instrumental, rather than an objective per se. For example, candidates may participate in primaries in order to build name recognition, rather than in order to win the nomination. If this is the intent, then a candidate will primarily engage in positive campaigning. Assuming that there are fewer candidates who compete in the disadvantaged party's primaries,[47] this would again distort the estimation. A response to this concern would be to just focus on the primaries in the advantaged party where winning the primary is essentially as good as winning the general election; in such primaries, it will be more likely that everybody who is in the race has a goal of winning. We collect information on the vote gap between the Democrat and the Republican for the last two general elections in the given district.[48] We next split the sample three ways:

1. If at least one of the last two general election contests had a vote margin greater than 10 percentage points and that primary election corresponds to the winning party of both of those elections, we consider this the dominant party. This primary is likely to be close.

2. If both of the last two general election contests had a vote margin greater than 10 percentage points and those primary elections correspond to the losing party, we consider this to

[47] Ansolabehere, Hansen, Hirano, and Snyder's book chapter "The Decline of Competition in U.S. Primary Elections, 1908-2004" (2006) discusses this phenomenon extensively.

[48] We restrict this to two lags. For U.S. Congressional races affected by re-districted, we try our best to take averages of the districts comprised of the 2002 district. However, in some cases we are forced to drop these races.

be the opposite of the non-dominant party. Here, entry may occur for other reasons than to win the contest.

3. If both of the last two general election contests were within 10 percentage points, we consider this a close district. In this case, a dominant party does not exist. Here, the primaries are also likely to be close.

Table 5 Columns (3)-(5) present the results for these three samples, respectively. Our results are consistent with our predictions, where the dominant party primary has a statistically significant spillover effect (Column (3)), and the non-dominant party (Column (4)) is no longer statistically significant.[49] However, the effect size is largest in Column (5), where we look only at close districts in which there is no dominant or non-dominant party. In the latter case, the point estimate shows that a duopoly increases the likelihood of airing a negative ad by 23 percentage points (an 80% increase on average).

We also create a measure of the average value of the vote gap over the past two general elections, as well as the interaction between this variable and our duopoly measure. For the lagged vote gap measure, we subtract the vote share of the party who aired the ad from the runner up party in that election (i.e. Republican-runner up for an ad aired by the Republican candidate). Table 6 Column (1) shows that the spillover effect is smaller in races that had a lower level of closeness in previous races (i.e. higher vote gap), and that the interaction is negative, though not statistically different from zero. This sign is consistent in Column (5) when we include state fixed effects in conjunction with this heterogeneity exercise, though the interaction is now statistically different form zero and larger in magnitude.[50]

3. Does the negative tone increase in close races?

Anticipation of a close race may deter entry (Hirano & Snyder 2014) and in close duopoly races the tendency to "go negative" is higher than in races that are not close (Lovett and Shachar (2011)). We propose three specification checks to investigate the relevance of closeness when estimating the spillover effect.

[49] In Column (4), we drop the incumbent control, since there are no incumbents running in the districits without dominant parties by construction (since these are the losing parties).

[50] The lagged vote gap variable is normally distributed and approximately ranges from -0.50 to 0.50. Therefore, in our sample the sign of the duopoly coefficient always remains positive and ranges from about 7% to 41%. This finding may suggest that the duopoly effect is reinforced i) in races with lower lagged vote gaps; and ii) when the party lost by a large margin in the past, perhaps because they might have less to lose by going negative.

First, we ensure that our results are not driven solely by close races, although our conjecture is that a close race should further reduce the intensity of negative advertising in non-duopoly races due to the spillover effect. In fact, especially in a close race, candidates may fear that airing a negative ad will greatly advantage a close competitor who is not the object of the attack. Specifically, we split our sample to races where the winner and runner up were and were not within 5 percentage points of one another. Table 5 Columns (6)-(7) contain these results.[51] While our estimates are robust to the exclusion of all races outside of a 5% vote margin at the conclusion of the race, the magnitude is higher in close races, where on average duopoly races double the likelihood of airing a negative ad (point estimate of 0.28). The spillover effect is still present in races with a wider margin of victory, where on average duopolies increase negative advertising by 55 percent (point estimate of 0.16). Thus, our results remain consistent when considering these races.

In Table 6, Column (2) also provides a measure of the deviation of the vote gap from the median, though we take the median for each measure of N, so we do not compare the vote gaps between the winner and runner-up across N. Since this variable subtracts the race's vote gap from the median vote gap, a higher number indicates that the race is closer (and a negative number indicates that the race was less close) than the median race for that number of competitors. In Column (2), we see that the effect is larger for closer races, where a 0.1 increase in the closeness of the race as compared to the median increases the duopoly effect by 0.05 percentage points. [52] This effect is roughly consistent in Column (6) when we add state fixed effects to the analysis.

Second, we compare duopoly and non duopoly races with the same margin of victory. Define $\rho_e(1)$ as the tone of the campaign in a duopoly race and $\rho_e(0)$ as the tone of the campaign in a non-duopoly race. Let D_e be a dummy variable equal to one if the race is a duopoly, and zero otherwise. The observed outcome is thus $\pi_e = D_e \cdot \rho_e(1) + (1 - D_e) \cdot \rho_e(0)$. The estimand of interest is the Average Treatment Effect (ATE), $E[\rho_e(1) - \pi_e(0)]$. We are also careful to ensure that our control variables from Table 3 are balanced post-estimation, meaning that each

[51] In the former case, we are left with only 56 elections, and our results remain robust to using the wild cluster bootstrap from Cameron et al. (2008) to get better approximations to asymptotically valid standard errors.

[52] Ideally, to construct these measure of closeness, we would like to exploit variation in the data that is not contaminated by advertising, i.e., opinion polls collected at the beginning of the campaign, which are not available for a large number of primaries. While we acknowledge the limitation of using ex-post voting measures, we could at least check the correlation between the measures of closeness obtained with final vote shares and electoral polls, for a subsample of 31 races, for which electoral polls were available (using Polling Report). When doing so, the correlation of the gap between the winner and runner up in the polls and the final election result is 0.44.

of these control variables are not statistically different from each other between the duopoly and non-duopoly groups at the 5 percent level.

Table B.8 in Appendix B reports nearest-neighbor propensity score matching estimates when we employ matching estimators as defined above, we allow for up to 10 neighbors, and use a matching caliper of 0.001. Our results are robust to different calipers as well as different forms of matching, such as a kernel. We provide only this measure for simplicity, but the remainder are robust. When we use this estimator, the results are largely unchanged, though smaller in magnitude. Duopoly contests exhibit about 10 percent more negativity than non-duopolies.

Third, we construct one additional measure of closeness based on final vote shares. The first one is the own-party Herfindahl-Hirschman Index (henceforth, HHI), which measures the 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.[53] When we control for the own party HHI in our main specifications in Table B.9, we find that the estimate of α_1 remains significant in all specifications except when we use the $N_{\text{gap}\leq 10}$ measure.[54] This finding seems to suggest that the closeness of the race does not jeopardize our main results.

In sum, we can conclude that i) our results are not entirely driven by the level of competition in the race; and ii) consistently with our proposed mechanism that underlies the effect of the number of competitors on the tone of the campaign, the spillover effect is amplified when the race is close.

4. Does the opposing party primary election play a role?

Now we use 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.[55] To measure this, we construct the opposing party HHI, similar to

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

[54]The correlation between own party HHI and our measure of $N_{\pi\geq 10}$ is -0.381.

[55]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

the way we did the own party HHI. When we control for the opposing party HHI in our main specification in Table B.10, we find that our results remain substantively similar.

5. Do state or market-level factors impact the results?

It may be that the results are confounded by state-level unobservable factors that drive candidates to enter and go negative. To show that this is not the case, we provide a specification in Columns (3), (5) and (6) of Table 6, where we add state-level fixed effects. Alternatively, it may also be the case that some markets are more susceptible to negative advertising, and candidates target their negativity towards these markets. Thus, we provide one more specification in Column (4) of Table 6 to show that this is not driving the spillover effect. In both circumstances, the main spillover effect persists.

6. How does the timing influence the election tone?

In Table 7 we provide alternative ways to control for the timing of an ad, and show that the estimates of the spillover effect remain the same across specifications. Column (1) controls for the number of days until the election the ad aired instead of our preferred normalized measure. Column (2) takes the natural log of the days measure, allowing for a different normalization of the days measure. The spillover effect is comparable to that in our baseline specification in Table 3 Column (3). In Columns (3)-(6) of Table 7 we restrict the sample to include subsets of the election season. First, it might be the case that all negativity happens in the last two weeks or last one week of the election. If this is the case, the entire effect could be coming from this part of the election season. Columns (3) and (4) show an effect that is identical in magnitude to the average effect. In Columns (5) and (6), we split the sample by the first and second half of the election season, respectively. The effect size is again comparable to the average effect. This suggests that perhaps the variation in negativity over the course of the election is less influential than one might expect ex ante.

4.1.3 Discussion

Our results have established an empirical link between the number of competitors in a race and the extent of negativity. We have motivated this hypothesis as coming from a spillover effect that arises with multiple candidates as compared to duopoly races. However, it could be the case

in Governor, House, and Senate primary races, candidates may be forward looking.

that the empirical pattern we find might be caused by a different mechanism. One possibility is that in multiple candidate races there may be added pressure to refrain from negativity since "defecting" on the party's general desire to keep the primary clean will create more local enemies in one's party. In duopoly contests, angering one other local candidate in one's party may not be as harmful as burning bridges with many candidates within one's party and state.[56] If all the variation we find is due to this mechanism, then after the first negative ad airs (and the tacit agreement to keep the race clean is broken) there should be no systematic differences between oligopoly and duopoly races.

To explore this, we keep elections with 2 or 3 candidates using our preferred measure of the effective number of candidates $N_{\pi \geq 10\%}$. We then determine when the first attack occurred.[57] For duopolies, the first negative advertisement airs, on average, 33 days after the first advertisement airs. For oligopolies, the first negative advertisement airs, on average, 47 days into the campaign. Next, we descriptively look at the other candidates in the race. For duopolies, this will be the only other candidate in the race, and for oligopolies (3 candidate races), this will be the other two candidates in the race. We denote a response to the negativity as any ad that goes negative from a competitor after that initial negative ad is aired in the contest. On average, duopolies are more likely to have a response to that first negative ad than non-duopolies, where the opponent in a duopoly responds 51% of the time and either opponent responds to a negative attack in 21% of oligopolies. This suggests that the spillover effect exists even after the first negative advertisement is aired and the collusive agreement is broken.

Across oligopoly contests, the average time to the first response is approximately 13.6 days with a median of 7 days. Five percent of these three candidate races respond within one day of the first attack. In half of the oligopoly races with responses (roughly 10% of all oligopoly races), both candidates go negative. When compared with oligopoly races with only one responder, oligopolies with two responders (indicative of a complete breakdown of the party agreement) are similar in political experience, incumbency, candidate demographics, and party. The only dimension in which they differ is that races with two responders are more likely to be guber-

[56] Note that this alternative mechanism is at play only if a candidate attacks and makes enemies with all other candidates. We cannot directly check this in the data. However, it is still the case that there is certainly the potential to make several enemies in non-duopoly races.

[57] Ideally we would test this by determining who was responding to a previous attack by another competitor. Unfortunately, the WiscAds data only tell us if the ad was responding to another ad but not to which candidate the ad responds to.

natorial races. This may allude to the fact that there is more party collusion on negativity for U.S. Congressional and Senate races, where favors are more often granted to those who lose the nomination (future offices, less prestigious offices, etc.). This may be less common in state-wide offices.

This evidence suggests that even if there is more tacit pressure in oligopoly contests to refrain from negativity, after this agreement is broken (the first negative ad airs) there is still a strong systematic tendency to respond less with negativity in multi candidate races versus duopoly races. This points to the prevalence of the spillover effect playing a key role. More generally these results highlight the sources of the increased negativity we find in duopoly races - duopolies air the first negative ad sooner, and respond more aggressively, than non-duopoly races.

5 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, as the beneficial effects of tearing down the target candidate are shared between the sponsor (who pays for the ad) and other competitors. 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. It may also contribute to explain the relative negativity in U.S. campaigns when compared to multiparty systems. For example, in 1996 New-Zealand abandoned its first-past-the-post electoral system, which is characterized by a two-party system, and adopted a mixed proportional electoral system, which led to a multiparty system. Ridout and Walter (2013) show that the tone of the campaign was more positive after the change of the electoral system.[58]

[58]While campaigns in the United States tend to saturate televised advertising, this is not the case in many other countries, as campaigns are not always funded through individual campaign contributions. However, it still may be the case that the overall of a campaign is more negative in the U.S. than in other countries due to the comparison of a two-party versus a multiparty system. For example, in a study of the 2005 Danish election (a multiparty contest where ten parties actively advertised), Hansen and Pederson (2008) show that negative campaigning constitutes a very minor aspect of political campaigning in Denmark: only 8 percent of all the advertisements featured in 114 newspapers during the 2005 Danish electoral campaign were coded as 'exclusively

Using a newly created dataset about primary elections in 2000, 2002, 2004, and 2008 merged with the WiscAds data, we find that duopolies are twice as likely to use negativity in an advertisement as 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 general elections are associated with producing more negativity than primary contests. Further, this paper speaks to the growing literature studying sabotage in contests (Chen (2003), Konrad (2000)), providing empirical evidence that adding more entrants decreases the fraction of negativity in a contest.

The existence of a spillover effect suggests that the structure of the political market (e.g., duopoly versus not) can affect the incentives of candidates to engage in negative advertising, and this effect is more prevalent when the primary race is close and/or in a district with a dominant party. Therefore, the results of this article have important implications for the regulation of political contests. Any policy that affects entry in the race (and therefore the number of candidates) may have unintended consequences on the advertising strategies of candidates. Consider for example the regulation of primaries nominations. As states increasingly move toward more inclusive nominating procedures, these expanded eligibility rules lead the number of candidates to increase and this, in turn, may decrease the negative tone of the campaign. Another example is campaign finance reform. If relaxing spending caps decreases the number of candidates entering the race (Mattozzi and Iaryczover (2012)), then an unintended consequence of such a policy would be an increase of the negative tone of the campaign advertising. Understanding the presence of such unintended consequences should help inform the policy debate on campaign finance reform, the openness of the primary, and also the debate on controlling the amount of negativity in politics.

negative' (and 78 percent as positive), and negative campaigning only accounted for 7 percent of the time during the Party Election Broadcasts (PEBs). They also argue that the Danish 2005 election was not unique compared to previous elections in Denmark.

Figure 1: Top 100 Media Markets

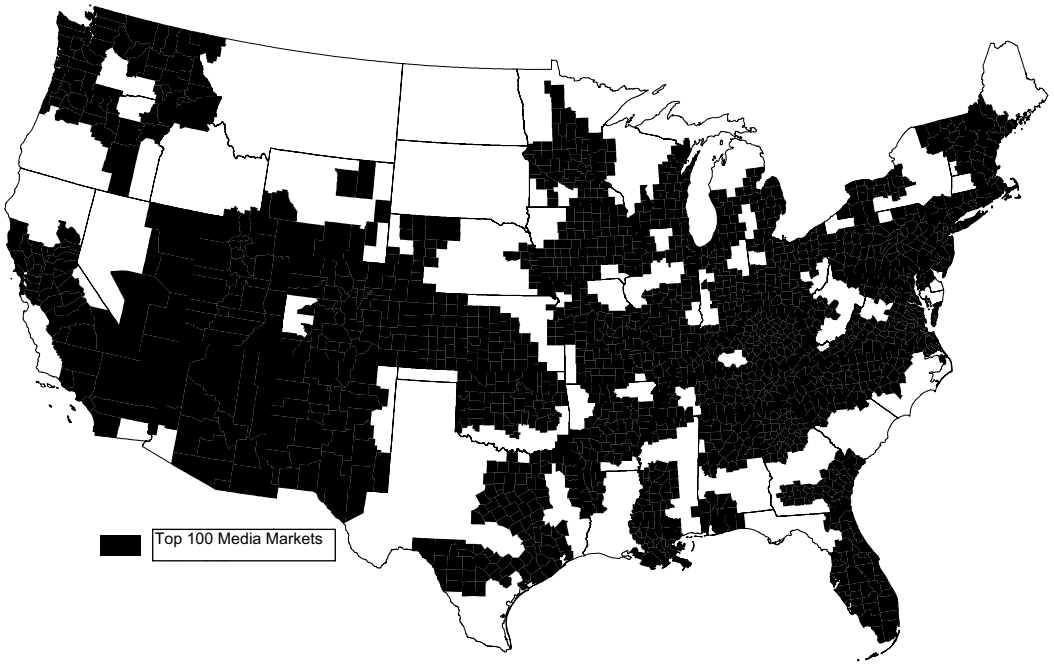

Figure 2: Frequency of Negative Ads with Two and more than Two Effective Candidates (using $N(\pi > 10\%)$)

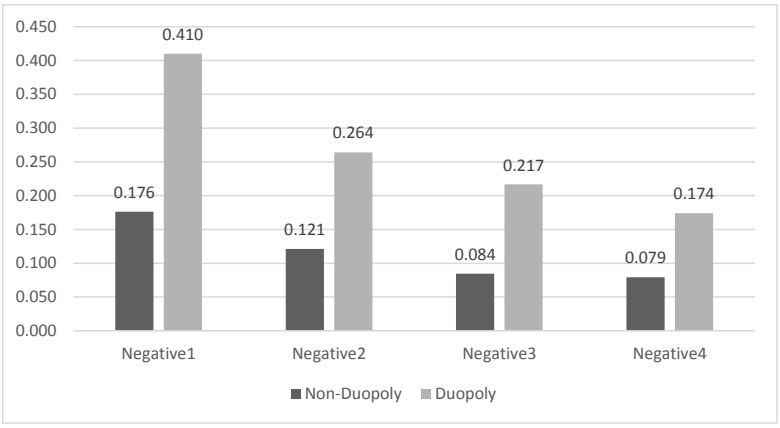

Figure 3: Frequency of Negative Ads with Two and more than Two Effective Candidates

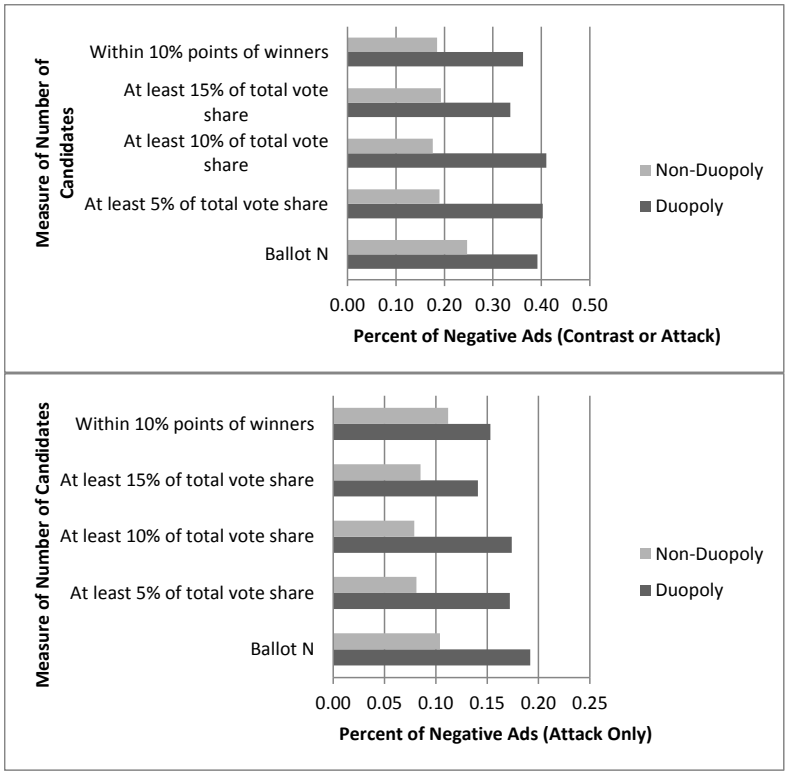

Table 1: The Cumulative Distribution Function of Ballot N and Effective N

Measure N	Ballot N	$N_{\pi \geq 5\%}$	$N_{\pi \geq 10\%}$	$N_{\pi \geq 15\%}$	$N_{gap \leq 10\%}$
1	0	2.34	9.36	16.37	73.98
2	36.84	50.29	61.40	75.15	94.15
3	61.11	76.32	89.18	97.08	97.95
4	74.85	92.11	97.66	100	99.12
5	82.75	96.78	99.71	100	100
6	90.35	99.12	100	100	100
7	95.03	99.71	100	100	100
8	97.66	100	100	100	100
9	98.83	100	100	100	100
10	100	100	100	100	100

Notes: There are 342 elections with two or more candidates on the ballot and active campaign advertising in gubernatorial, House, and Senate elections for 2002, 2004, and 2008 combined. Ballot N includes all candidates whose names were on the ballot (not write-ins). $N_{\pi \geq 5\%}$ includes candidates who received at least 5 % of the final vote share. $N_{\pi \geq 10\%}$ includes candidates who received at least 10 % of the final vote share. $N_{\pi \geq 15\%}$ includes candidates who received at least 15 % of the final vote share. $N_{gap \leq 10\%}$ includes candidates who came within 10 % points of winner.

Table 2: Candidate Characteristics do Not Differ Across the Duopoly Measure

	Advertisers		Candidates	
	Non-Duopoly	Duopoly	Non-Advertiser	Advertiser
Male	0.8137	0.8281	0.8400	0.8268
	(0.3900)	(0.3780)	(0.3670)	(0.3789)
White	0.9004	0.9128	0.8492*	0.8959*
	(0.3001)	(0.2832)	(0.3586)	(0.3058)
College Degree	0.9608	0.9633	0.9626	0.9614
	(0.1944)	(0.1885)	(0.1901)	(0.1928)
Law School	0.3824	0.3730	0.3029***	0.3836***
	(0.4868)	(0.4846)	(0.4602)	(0.4867)
Political Experience	0.3994***	0.5434***	0.3415***	0.4814***
	(0.4905)	(0.4991)	(0.4748)	(0.5000)
Observations	306	244	407	671

Notes: Sources of demographic variables available at `www.montana.edu/urban/research.html`. Mean of each variable with standard deviation in parentheses. In Columns (1) and (2) Duopoly is defined using the $N_{\pi \geq 10\%}$ measure where candidates who came with at least 10% of the final vote share are "viable competitors". In Columns (3) and (4) we consider all candidates on the ballot. *, **, *** Significantly different at the 10%, 5%, and 1% level, respectively. Remainder are not significantly different at the 10% level.

Table 3: Benchmark Specification 1, Advertising-level Analysis

Dependent Variable: Contrast=1 if ad EVER attacked					
	(1)	(2)	(3)	(4)	(5)
	Ballot N	$N_{\pi \geq 5\%}$	$N_{\pi \geq 10\%}$	$N_{\pi \geq 15\%}$	$N_{gap \leq 10\%}$
Duopoly	0.195***	0.228***	0.250***	0.156***	0.135*
	(0.0733)	(0.0526)	(0.0519)	(0.0524)	(0.0762)
2008	0.150**	0.0563	0.0341	0.0649	0.121
	(0.0582)	(0.0569)	(0.0592)	(0.0655)	(0.0946)
2004	0.0461	0.00427	0.0259	-0.0319	0.139
	(0.0553)	(0.0497)	(0.0500)	(0.0680)	(0.0914)
Incumbent	-0.00258	-0.0784	-0.0698	0.00549	0.0898
	(0.0574)	(0.0519)	(0.0510)	(0.0598)	(0.0743)
Governor	0.0767	-0.00785	0.00295	0.0413	-0.0305
	(0.0471)	(0.0439)	(0.0455)	(0.0537)	(0.0827)
Days Until Election	-0.316***	-0.328***	-0.331***	-0.331***	-0.370***
	(0.0461)	(0.0466)	(0.0487)	(0.0503)	(0.0577)
Republican	0.0173	0.0344	0.0343	0.0503	0.122
	(0.0425)	(0.0406)	(0.0425)	(0.0498)	(0.0799)
Political Experience	0.0446	0.0450	0.0253	0.0250	0.0534
	(0.0427)	(0.0376)	(0.0397)	(0.0489)	(0.0759)
Panel B					
Mostly Attack=1 if ad attacked at least half airtime					
Duopoly	0.135**	0.131***	0.148***	0.0856**	0.0881
	(0.0549)	(0.0435)	(0.0416)	(0.0354)	(0.0673)
Attack at End=1 if ad ended in an attack					
Duopoly	0.102**	0.120***	0.125***	0.0771***	0.0795
	(0.0444)	(0.0322)	(0.0319)	(0.0293)	(0.0569)
Attack Only=1 if ad Attack Onlyed					
Duopoly	0.106***	0.0913***	0.0953***	0.0631**	0.0387
	(0.0387)	(0.0287)	(0.0286)	(0.0267)	(0.0454)
Observations	593,477	578,350	549,969	535,533	205,599

Notes: Robust standard errors clustered at the election level in parentheses. Linear Probability Model. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Excluded group is 2 candidates.

Table 4: Robustness (using $N_{\pi \geq 10\%}$) Across Measure and Years

Dependent Variable: Contrast=1 if ad EVER attacked									
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
3	-0.228***	-0.191**	-0.269***	-0.186**	-0.308***				
	(0.0441)	(0.0929)	(0.100)	(0.0716)	(0.0665)				
4+	-0.229***	-0.141	-0.297***	-0.294***	-0.251**				
	(0.0512)	(0.114)	(0.0799)	(0.0751)	(0.105)				
Duopoly						0.174*	0.275***	0.191***	0.286***
						(0.0912)	(0.0940)	(0.0710)	(0.0671)
2002	-0.0398								
	(0.0639)								
2004	-0.00774								
	(0.0524)								
2008	0.00161								
	(0.0525)								
Incumbent in Election	0.0348	0.0274	-0.0596	0.181	-0.0905	0.0313	-0.0573	0.185	-0.0954
	(0.0695)	(0.218)	(0.104)	(0.114)	(0.0812)	(0.218)	(0.105)	(0.117)	(0.0809)
Governor	0.0284	0.147	0.0942	0.0398	-0.127	0.140	0.0980	0.0453	-0.127
	(0.0384)	(0.106)	(0.0772)	(0.0658)	(0.0833)	(0.103)	(0.0748)	(0.0674)	(0.0834)
Days Until Election	-0.339***	-0.310***	-0.168	-0.408***	-0.425***	-0.310***	-0.168	-0.408***	-0.425***
	(0.0457)	(0.0845)	(0.102)	(0.0657)	(0.0675)	(0.0845)	(0.102)	(0.0657)	(0.0675)
Republican	0.0341	0.0000628	-0.0703	0.0897	0.0468	-0.00709	-0.0699	0.0814	0.0536
	(0.0381)	(0.0726)	(0.0723)	(0.0612)	(0.0680)	(0.0733)	(0.0724)	(0.0594)	(0.0671)
Years	ALL	2000	2002	2004	2008	2000	2002	2004	2008
Observations	635,296	65,327	167,979	226,899	175,091	65,327	167,979	226,899	175,091

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

Table 5: Robustness (using $N_{\pi \geq 10\%}$)

Dependent Variable: Contrast=1 if ad EVER attacked							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Duopoly	0.158*	0.201***	0.190***	0.184	0.231***	0.281***	0.162***
	(0.0874)	(0.0569)	(0.0561)	(0.116)	(0.0540)	(0.0646)	(0.0550)
2008	0.112	0.0468	0.0981	-0.193*	0.184***	0.0314	0.0268
	(0.0977)	(0.0621)	(0.0630)	(0.111)	(0.0628)	(0.0724)	(0.0646)
2004	0.309***	-0.0135	0.149**	-0.249***	0.0667	-0.00497	-0.0174
	(0.0966)	(0.0526)	(0.0639)	(0.0772)	(0.0494)	(0.0677)	(0.0565)
Governor	-0.185	0.0253	-0.0400	-0.0460	0.0587	-0.000727	0.0461
	(0.112)	(0.0496)	(0.0474)	(0.0746)	(0.0510)	(0.0471)	(0.0556)
Days Until Election	-0.328***	-0.329***	-0.410***	-0.182	-0.361***	-0.397***	-0.300***
	(0.0787)	(0.0589)	(0.0519)	(0.132)	(0.0676)	(0.0664)	(0.0622)
Republican	0.0390	0.0236	0.117**	-0.0460	0.0752	0.169***	-0.00817
	(0.0989)	(0.0451)	(0.0487)	(0.0869)	(0.0482)	(0.0495)	(0.0497)
Political Experience	0.0130	0.00297	0.0937*	-0.105***	-0.0375	0.0390	-0.00180
	(0.0759)	(0.0424)	(0.0503)	(0.0389)	(0.0544)	(0.0453)	(0.0467)
Incumbent			0.0239	0.299***	0.0272	0.151*	-0.0111
			(0.0799)	(0.103)	(0.0728)	(0.0819)	(0.0604)
Keeps Races with an Incumbent	X	-	-	-	-	-	-
Drops Races with an Incumbent	-	X	-	-	-	-	-
Keeps only Dominant Party	-	-	X	-	-	-	-
Drops Dominant Party	-	-	-	X	-	-	-
Keeps Close Districts	-	-	-	-	X	-	-
Keeps only Close Races (<= 5%)	-	-	-	-	-	X	-
Drops Close Races (<= 5%)	-	-	-	-	-	-	X
Observations	107,328	442,641	208,554	144,233	197,182	153,859	396,110

Notes: Robust standard errors clustered at the election level in parentheses. All models include state-level fixed effects. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 6: Robustness (using $N_{\pi \geq 10\%}$)

Dependent Variable: Contrast=1 if ad EVER attacked						
	(1)	(2)	(3)	(4)	(5)	(6)
Duopoly	0.237***	0.255***	0.187***	0.183***	0.179***	0.196***
	(0.0480)	(0.0474)	(0.0323)	(0.0326)	(0.0302)	(0.0309)
Lagged Vote Gap	-0.0808				0.0771	
	(0.130)				(0.0927)	
Lagged Vote Gap × Duopoly	-0.338				-0.402**	
	(0.255)				(0.188)	
Vote Gap Deviation		-0.107				-0.205
		(0.206)				(0.162)
Vote Gap Deviation × Duopoly (N2)		0.535**				0.481**
		(0.258)				(0.228)
2008	0.0403	0.0285	0.116***	0.114**	0.115***	0.111***
	(0.0561)	(0.0565)	(0.0438)	(0.0454)	(0.0428)	(0.0403)
2004	0.0409	0.00526	0.0875**	0.0788**	0.0942**	0.0846**
	(0.0478)	(0.0467)	(0.0402)	(0.0356)	(0.0406)	(0.0380)
Governor	0.0155	0.00267	0.0119	0.0269	0.0180	0.0305
	(0.0449)	(0.0472)	(0.0342)	(0.0321)	(0.0344)	(0.0370)
Days Until Election	-0.332***	-0.331***	-0.334***	-0.325***	-0.336***	-0.334***
	(0.0493)	(0.0491)	(0.0502)	(0.0487)	(0.0506)	(0.0501)
Republican	0.0134	0.0528	0.0445	0.0588*	0.0357	0.0521*
	(0.0459)	(0.0400)	(0.0288)	(0.0301)	(0.0297)	(0.0284)
Political Experience	0.0227	0.0178	0.0219	0.0375	0.0179	0.0134
	(0.0394)	(0.0377)	(0.0245)	(0.0252)	(0.0247)	(0.0240)
Incumbent	-0.0508	-0.0662	-0.135***	-0.110**	-0.124***	-0.116**
	(0.0482)	(0.0467)	(0.0462)	(0.0462)	(0.0456)	(0.0460)
Observations	545334	549969	549969	533498	545334	549969
State Fixed Effects	-	-	X	-	X	X
Market Fixed Effects	-	-	-	X	-	-
Observations	545,334	549,969	549,969	533,498	545,334	549,969

Notes: Robust standard errors clustered at the election level in parentheses. $^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$. Duopoly measure uses $N_{\pi \geq 10\%}$. Lagged Vote Gap equals the average of the difference between the party of the advertiser and the other party (i.e. if the ad was aired by the Democrat, it would be the Democrat-second place candidate) in the last two general elections for the given office. Vote Gap Deviation equals the median vote gap between the winner and runner up for the number of candidates in the election minus the vote gap between the winner and runner up for the given election. This variable is negative if the median vote gap is smaller than the vote gap for the election, meaning higher values of this variable associate with closer races.

Table 7: Robustness (using $N_{\pi \geq 10\%}$) Time Until Election

Dependent Variable: Contrast=1 if ad EVER attacked						
	(1)	(2)	(3)	(4)	(5)	(6)
Duopoly	0.245***	0.246***	0.244***	0.246***	0.243***	0.240***
	(0.0521)	(0.0533)	(0.0531)	(0.0507)	(0.0562)	(0.0598)
2008	0.0392	0.0459	0.0813	0.0701	0.0614	-0.0263
	(0.0588)	(0.0618)	(0.0584)	(0.0603)	(0.0669)	(0.0715)
2004	0.0474	0.0618	0.0127	0.0349	0.0756	-0.0627
	(0.0558)	(0.0560)	(0.0604)	(0.0616)	(0.0575)	(0.0654)
Incumbent	-0.0535	-0.0530	-0.172**	-0.177**	-0.0917	-0.0576
	(0.0572)	(0.0597)	(0.0725)	(0.0704)	(0.0664)	(0.0520)
Governor	0.0226	0.0351	-0.0545	-0.100**	0.00466	-0.0165
	(0.0510)	(0.0483)	(0.0541)	(0.0504)	(0.0570)	(0.0475)
Republican	0.0290	0.0314	0.0121	0.0507	0.0408	0.0494
	(0.0427)	(0.0436)	(0.0503)	(0.0510)	(0.0540)	(0.0444)
Political Experience	0.0326	0.0313	0.00545	0.0287	0.0617	-0.0108
	(0.0411)	(0.0416)	(0.0401)	(0.0412)	(0.0475)	(0.0422)
Days	-0.000219					
	(0.000161)					
Log(Days)		-0.0282***				
		(0.0105)				
Includes						
Last 2 Weeks	-	-	X	-	-	-
Last Week	-	-	-	X	-	-
First Half	-	-	-	-	X	-
Second Half	-	-	-	-	-	X
Observations	549,969	547,516	225,540	131,517	274,991	279,998

Notes: Robust standard errors clustered at the election level in parentheses. $^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$. Days is the number of days between the date the ad aired and the election. Log(Days) is the natural log of days and is missing for ads aired on election day. Duopoly uses the $N_{\pi \geq 10\%}$ measure. Specifications include 2002, 2004, and 2008 elections.

References

Anderson, Simon P, and Régis Renault. 2009. "Comparative advertising: disclosing horizontal match information." *The RAND Journal of Economics*, 40(3): 558–581.

Anderson, Simon P, Federico Ciliberto, and Jura Liaukonyte. 2013. "Information content of advertising: Empirical evidence from the OTC analgesic industry." *International Journal of Industrial Organization*, 31(5): 355–367.

Ansolabehere, Stephen, and Shanto Iyengar. 1995. *Going Negative: How Political Advertisements Shrink and Polarize the Electorate.* Free Press.

Ansolabehere, Stephen, John Hansen, Shigeo Hirano, and James Snyder. Jr. 2006. *The Marketplace of Democracy.* Brookings Press.

Balafoutas, Loukas, Florian Lindner, and Matthias Sutter. 2012. "Sabotage in Tournaments: Evidence from a Natural Experiment." *Kyklos*, 65(4): 425–441.

Barigozzi, Francesca, and Martin Peitz. 2004. "Comparative Advertising and Competition Policy." *International University in Germany Working Paper*, , (19).

Berry, Steven, James Levinsohn, and Ariel Pakes. 1995. "Automobile Prices in Market Equlibrium." *Econometrica*, 63(4): 841–890.

Brady, David, Hahrie Han, and Jeremy Pope. 2007. "Primary Elections and Candidate Ideology: Out of Step with the Primary Electorate?" *Legislative Studies Quarterly*, XXXII: 79–105.

Cameron, Colin A., Jonah B. Gelbach, and Douglas J. Miller. 2008. "Bootstrap-Based Improvements for Inference with Clustered Errors." *Review of Economics and Statistics*, 90(3): 414–427.

Cappella, Joshua, and Kathleen Jamieson. 1997. *Spiral of Synicism: The Press and the Public Good.* New York: Oxford University Press.

Carpenter, Jeffrey, Peter Matthews, and John Schirm. 2010. "Tournaments and Office Politics: Evidence from a real effort experiment." *American Economic Review*, 100(1): 504–17.

Center for Responsive Politics. 2008. "2008 Presidential Expenditures." *http://www.opensecrets.org/pres08/expenditures.php?cycle=2008*.

Chen, Kong-Pin. 2003. "Sabotage in Promotion Tournaments." *Journal of Law Economics and Organization*, 19: 119–140.

Coate, Stephen, and Michael Conlin. 2004. "A Group Rule Utilitarian Approach to Voter Turnout: Theory and Evidence." *American Economic Review*, 94(5): 1476–1504.

Crotty, William, and Gary Jacobson. 1980. *American Parties in Decline.* Boston: Little, Brown and Company.

DeMello, Jaoa, and Bernardo DaSilveira. 2011. "Campaign Advertising and Election Outcomes: Quasi-Natural Experiment Evidence from Gubernatorial Elections in Brazil." *Review of Economic Studies*, 78(2): 590–612.

Diermeier, Daniel, Michael Keane, and Antonio Merlo. 2005. "A Political Economy Model of Congressional Careers." *American Economic Review*, 95(1): 347–373.

Erikson, Robert, and Thomas Palfrey. 2000. "Equilibrium in Campaign Spending Games: Theory and Evidence." *American Political Science Review*, 82: 385–403.

Finkel, Steven, and John Geer. 1998. "A Spot Check: Casting Doubt on the Demobilizing Effect of Attack Advertising." *American Journal of Political Science*, 42: 573–95.

Freedman, P., and K. Goldstein. 1999. "Measuring media exposure and the effects of negative campaign ads." *American Journal of Political Science*, 43(4): 1189–1208.

Fridkin, Kim L, and Patrick Kenney. 2011. "Variability in Citizens' Reactions to Different Types of Negative Campaigns." *American Journal of Political Science*, 55(2): 307–325.

Galasso, Vincenzo, and Tommaso Nannicini. 2013. "Men Vote in Mars, Women Vote in Venus: A Survey Experiment in the Field." *CEPR Discussion Paper No. 9547.*

Goldstein, Kenneth, and Joel Rivlin. 2007*a*. "Congressional and gubernatorial advertising, 2003-2004." *The University of Wisconsin Advertising Project, The Department of Political Science at The University of Wisconsin-Madison.*

Goldstein, Kenneth, and Joel Rivlin. 2007*b*. "Congressional and guvernatorial advertising, 2007-2008." *The University of Wisconsin Advertising Project, The Department of Political Science at The University of Wisconsin-Madison.*

Goldstein, Kenneth, and Joel Rivlin. 2007*c*. "Presidential advertising, 2003-2004." *The University of Wisconsin Advertising Project, The Department of Political Science at The University of Wisconsin-Madison.*

Gordon, Brett, and Wesley Hartmann. 2013. "Advertising Effects in Presidential Elections." *Marketing Science*, 32(1): 19–35.

Gordon, Brett, and Wesley Hartmann. 2014. "Structural Equilibrium Analysis of Political Advertising." *Working Paper.*

Hansen, Kasper M., and Rasmus Tue Pedersen. 2008. "Negative Campaigning in a Multiparty System." *Scandinavian Political Studies*, 31(4): 408–427.

Harbring, Christine, and Bernd Irlenbusch. 2011. "Sabotage in Tournaments: Evidence from a Laboratory Experiment." *Management Science*, 57(4): 611–627.

Hirano, Shigeo, and James Snyder. 2012. "The Direct Primary and Candidate-Centered Voting in U.S. Elections." *Working Paper*.

Hirano, Shigeo, and James Snyder. 2014. "Primary Elections and the Quality of Elected Officials." *Quarterly Journal of Political Science*, 9(4): 473–500.

Hirano, Shigeo, James M. Snyder Jr., Stephen Ansolabehere, and John Hansen. 2010. "Primaries and Polarization in the U.S. Congress." *Quartlery Journal of Political Science*, 5(2): 169–191.

Huber, Gregory A., and Kevin Arceneaux. 2007. "Identifying the Persuasive Effects of Presidential Advertising." *American Journal of Political Science*, 51: 957–977.

Iaryczover, M., and M. Mattozzi. 2012. "The pro-Competitive Effect of Campaign Limits in Non-Majoritarian Elections." *Economic Theory*, 49(3): 591–619.

Jacobson, Gary C. 1980. *Money in Congressional Elections.* New Haven:Yale University Press.

Konrad, Kai A. 2000. "Sabotage in rent-seeking contests." *Journal of Law Economics and Organization*, 16(1): 155–265.

Krasno, Jonathan S., and Donald P. Green. 2008. "Do Televised Presidential Ads Increase Voter Turnout? Evidence from a Natural Experiment." *The Journal of Politics*, 70: 245–261.

Krupnikov, Yanna. 2011. "When Does Negativity Demobilize? Tracing the Conditional Effect of Negative Campaigning on Voter Turnout." *American Journal of Political Science*, 55(4): 797–813.

Lau, Richard R., Lee Sigelman, and Ivy Brown Rovner. 2007. "The Effects of Negative Political Campaigns: A Meta-Analytic Reassessment." *The Journal of Politics*, 69: 1176–1209.

Lovett, Mitch, and Ron Shachar. 2011. "The Seeds of Negativity: Knowledge and Money." *Marketing Science*, 30(3): 430–446.

Malhotra, Neil, and Erik Snowberg. 2010. "The 2008 Presidential Primaries through the Lens of Prediction Markets." *Working Paper*.

McGhee, Eric, Seth Masket, Boris Shor, Steve Rogers, and Nolan McCarty. 2014. "A Primary Cause of Partisanship? Nomination Systems and Legislator Ideology." *American Journal of Political Science*, 58(2): 337–351.

McGillivray, Alice, M., Richard Scammon, and Rhodes Cook. 2005. *America Votes:26, 2003-2004 Election Returns by State.* CQ Press.

McGillivray, Alice, M., Richard Scammon, and Rhodes Cook. 2009. *America Votes:26, 2007-2008 Election Returns by State.* CQ Press.

NPR. 2010. "Negative Ads Fuel Surge In Spending." *http://www.npr.org/templates/story/story.php?storyId=129470444*.

Peterson, David, and Paul Djupe. 2005. "When primary campaigns go negative: The determinants of campaign negativity." *Political Research Quarterly*, 58(1): 45–54.

Prat, Andrea, and David Stromberg. 2011. "The Political Economy of Mass Media." *Working Paper.*

Ridout, Travis N., and Annemarie S. Walter. 2013. "Party System Change and Negative Campaigning in New Zealand." *Party Politics*, 1354068813509522.

Shachar, Ron, and Barry Nalebuff. 1999. "Follow the Leader: Theory and Evidence on Political Participation." *American Economic Review*, 89: 525–547.

Snyder, James, and David Stromberg. 2010. "Press Coverage and Political Accountability." *Journal of Political Economy*, 118: 355–408.

Snyder, James M. Jr., and Michael Ting. 2011. "Electoral Selection with Parties and Primaries." *American Journal of Political Science*, 55(4): 782–796.