Market Structure Matters: Explaining Why Politicians "Go Negative"*

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Abstract

Why is negative advertising such a prominent feature of competition in the "political market"? A possible explanation hinges on the "fewness" of competitors in a political race. We often observe two-candidate races (i.e., duopolies) where there is a simple economic rationale for "going negative": when the number of competitors is greater than two, engaging in negative ads creates positive externalities for opponents that are not the object of the attack. On the contrary, positive ads benefit only the advertiser. To empirically investigate the hypothesis that the number of competitors explains the volume of negative advertising in an election, we focus on US non-presidential primary contests in 2004, where the nature of primaries provides us with a cross section of independent races and large variation in the number of entrants. Our estimation employs novel data from the Wisconsin Advertising Project, which contains information on all political advertisements aired in the top 100 media markets in 2004 races. We document that duopolies are twice as likely to air a negative ad when compared to non-duopolies, and that doubling the number of competitors in a race leads to approximately a 35-40 percent decline in the likelihood of an ad being negative. These results are robust to the inclusion of a variety of controls and instruments for entrants in the race.

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Introduction

Political competition has long been famous for using negative portrayals of one's opponent as a strategic weapon. Indeed negative advertising, or mudslinging as it is sometimes called, is usually considered par for the course in any political contest. What has been more alarming to some commentators is the sheer amount spent on negative advertising. For example, John Kerry and George Bush together spent 522 million dollars in the 2004 presidential campaign, with over 365 million dollars, (or 69.9 percent) of this amount being spent on negative advertising.[1]

Why is negative advertising such a prominent feature of competition in the "political market"? Or said another way, why does negative advertising appear so dominant in political competition but is not so commonplace 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? We hypothesize that part of the explanation lies in a unique feature of the structure of political markets. In particular, the two-party system effectively gives rise to duopoly competition between political candidates in a general election, whereas pure duopolies are rarely observed in the consumer product market space. We conjecture that there is a clear cut 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. On the contrary, 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, and the magnitude of this effect is increasing in the number of opponents you face (since the spillover to another candidate is more likely when there are more substitutes available).

This basic economic explanation seems to accord with a familiar armchair observation - for the most obvious cases where a consumer product market also looks like a duopoly, there exist some very well known negative advertising campaigns (Apple versus Microsoft and Verizon versus AT&T). However, there could be other confounding factors that contribute to explain the larger use of negative ads in politics when compared to an everyday commodity market. For example, political markets are "winner take all markets" where it is winning a plurality of votes rather than the absolute market share that matters, and hence it may be more effective to target the closest candidate with negative advertising rather than engaging in positive ads. In addition, the time horizon is different. While in a commodity market firms repeatedly interact, competitors in a political campaign face a finite horizon that ends with the election day, and this may differently shape their incentive of going negative. Further, in the case of firms, the investment in negative ads vanishes if the attacked competitor leaves the market.

To control for these confounding factors, we aim to empirically investigate the hypothesis that the "fewness" in the number of competitors is a relevant explanation for "going negative"

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

by focusing only on political races, which share the same institutional features but have different number of competitors. Yet focusing on political competition presents 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 Untied States, i.e., the contest among Democrats or Republicans for who will become the party nominee in a particular House, Senate, or Gubernatorial race. The local nature of these primary contests provides us with a cross section of independent races that exhibit a rich degree of variation in the number of entrants. Using this variation, we seek to measure the effect of "dropping a competitor" 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 in the 2004 elections. As the data contains a comprehensive record of political advertising, we are able to measure the probability of going negative at the ad level to quantify our effects. To the best of our knowledge, this is the first time the Wisconsin Advertising Project (WiscAds) data has been used in the economics literature. Our main findings are that duopolies have over twice as high a likelihood of airing a negative ad as compared to non-duopolies, and that doubling the number of competitors in a race leads to approximately a 35-40 percent absolute decline in the likelihood of an ad being negative. These results are robust to the inclusion of a variety of controls as well as instruments for the number of competitors in a race.

Campaign consultants and political scientists have long suggested that advertising tone is a crucial ingredient of effective advertising, and that negativity has real impacts on attention to politics and civic engagement. On this matter, our empirical findings, which tie together the number of competitors and the tone of the campaign, 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. For example, regulation on campaign contributions may decrease the number of competitors, and consecutively increase their incentive to engage in negative advertising. As a result, bitter campaign may have detrimental effects on voters' turnout.

There has been much interest in both the political science and economics literature as to the consequences of negativity in campaigning for election outcomes. Empirical studies of political advertising in general primarily examine the effects of campaigning on voter behavior (see e.g., Shachar and Nalebuff (1999), Coate and Conlin (2004), (2008), Levitt (1994)). A strand of studies have considered the public policy effects of negative advertising, a particularly influential work being Ansolabehere and Iyengar (1995). The main finding of these studies is that negativity

alienates the political middle and thus has deleterious effects on participation.

While existing work has thus focused on the demand side (i.e., voters) implications of negativity, our study shifts the focus onto the supply side incentives to "produce" negativity, and in particular how the degree of competitiveness influences negativity. To illustrate our hypothesis, we construct a simple model of political competition that draws upon ideas from the political literature based on games of voters' mobilization, which were first developed by Snyder (1989) and Shachar and Nalebuff (1999). These works are motivated by the fact that historically parties and candidates spent a great deal of effort to get their own voters to the polls. Following these papers, we black-box the underlying mechanism by which voters' choices are affected by campaigning, and posit a model in which candidates engage in positive (negative) advertising to mobilize (demobilize) their own (opponent's) supporters. The model helps to illustrate both the incentive to go negative and the effect of the degree of competition on this incentive. Another strand of the theoretical literature focuses on the informative role of advertising (see for instance Coate (2004A), (2004B), Galeotti and Mattozzi (2009), Polborn and Yi (2006), and Prat (2002)). In particular, Polborn and Yi (2006) differentiate between positive and negative advertising. In the context of incomplete information, they show that balancing negative and positive advertising provides voters with the most information. They argue that negative advertisements show a different side of the candidate that a voter will not be exposed to without this type of technology.

A Theoretical Example

The main hypothesis we wish to study in the data is that when the number of candidates (L) increases, the fraction of negative advertising decreases. To illustrate the economics behind this hypothesis, we propose a simple model where candidates have access to two different forms of advertising, negative and positive ads. The key effect is that when L is greater than two, engaging in negative ads creates positive externalities to those opponents that are not the object of the attack. On the contrary, positive ads benefits only the advertiser. Therefore, the presence of a spillover effect in negative ads disincentives candidates from using this form of advertising when they face more than one opponent. We emphasize that our model is not the only way to capture the spillover effect, but just one revealing way to illustrate it.

To formally describe the force driving this result we assume that candidates simultaneously choose how to allocate their budget between two different forms of campaigning to increase their support on election day. Specifically, each candidate i chooses positive advertising (P_i) to increase the number of their own voters that go to the polls, and negative advertising to keep candidate j's supporters home ($\mathbf{N}_i^j = N_i^1, \ldots, N_i^L$) on election day. Let $k = 1, \ldots, L$ denote a candidate and Π_{k_0} her political support in the absence of campaign. We assume that the

number of votes that candidate i receives after the campaign is equal to,

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

where $\alpha, \beta \in (0,1)$. Note that $\frac{P_i^\alpha}{\left(\sum_j N_j^i\right)^\beta}$ is increasing and concave in P_i and decreasing and convex in N_j^i.[2] This assumption captures the idea that the number of i's supporters that are mobilized to show up at the poll is directly affected by the amount of i's positive ads and the amount of negative ads that i receives from her opponents, and the marginal mobilization effect of an ad is decreasing.

Letting π_k denote candidate k's political market share (vote share) we have that

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

Each candidate has the same war chest, which we normalize to be equal to 1. The objective of the candidates is to maximize their vote share $\pi_i(\cdot)$ given their budget constraint $P_i + N_i^1 + \ldots + N_i^L = 1$, which is a plausible assumption in primaries. Note that it will always be the case that $N_i^i = 0$ for all i.

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

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

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

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

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

$$P_i = N_i^j = \frac{1}{2}.$$

[2]Note that if all N are equal to 0, the ratio goes to infinity, so we add an ε.

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

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

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

The comparison between the vote share of candidate 1 (Π_1) in (1) and (2) highlights the spillover effect that rises when $N = 3$. For example, it is immediate to see that in (1) Π_1 is decreasing in N_2^1 . On the contrary, in (2) Π_1 still decreases in N_2^1 and N_3^1, but it increases in N_2^3 and N_3^2, which are the spillover effects of negative ads made by candidate 2 against candidate 3, and vice-versa.

Let $\Pi_{1_0} = \Pi_{2_0} = \Pi_{3_0}$, and $\left(\frac{P_1}{N_2^1+N_3^1}\right)^\alpha + \left(\frac{P_2}{N_1^2+N_3^2}\right)^\alpha + \left(\frac{P_3}{(1-P_1-N_1^2)+N_2^3}\right)^\alpha = D$. Rewriting it,

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

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

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

After some simplifications,

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

Imposing symmetry,[3] $D = 3\left(\frac{P}{2N}\right)^\alpha$ and since $P = 0$ cannot be optimal, $\alpha \left(\frac{P_1}{N_2^1+N_3^1}\right)^\alpha > 0$ and can be neglected.

Hence,

$\left(\frac{P}{2N}\right)^\alpha \left(\frac{2}{P} - \frac{1}{1-P}\right) = 0$. Therefore, $P_i = \frac{2}{3}$ and $N_i^j = \frac{1}{6}$ for all i.

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

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

It is easy to show that also the second first order condition with respect to N_1^2 is satisfied. Namely, $\frac{-D'_{N_1^2}\left(\frac{P_1}{N_2^1+N_3^1}\right)^{\alpha}}{D^2} = 0$

The main insight of this model is the comparison between a two-candidate and a three-candidate race, which highlights the presence of a spillover effect in the latter that disincentives competitors from attacking each other.

Data Description

To perform our analysis, we use data from the TNSMI/Campaign Media Analysis Group (CMAG) made available by the University of Wisconsin Advertising Project (WiscAds). A unique aspect of this dataset is that it provides a comprehensive record of each political advertisement aired in the top 100 media markets in the United States in all 2004 elections, including all special and run-off elections. The top 100 media markets cover about 85% of the US population (see Figure 1).[4] [5] Throughout the entire 2004 election season, over half a million television spots (558,989 ads) were aired in favor of gubernatorial, U.S. Senate, and U.S. House candidates. Of these ads, 254,368 were aired during primary campaigns for the gubernatorial, the U.S. House, the U.S. Senate elections, which are the focus of this paper because of the large variation in the number of candidates.[6]

We then combined the WiscAds data with information regarding the characteristics of each electoral contest, obtained from *America Votes* (Alice, Scammon and Cook 2005). Throughout our analysis, we refer to an election (or electoral contest) as each specific race (e.g., Democratic Primary for Wisconsin Governor). Thus, for each electoral contest, we collected data about the number of candidates in the race, along with the name of each candidate, the vote share (percentage) obtained in the primary election, her partisan affiliation and demographics. Information about each candidate's age, education, race, and political experience were obtained from the official Biographical Directory of the U.S. Congress (1789-present) if the candidate has ever been a member of Congress. Otherwise, we used alternative web-based data sources, such as online versions of state and local newspapers and wikipedia.[7]

When we merged the data on the electoral contests with the WiscAds dataset, we eliminate the unopposed elections and all elections for which we do not observe advertisements. This

[4] See (Goldstein and Rivlin 2007a) for a detailed description of the WiscAds data.

[5] Candidates make an extensive use of televised advertising. For example, in the 2008 US presidential election, candidates spent over $360 million on broadcast time throughout their campaigns. Broadcast media accounted for the highest share of the overall media expenditure, followed by miscellaneous media ($273 million), internet media ($43 million) and print media ($21 million). See http://www.opensecrets.org/pres08/expenditures.php?cycle=2008.

[6] Whether an advertisement was aired during the primary or general election was determined by the date of the primary in each state. If the ad aired prior to the primary election, then it was counted as a primary ad; if it aired between a primary and a primary run-off, it was considered to be part of that campaign. Any ads that aired after the primary (or after the primary run-off if the state had one) were dropped from the dataset.

[7] Candidate information and sources are available upon request.

includes all elections that occurred in districts that were outside the largest 100 media markets (i.e. North Dakota's electoral contests). Overall there were 966 elections from 2004 Senate, House, and gubernatorial primaries; but of these, 558 elections were unopposed and 68 elections had no candidates. In a strongly Democratic district, for example, it is not uncommon for there to be no Republican candidates running in a primary. The remaining 340 primary elections had two or more competitors (199 are two-candidate races and 141 elections have three or more candidates). When we merged the race data with the advertising data, we lost 214 House races, 7 gubernatorial races and 13 Senate races. In all cases, approximately 20% of the lost races may have advertised but were outside of the top 100 media markets, and about 80% of the races did not experience any advertising for the primary election.[8]

In the final dataset, there are 104 primary elections with two or more candidates and active campaign advertising, of which 26 for the Senate, 63 for the House, and 15 for gubernatorial elections. As shown in Table 1, 75% of the electoral contests have two to four candidates on the ballot, with similar patterns across gubernatorial, House and Senate races. The most candidates that compete in a primary contest is ten. As reported in Table 2, we observed 242,461 ads in the campaign of these races, of which 42.09% are from Senate elections, 17.55% from House elections, and 40.36% from gubernatorial elections. Given the fact that media markets are almost always larger than House districts, 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 typically campaign via televised advertising.

The WiscAds 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 from CMAG contains information on when the advertisement aired (date, time of day, and what program) and where the ad aired (television station and media market) in addition to the cost of the ad.[9]

Furthermore, WiscAds coders examine the content of each advertisement 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. 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.[10] The WiscAds data also includes measures for whether or not the opposing candidate is pictured in the ad, and if the focus of the ad is on personal or policy matters. With these variables coded, we are able to

[8]We also drop one Louisiana governor race, since it had a runoff after the primary. We also drop Ronnie Musgrove's advertising in a 5 candidate Mississippi election, since he (the incumbent) was prematurely negatively advertising against the general election candidate, which does not pertain to primary competition.

[9]While there are cost measures in the dataset for each ad, they are estimated by the TNS team based on the media market, time of day, and the show the ad aired one. Part of TNS's expertise is the measurement of these costs. Virtually all advertisements are for 30 second television spots, so the length of an ad is not a relevant issue

[10]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.

construct various measures of negativity to determine, with a series of different metrics, if each particular ad is negative. We create five measures of negativity, each of which is coded as one if the advertisement is designated as "negative" under a specific set of criteria, and zero otherwise. The first measure, *Negative1*, takes account of all ads that either spend the entire ad attacking the opponent or spend some time promoting and some attacking (attack plus contrast ads). *Negative2* looks at ads that attack for at least half of the airtime, and *Negative3* includes only those ads that end with an attack. *Negative4* includes all ads that only attack the opponent, and *Negative5* accounts for all ads that attack for at least half of the airtime and are focused on personal issues rather than policy. Hence *Negative1* is the most inclusive measure whereas *Negative6* requires the most criteria to pass as negative.

In Figure 2 we plot the proportion of negative ads under the five different definitions of negativity, and compare across duopoly and non-duopoly markets. The figure reveals the basic effect we find in the data, which is that across all the negativity measures, duopoly markets exhibit more than twice as high a probability of airing a negative ad as opposed to non-duopoly markets. That is, we see that in two-competitor races the percent of negative advertising is almost double that of races with more than two candidates across all measures of negativity. Table 3 reports the proportion of ads that are negative under the various criteria, conditional on the number of competitors in each election, where we see the most staunch difference in going from 2 to 3 candidates in an election. For example, focusing on the most inclusive definition (*Negative1*), we see that duopoly markets as compared to markets with five or more competitors have about a 30 percent absolute higher probability of airing a negative ad, or close to a 300 percent increase in the probability of going negative.

There is a natural concern that our measure of the number of competitors, which is the number of candidates who appear on the primary ballot (which we refer to as the "Ballot N" measure of candidates) may be overstated, since there could be a number of "fringe" candidates on the ballot who pose no real competitive threat to the "viable" candidates (meaning that the viable candidates effectively ignore potential spillover to the fringe candidate in making advertising choices). We thus construct an alternative measure of the number of candidates in a race, which we call "Effective N" and is constructed by ignoring candidates who earned less than 5 percent of the popular vote in the election. Table 4 shows the effect on the distribution of the number of candidates across races, and as can be seen, the "Effective N" measure puts more mass of the distribution on races with 2, 3, or 4 candidates (since elections with 5 or more candidates are getting re-classified into one of these groups). The more compressed distribution accords with common sense that primary races with 5 or more credible candidates vying for votes are quite rare. Figure 3 and Table 5 reproduce the duopoly effects on negative advertising using "Effective N" as the measure of competition, and we can see that the same basic effect holds - duopolies have more than double the probability of going negative when compared to

non-duopolies and (focusing attention on *Negative1* for a moment) cutting the competition in half gives rise to an almost 300 percent increase in the probability of going negative. Table 5 also reveals that effective N produces a more distinguished gradient between three and four person races (four person races now showing noticeably less negativity than three person races), stemming from the less noisy measure of competition.

Robustness

In what follows, we seek to check the robustness of this measure of the effect of competition on the probability of going negative by both adding additional controls to the specification and instruments for the "entry" decision to become a candidate. The main endogeneity concern is that factors that lead a race to only have a few candidates, and in particular lead a race to be a duopoly, might also be related to the factors that cause the "tone" of an election to be more negative. While we view entry into a primary race as a highly idiosyncratic event and hence exogenous to the decision to go negative upon entering, we are sensitive to the fact that the number of candidates in a race could be an endogenous outcome and hence other forces could also explain the relationship.

To motivate our approach to instrumenting for the number of competitors N, in Table 6 we show the differences in the observable characteristics of elections across different levels of entry. As can be seen, the demographics of entrants do not systematically change across races of different size[11], and particularly surprising in this respect is that political experience (whether the individual has held political office in the past) does not systematically vary. Whether an incumbent is in the race does appear to dispose the election towards being a duopoly, but since incumbents may advertise differently (as suggested by the theoretical literature, and in particular Skaperdas and Grofman(1995) and Harrington and Hess(1996)), it is not a safe instrument.

The bottom of the table shows election measures of competition and the campaign median cost that do systematically vary across races of different size. HHI and Entropy are measures of concentration of the popular vote share across candidates. As HHI gets large, the popular vote is becoming more concentrated on a small number of the candidates, and as Entropy gets small a similar effect arises. Hence these measures capture the "closeness" of competition among the entrants in a race, and the key relationship is that races where the candidates are more evenly matched (and hence the election is really up for grabs) attract more entrants. Or said another way, races that do not have a clear cut winner ex-ante attract more entrants. If advertising has a marginal effect on electoral outcomes (which is enough to swing a race one way or the other), then it will not affect the closeness of competition as measured by HHI or Entropy, and we thus view these as powerful instruments for the entry decision.[12] In particular, these instruments

[11] However, duopolies appear to increase probability of winning the general election for the winner of the primary.

[12] Ideally we would have an ex-ante measure of the relative dominance amongst candidates, but since polling

exploit the "winner takes all" structure of political contests in candidates' entry decisions, as having a high relative market share is essential to winning the election, thus deterring fringe candidates.

We also see that the median price of advertising in an election, which proxies for the population size, is also related to entry (more entrants being seen in more dense markets, which are the more expensive markets to advertise). We expect that higher advertising costs are generally coincident with more expensive media markets, thus causing more densely populated areas to have more viewers seeing each ad. In these elections, candidates may be particularly interested in advertising to promote their image. In larger (and more expensive) media markets such as Los Angeles or Chicago, the probability of attracting national press is much higher, and hence there are greater benefits to entry and possibly holding political office in such areas for those politicians seeking fame. Finally, we also construct a dummy for whether or not the party won the previous general election. The positive correlation with N seems to say that if the Republican won in the previous general election, the number of candidates in the Republican primary will be fewer. In addition, the mean number of candidates when the Republican candidate won the previous general election is lower than when the Republican lost. Obviously, the parallel argument holds for Democrats. One way to interpret these results is that when the Republican party dominates the district, it is more likely to have strong candidates who deter entry.

All of these variables are correlated with entry in the data and do not significantly add any explanatory power on the decision to make an ad negative, as is shown in Table 7. Hence Median Election Cost, Incumbent Party, HHI and Entropy constitute our instrument set. However, we will also perform formal tests for the validity of these instrumental variables.

To illustrate the robustness of the main effects we found in the data (i.e., Figures 2-3 and Tables 3 and 5), we focus on the "Effective N" measure of competition and *Negative1* as our measure of negative advertising, since both are the most reliable measures (i.e., subject to the least measurement error). However the results that follow also hold if we had used the Ballot measure of N and/or the other negativity measures (*Negative1* is the most inclusive and hence any kind of negativity in the ad towards an opponent will be flagged as being *Negative1*, which we also view as the most relevant dependent variable). Table 8 reproduces the main effect we found in the data within a regression framework. In particular, we employ a linear probability model for the event that an advertisement in the data is negative, where we are careful to cluster the ad level observations at the election level to control for any unobserved shock that correlates observations within an election, and also careful to use robust standard errors to control for heteroskedasticity).[13] For starters, we use the log number of effective candidates as the main

data for primary candidates is hard to acquire, we use ex-post measures with the understanding that while advertising can change an election's outcome, it is only a marginal effect, and the dominance relationship between candidates as measured by HHI and Entropy are unaffected by the negative advertising behavior.

[13]We opt for linear probability model for the simplicity of implementing the IV's. Our basic marginal effects do not change in an economically significant way when we use a logit instead of a linear probability model as

explanatory variable, and its coefficient in the first specification in Table 8 (without any controls) roughly captures the unconditional moment found in the data, which is that doubling the number of candidates (say going from 2 to 4) leads to an absolute decline in the probability of going negative of about .40. As can be seen in the specifications (2)-(5), this basic unconditional effect remains robust even after adding relevant controls. The significant controls across specifications are the partisan color of the primary, whether it is a primary for House, the total ad volume, which finds that elections with a higher total quantity of advertising allocate a larger fraction of those ads towards being negative, and the time to election. The latter one measure the days until the election (normalized by the length of the campaign). It is continuous in the interval (0,1), and takes value equal to one at the farther day away from the election and 0 at the election day. Its estimated coefficient is always significant and negative, meaning that as we get closer to the election day the probability of going negative increases. Surprisingly, incumbency of the candidate does not seem to play a role.

Table 9 shows the effects of competition on negativity when we instrument for the number of candidates in a race. Both the unconditional effect and the partial effect tell the same basic story as before: doubling the number of competitors (from 2 to 4, say) leads to an absolute reduction in the probability of going negative of about 35-40 percent (that is, we go from a little over 40 percent chance of an ad being negative in a two person race to something closer to a 5 percent probability in 4 or more person races). We then formally test for the exogeneity of the instrumental variables using a Sargent test for overidentification. In all specifications we fail to reject that the excluded variables are exogenous, with a p-value of 0.452 in the specification including all three instruments. The robustness of this raw effect in the data can also be seen in a different way, by comparing just duopolies to non-duopolies. The first specification in Table 10 (which does not use any instruments) thus reproduces the basic effect in the first bar graph from Figure 3, namely that duopolies have a 25 percent absolute higher probability of airing a negative ad than non-duopolies (or more than double). When we instead instrument for the duopoly indicator variable using our most powerful instruments (specifications 3 and 4), we see that this raw effect is preserved. In these specifications, we continue to fail to reject the exogeneity of the excluded variables with a p-value of 0.428 in the case where we include all of our instruments. The order of magnitude of the effect of duopolies with controls (specification 5) is also preserved by the instruments. The underlying message is that duopolies more than double the probability of going negative relative to non-duopolies, which accords with our theory since it is exactly in non-duopoly markets that the spillover effect of negativity is present.

illustrated in Table 12.

The Tone of the Race

Elections are complicated events with rich dynamics. We may think of situations where advertising against your opponent resembles a coordination game in which it is your best response to go negative if everyone else is going negative. Thus a key determinant in the decision to air a negative ad is the current "tone" of the election. But what then determines the tone of an election? The theory we propose suggests that the number of competitors and in particular whether the election is a two-candidates race or not, will predispose campaigns to take on a certain tone. However, while it is the paucity of candidates that on average triggers a more bitter tone, once the tone of an election becomes negative, agents have a further incentive to attack the opponents regardless of their number.

To see this play out in the data, we construct a variable that captures the tone of a race up to a particular point in the election, which is the fraction of all advertising in the election to date that has been negative. Table 11 shows the role that tone plays in explaining negativity. Columns 1 and 3 show the effect of the number of competitors on going negative (both with log number of competitors and the duopoly indicator), which matches the results from our previous analysis and shows the basic "doubling" effect we have now extensively discussed. In columns 2 and 4 we can see what happens when we control for the tone of the election. As we hypothesized, once we control for the current tone (which also captures the level of competition in the race), the significance and magnitude of the effect of the number of competitors vanishes. This finding seems to suggest that races with a fewer number of competitors are more likely to trigger a negative tone, which can be viewed as an evolving state variable throughout the campaign. Once the tone is set to be negative, this will be a crucial determinant in deciding whether to air a negative or positive ad in the future.

Concluding Remarks

In this paper we provide a novel explanation for the high volume of negative advertising in the U.S. political market, which is largely characterized by "duopolies" (races with only two viable competitors). 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. Therefore, the presence of a spillover effect in negative ads refrains candidates from using this form of advertising when they face more than one opponent. On the contrary, in a two-competitor race, positive and negative ads equally benefit the advertiser.

The WiscAds data set, which is novel to economists, is uniquely suited for quantifying the effect that the number of competitors has on the tone of the campaign. A major advantage of this data is that it contains a comprehensive record of all political advertisements aired in the 2004 elections and their content. We then combined the WiscAds data with information

regarding the characteristics of each 2004 primary election.

We find that duopolies, when compared to the rest of the field, are twice as likely to use negative advertising technologies. We then show that with instruments that capture the population density of the election area and the concentration of ex-post vote shares, this result holds. Finally, we document that a candidate is likely to respond to the tone used by her competitors in the previous phases of the campaign.

Campaign consultants and political scientists have long suggested that advertising tone is a crucial ingredient of effective advertising, and that negativity has real impacts on attention to politics and civic engagement. On this matter, our empirical findings, which tie together the number of competitors and the tone of the campaign, shed new light on the consequences that 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. For example, imposing caps on campaign contributions affects the number of competitors, and consecutively their incentive to engage in negative advertising. Ultimately, bitter campaigns might have deleterious effects on voters' turnout. [14]

[14]See for example Iaryczover and Mattozzi (2010) for the implication that imposing cap on campaign spending may have on the number of candidates contesting the election, and Ansolabehere and Iyengar (1995)for the effect of negativity on turnout.

Figures

Figure 1: Top 100 Media Markets

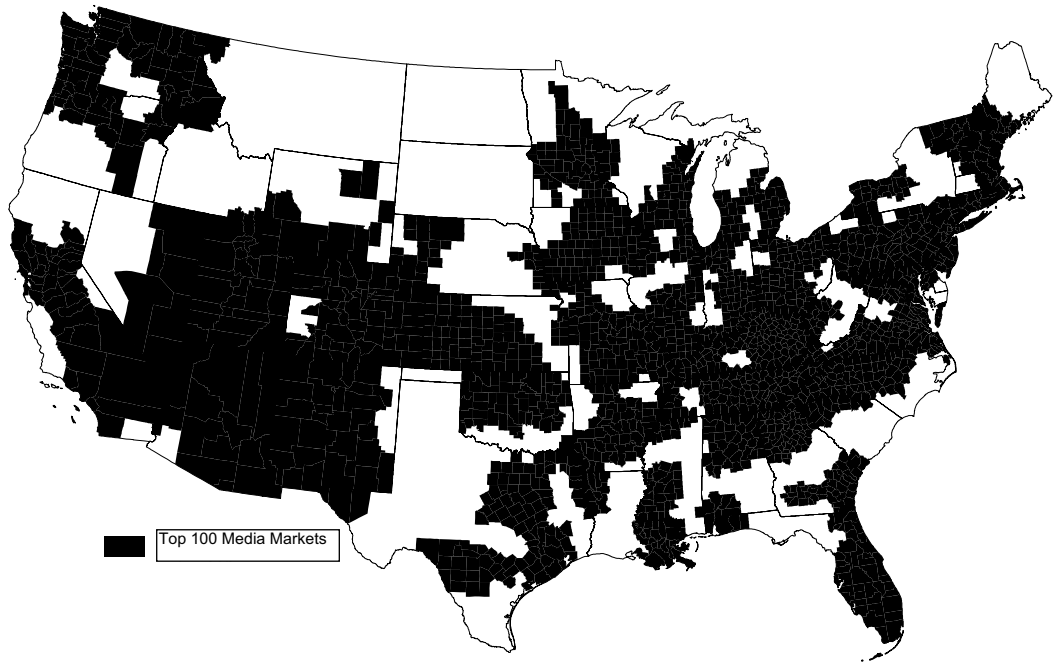


Figure 2: Frequency Negative Ads with Two Candidates and more than Two Candidates

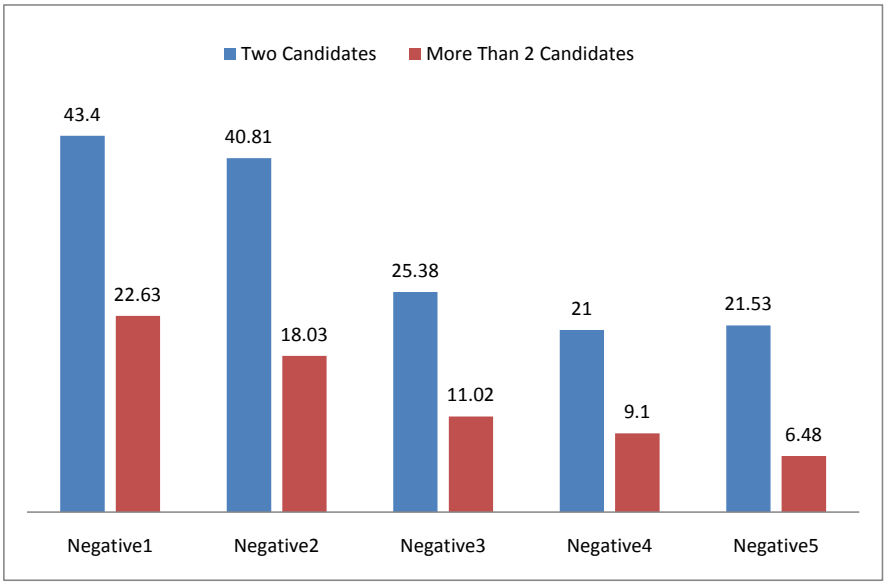
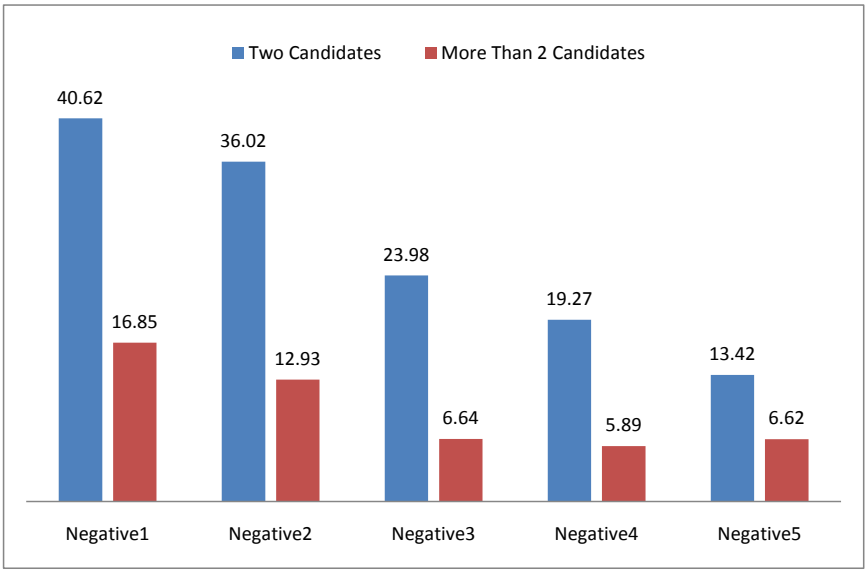


Figure 3: Frequency Negative Ads with Two Effective Candidates and more than Two Effective Candidates



Tables

Table 1: Summary of Office by Number of Candidates

Candidates	Senate	House	Governor	Races
2	8	25	5	38
	21.0%	65.8%	13.2%	
3	5	17	3	25
	20.0%	68.0%	12.0%	
4	4	9	2	15
	26.7%	60.0%	13.3%	
5	1	3	0	4
	25.0%	75.0%	0.0%	
6	2	4	2	8
	25.0%	50.0%	25.0%	
7	1	2	0	3
	33.3%	66.7%	0%	
8	3	2	1	6
	50.0%	33.3%	16.7%	
9	1	0	1	2
	50.0%	0.0%	50.0%	
10	1	1	1	3
	33.3%	33.3%	33.3%	
Total Races	26	63	15	104

Table 2: Breakdown of Ads by Races

	Number of Ads	Percent of Total Ads
U.S. Senate	102,051	42.09
U.S. House	42,560	17.55
Governor	97,850	40.36
Total	242,461	

Table 3: Percent of Negative Advertisements

Overall

	Negative1	Negative2	Negative3	Negative4	Negative5	Sample Size
	.2673	.2252	.1385	.1145	.0945	242,461

By Number of Candidates

	Negative1	Negative2	Negative3	Negative4	Negative5	Sample Size
2	.4320	.4062	.2525	.2090	.2142	48,025
3	.3296	.2753	.1957	.1688	.0577	55,921
4	.3225	.2658	.1522	.1120	.1278	52,461
5 or more	.1009	.0668	.0292	.0278	.0311	86,284
P-value	0.000	0.000	0.000	0.000	0.000	

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

Table 4: Ballot N and Effective N

Ballot N	Frequency	Percent	Effective N	Frequency	Percent
1	0	0	1	1	0.96
2	38	36.54	2	49	47.12
3	25	24.04	3	28	26.92
4	15	14.42	4	16	15.38
5	4	3.85	5	6	5.77
6	8	7.69	6	3	2.88
7	3	2.88	7	1	0.96
8	6	5.77	8	0	0
9	2	1.92	9	0	0
10	3	2.88	10	0	0
Total	104	100	**Total**	104	100

Table 5: Percent of Negative Advertisements, using Effective N

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

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

Table 6: Summary Statistics of Entry Behavior

Candidate Specific Variables				
	$N = 2$	$N = 3$	$N = 4$	$N > 4$
Male	0.9268	0.8000	0.8636	0.8478
	(0.2637)	(0.4082)	(0.3513)	(0.3632)
	[41]	[25]	[22]	[46]
Age	54.3529	52.3044	49.8750	50.9302
	(10.0571)	(9.6927)	(8.1803)	(10.0200)
	[34]	[23]	[16]	[43]
College	1.00	0.92	1.00	1.00
	(0)	(0.2769)	(0)	(0)
	[36]	[25]	[20]	[44]
Law School	0.4444	0.3600	0.4000	0.5682
	(0.5040)	(0.4899)	(0.5026)	(0.5011)
	[36]	[25]	[20]	[44]
Political Experience	0.6842	0.7083	0.6842	0.4884
	(0.4711)	(0.4643)	(0.4776)	(0.5058)
	[38]	[24]	[19]	[43]
Incumbency	0.2909	0.1111	0.0263	0.0278
	(0.4584)	(0.3178)	(0.1622)	(0.1655)
	[55]	[45]	[38]	[72]
Political Dynasty	0.0556	0.0417	0.2500	0.1026
	(0.2323)	(0.2041)	(0.4472)	(0.3074)
	[36]	[24]	[16]	[39]
Candidate Won General Election	0.710	0.348	0.538	0.455
	(0.083)	(0.102)	(0.144)	(0.109)
	[31]	[23]	[13]	[22]
Election Level Variables				
	$N = 2$	$N = 3$	$N = 4$	$N > 4$
HHI	0.599	0.477	0.405	0.312
	(0.11)	(0.21)	(0.11)	(0.14)
Entropy	58.064	79.519	106.498	141.155
	(13.33)	(24.19)	(18.81)	(33.60)
Median Election Cost	377.071	363.684	469.691	538.740
	(145.12)	(198.50)	(255.38)	(295.12)
Incumbent Party	0.579	0.560	0.667	0.385
	(0.081)	(0.101)	(0.126)	(0.097)

Means reported. Standard deviations in parentheses. Sample size in brackets

Political Experience defined as having held a national or state-level office in the past

Political Dynasty defined as having a parent or grandparent with political experience.

Incumbency defined as holding the specific office in the previous term.

Incumbent Party defined as the party winning the previous general election.

Table 7: Validity of IVs

Correlations			
	N	Effective N	Negative1
HHI	-0.618	-0.681	-0.1054
Entropy	0.847	0.893	-0.0342
Median Election Cost	0.342	0.335	-0.0434
Incumbent Party	-0.144	-0.234	0.034
Sample Size	104	104	104
Negative1 is the percent of negative (contrast) ads in an election.			

Regression			
	(1)	(2)	(3)
	Negative1	Negative1	Negative1
log(Effective N)	-0.397***	-0.393***	-0.597***
	(0.110)	(0.111)	(0.145)
Median Election Cost	-0.000117	-0.000121	-0.000131
	(0.000118)	(0.000111)	(0.000122)
Incumbent Party		0.00740	-0.00911
		(0.0551)	(0.0579)
HHI			-0.00232
			(0.190)
Entropy			0.00211*
			(0.00119)
N	242,448	242,448	242,448

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

Table 8: Raw Effects using Regression Framework

	(1)	(2)	(3)	(4)	(5)
	Negative1	Negative1	Negative1	Negative1	Negative1
log(Effective N)	-0.421***	-0.378***	-0.398***	-0.392***	-0.430***
	(0.0955)	(0.0956)	(0.0991)	(0.0937)	(0.107)
Incumbent		0.0940*	0.0408	0.0534	0.0441
		(0.0504)	(0.0526)	(0.0501)	(0.0467)
Time until Election			-0.410***	-0.409***	-0.410***
			(0.0645)	(0.0644)	(0.0645)
Total Ad Volume			0.0368*	0.0468**	0.0886***
			(0.0195)	(0.0192)	(0.0251)
Republican				0.0936*	0.105**
				(0.0554)	(0.0514)
Governor					-0.0216
					(0.0729)
House					0.178***
					(0.0453)
N	242,448	242,448	242,448	242,448	242,448

Standard errors clustered at the election level in parentheses

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

Table 9: IV Second Stage Results

	(1) Negative1	(2) Negative1	(3) Negative1	(4) Negative1	(5) Negative1	(6) Negative1
log(Effective N)	-0.555***	-0.511***	-0.390***	-0.509**	-0.330*	-0.401***
	(0.126)	(0.106)	(0.0988)	(0.237)	(0.173)	(0.109)
Incumbent				0.0155	0.0809	0.0547
				(0.0937)	(0.0713)	(0.0478)
Time until Election				-0.413***	-0.406***	-0.408***
				(0.0655)	(0.0650)	(0.0646)
Total Ad Volume				0.0915***	0.0848***	0.0875***
				(0.0253)	(0.0269)	(0.0257)
Republican				0.101*	0.110**	0.106**
				(0.0541)	(0.0556)	(0.0517)
Governor				-0.0412	0.00378	-0.0142
				(0.0934)	(0.0870)	(0.0739)
House				0.180***	0.174***	0.177***
				(0.0448)	(0.0456)	(0.0453)
N	242,448	242,448	242,448	242,448	242,448	242,448
Instruments used						
Median Election Cost	X	X	X	X	X	X
Incumbent Party	-	X	X	-	X	X
Entropy	-	-	X	-	-	X
HHI	-	-	X	-	-	X
Hansen J Statistic	-	0.126	2.142	-	0.893	1.091
P-value	-	0.7221	0.544	-	0.3447	0.7792

Robust standard errors clustered at the election level in parentheses

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

Table 10: Duopoly Regression

	(1) OLS Negative1	(2) IV Negative1	(3) IV Negative1	(4) IV Negative1	(5) OLS Negative1	(6) IV Negative1	(7) IV Negative1	(8) IV Negative1
Duopoly	0.238***	0.448***	0.351***	0.278***	0.230***	0.605	0.212	0.298***
	(0.0731)	(0.160)	(0.0963)	(0.0731)	(0.0841)	(0.407)	(0.143)	(0.0859)
Incumbent					0.0570	-0.178	0.0684	0.0149
					(0.0545)	(0.269)	(0.0955)	(0.0574)
Time until Election					-0.408***	-0.434***	-0.407***	-0.413***
					(0.0649)	(0.0707)	(0.0655)	(0.0642)
Total Ad Volume					0.0830***	0.100***	0.0821***	0.0861***
					(0.0281)	(0.0348)	(0.0282)	(0.0274)
Republican					0.120*	0.112	0.121*	0.119*
					(0.0632)	(0.0866)	(0.0638)	(0.0641)
Governor					0.000234	-0.140	0.00703	-0.0249
					(0.0877)	(0.181)	(0.0992)	(0.0857)
House					0.165***	0.170**	0.165***	0.166***
					(0.0576)	(0.0832)	(0.0569)	(0.0594)
N	242,461	242,461	242,461	242,461	242,461	242,461	242,461	242,461
Instruments used								
Median Election Cost	-	X	X	X	-	X	X	X
Incumbent Party	-	-	X	X	-	-	X	X
Entropy	-	-	-	X	-	-	-	X
HHI	-	-	-	X	-	-	-	X
Hansen J Statistic	-	-	0.419	1.963	-	-	1.893	2.806
P-value	-	-	0.518	0.58	-	-	0.169	0.423

Robust standard errors clustered at the election level in parentheses

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

Table 11: Controlling for the Tone of the Election thus far

	(1)	(2)	(3)	(4)
	Negative1	Negative1	Negative1	Negative1
log(Effective N)	-0.421***	-0.0758*		
	(0.0955)	(0.0426)		
Duopoly			0.238***	0.00999
			(0.0731)	(0.0325)
Tone		1.142***		1.184***
		(0.0665)		(0.0715)
N	242,448	242,448	242,461	242,461

Standard errors clustered at the election level in parentheses

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

Tone is the percent of negative ads previously aired in the election.

Table 12: Comparison of Linear Probability and Logit

	OLS	Logit	OLS	Logit	OLS	Logit	OLS	Logit
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Negative1	Negative1	Negative1	Negative1	Negative1	Negative1	Negative1	Negative1
Effective N	-0.421***	-0.438***	-0.397***	-0.448***				
	(0.0955)	(0.103)	(0.112)	(0.109)				
Duopoly					0.238***	0.238***	0.211**	0.219***
					(0.0731)	(0.0731)	(0.0842)	(0.0839)
Incumbent			0.0735	0.0260			0.0844	0.0563
			(0.0499)	(0.0564)			(0.0587)	(0.0617)
Days Until Election			-0.000416	-0.000522*			-0.000470*	-0.000537*
			(0.000253)	(0.000295)			(0.000258)	(0.000297)
Total Ad Volume			0.108***	0.134***			0.105***	0.128***
			(0.0299)	(0.0397)			(0.0328)	(0.0449)
Republican			0.106**	0.124**			0.120*	0.137**
			(0.0514)	(0.0541)			(0.0624)	(0.0667)
Governor			0.0664	0.0680			0.0975	0.114
			(0.0917)	(0.0990)			(0.105)	(0.116)
House			0.216***	0.312***			0.209***	0.307***
			(0.0497)	(0.0777)			(0.0597)	(0.0971)
N	242,448	242,448	242,448	242,448	242,461	242,461	242,461	242,461

Marginal effects reported; Standard errors clustered at the election level in parentheses

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

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