The Effect of Television Advertising in United States Elections

John Sides[*]   Lynn Vavreck[†]   Christopher Warshaw[‡]

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Abstract

We provide a comprehensive assessment of the impact of television advertising on United States election outcomes from 2000-2018. We expand on previous research by including presidential, Senate, House, gubernatorial, Attorney General, and state Treasurer elections and using both difference-in-differences and border-discontinuity research designs to help identify the causal effect of advertising. We find that televised broadcast campaign advertising matters up and down the ballot, but it has much larger effects in down-ballot elections than in presidential elections. Using survey and voter registration data from multiple election cycles, we also show that the primary mechanism for ad effects is persuasion, not the mobilization of partisans. Our results have implications for the study of campaigns and elections as well as voter decision-making and information-processing.

[*]William R. Kenan, Jr. Professor, Department of Political Science, Vanderbilt University, john.m.sides@vanderbilt.edu

[†]Marvin Hoffenberg Professor of American Politics, Department of Political Science, UCLA lvavreck@ucla.edu, ORCID: https://orcid.org/0000-0003-4582-7960

[‡]Associate Professor, Department of Political Science, George Washington University, warshaw@gwu.edu, ORCID: https://orcid.org/0000-0002-2769-4028

How much does televised campaign advertising affect election outcomes in the United States? This has been a pertinent question since the first televised advertisements were aired during a 1950 Connecticut Senate election and then by President Dwight Eisenhower's 1952 campaign (Benoit 2018). Answering this question helps illuminate the motivations behind voting behavior, the influence of mass communication on the electorate, and how much candidates' resources and messages can help them win elections. Moreover, the aggregate effect of televised advertising may determine the actual winner in at least some races, thereby affecting the composition of government and the direction of public policy.

Political campaigns spend a great deal of money on television advertising. According to Fowler, Ridout, and Franz (2016), over $2.75 billion was spent to air over 4.25 million ads in the 2015-2016 election cycle. This includes about 1 million airings in the presidential race, 1 million airings in Senate races, 620,000 airings in House races, and 1.25 million airings in other races at the state and local levels. Spending on television advertising constitutes about 45 percent of a typical congressional campaign's budget (Jacobson and Carson 2019).

Research on televised political advertising has made significant progress in estimating its impact on voting behavior (for overviews, see Goldstein and Ridout 2004; Fowler, Franz, and Rideout 2016; Jacobson 2015). Studies have found associations between television advertising and individual vote intentions, aggregate vote shares, or both (e.g., Huber and Arceneaux 2007; Ridout and Franz 2011; Sides and Vavreck 2013; Spenkuch and Toniatti 2018). In presidential general elections, the persuasive impact of television advertising appears to be larger than the impact of other electioneering, such as canvassing or mail, whose impact is quite small, even zero (Kalla and Broockman 2018).

But there are significant limitations to what we know about the effects of televised campaign advertising on election outcomes. Most importantly, the extant literature is almost entirely focused on presidential general elections (e.g., Johnston, Hagen, and Jamieson 2004; Gordon and Hartmann 2013; Shaw 2006; Sides and Vavreck 2013; Sides, Tesler, and Vavreck 2018; Spenkuch and Toniatti 2018). Only a few studies have examined advertising effects

in Senate elections (Jacobson 1975; Goldstein and Freedman 2000; Ridout and Franz 2011; Fowler, Ridout, and Franz 2016; Wang, Lewis, and Schweidel 2018) or House elections (Jacobson 1975; Hill et al. 2013).[1] Just two studies have examined gubernatorial elections and both focus on survey-based vote intentions rather than election results (Hill et al. 2013; Gerber et al. 2011). To our knowledge, there has been no published research on the effect of advertising in down-ballot state-level races, such as elections for state Attorney General. And, most importantly, no study has used a comparable, credible research design to study advertising effects across multiple levels of office. The most relevant prior studies compare presidential and Senate elections (Jacobson 1975; Ridout and Franz 2011; Fowler, Ridout, and Franz 2016) and find that advertising in Senate elections appears to have larger effects on election outcomes than does advertising in presidential elections. This paucity of studies illustrates the conclusion of Kalla and Broockman (2018), who, after canvassing the available experiments on persuasion in general election campaigns, argue that "more evidence" on televised advertising "would clearly be welcome" (163). We aim to provide that evidence.

Campaign advertisements provide information to voters that may change the balance of considerations they hold about candidates in a given contest. As the balance shifts, citizens may change their views of the candidates (persuasion) or change their mind about whether to vote at all (mobilization). If advertising affects election outcomes mainly through persuasion at the individual level, it should have larger effects in down-ballot races than in presidential races. This is because voters know less and have weaker opinions about down-ballot candidates relative to presidential candidates. But if advertising works mainly through mobilization, potentially altering the partisan composition of the electorate, voters' decisions to stay home or turn out should affect all races on the ballot similarly. If so, there should

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1. Scholars have investigated the tone of campaigning in Senate elections and its possible effects on election outcomes (Lau and Pomper 2004) and how voter decision-making depends on the "intensity of Senate campaigns" (Kahn and Kenney 1999; Westlye 1991), which are related to but distinct from our focus. Studies of U.S. House elections focus mainly on candidate spending as a proxy for specific forms of campaigning such as advertising (e.g., Jacobson 1978; Green and Krasno 1988). Only occasionally have scholars tried to isolate the effects of House electioneering activities (Jacobson 1975; Ansolabehere and Gerber 1994; Schuster 2020).

be little heterogeneity across offices in the effect of ads on election outcomes.

We test these expectations by examining the impact of broadcast television advertising on election outcomes in the 5 presidential elections from 2000–2018 and also in 331 U.S. Senate elections, 226 gubernatorial elections, 3,859 U.S. House elections, and 237 other state-level elections during this time period. In total, we examine over 4,500 different races. To address the possibility that campaigns may place ads in media markets where they expect to do well (Erikson and Tedin 2019, 250), we employ research designs that strengthen the causal interpretation of our findings, including time-series cross-sectional models with a difference-in-differences design (Angrist and Pischke 2009) and a border-discontinuity design (Spenkuch and Toniatti 2018).

We find that the effect of ad airings is much larger in down-ballot elections than in presidential elections. The apparent effect of an individual airing is two to four times larger in gubernatorial, U.S. House, and U.S. Senate elections and ten to nineteen times larger in other statewide races, compared to presidential elections.

We also provide evidence that persuasion is the primary mechanism through which these differing effects of advertising emerge. Drawing on surveys of hundreds of thousands of voters across eight election cycles, we show that voters have less information and weaker opinions about the candidates in down-ballot races compared to presidential candidates and that in these down-ballot races television advertising is more strongly associated with voters' knowledge of the candidates, evaluations of the candidates, and ideological congruence with the candidates than it is in presidential races. By contrast, we find less evidence for another possible mechanism: that television advertising affects election outcomes by changing the partisan composition of the electorate. Drawing on administrative data from six different election cycles, we show that advertising is not consistently associated with the relative turnout of Democrats and Republicans. Moreover, we find that ads for one race do not substantially "spill over" and affect outcomes at another level of office, as would be true if advertising altered the partisan composition of the voters in any election year.

Our paper has several key implications for the study of voting behavior and elections. Despite increasing partisan loyalty among American voters, some voters still respond to television advertising. This is particularly true in down-ballot elections. Indeed, while television advertising is likely to swing only very close presidential elections, infusions of television advertising could swing a larger number of close down-ballot elections. Thus, the effort that candidates, political parties, and outside groups invest in raising money for, producing, and airing television advertising pays dividends. Mass communication in electoral campaigns matters, even in a more polarized electorate.

1   Theoretical Motivation

Does television advertising in U.S. elections affect election outcomes? And should its effect vary across levels of office? Drawing on literatures in psychology, political science, economics, and political communication, we assemble a set of expectations for both questions.

Campaign advertising can persuade voters if it provides novel information that affects their attitudes about one or both candidates. Prior research on attitude change shows that people can be susceptible to persuasion, but that there are many obstacles to changing someone's mind (e.g., DellaVigna and Gentzkow 2010; Petty, Priester, and Wegener 2014; Sears and Kosterman 1994). This well-established idea is central to theories of information processing in political science. For one, Zaller (1992) argues that attitude change in response to information is conditional on partisanship and other predispositions ("partisan resistance") as well as the number of existing considerations that someone has about an attitude object ("inertial resistance"). For another, Lodge and Taber (2013) argue that once people think about a political object, that object has an "affective tag" (a positive or negative feeling) stored in memory, which then influences subsequent information-processing and leads to "motivated reasoning." Both accounts suggest that persuasion is possible, but when people have relevant prior attitudes, and especially strongly held attitudes, they are less likely to

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change their attitudes in response to new information.

This pattern suggests more potential for persuasion in down-ballot races, where people have thought less about the candidates and have fewer stored considerations and weaker affective tags, if any. As Delli Carpini and Keeter (1996) show, Americans are more familiar with national political figures, such as the president and vice-president, than with figures like U.S. Senator. Indeed, the percentage of Americans who could name both Senators declined between 1947 and 1989, even as the percentage who could name the vice-president increased. Likewise, Hopkins (2018) shows that the percentage of Americans who can name their governor declined from 87% in 1947 to 66% in 2007. Hopkins also finds that Americans could supply less information about governors than presidents when asked to describe them, and were less likely to search the Internet for information about governors than presidents. These declines are likely linked to the decreasing amount of news coverage of state and local politics (Hayes and Lawless, Forthcoming). Research on congressional elections also finds differences in knowledge across levels of office. In particular,a a larger percentage of Americans can recall and recognize the names of U.S. Senate candidates than U.S. House candidates (Jacobson and Carson 2019). Here again, knowledge of congressional candidates is linked to how much local news covers congressional campaigns (Hayes and Lawless 2018).

These informational and attitudinal asymmetries across levels of political office imply that new information—such as in television advertising—should more strongly influence views of down-ballot candidates than views of presidential candidates.[2] The persuasive potential of campaigns and campaign advertising is evident in previous research. Campaigns provide information to voters, who become better able to name candidates (Elms and Sniderman 2006; Jacobson 2006) and identify where the candidates stand on political issues (Patterson and McClure 1972; Franklin 1991; Alvarez 1998; Johnston, Hagen, and Jamieson 2004). Television advertising specifically contributes both to informational gains (Freedman, Franz, and Goldstein 2004) and changes in attitudes toward the candidates (Freedman and Goldstein

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2. Even in presidential races, advertising may have a larger effect on views of the lesser-known candidate (Broockman and Kalla 2020).

1999; Johnston, Hagen, and Jamieson 2004; Huber and Arceneaux 2007; Ridout and Franz 2011; Coppock, Hill, and Vavreck 2020).[3] Moreover, Huber and Arceneaux (2007) show that changes in attitudes toward the candidates—i.e., persuasion—are an important mechanism by which television advertisements influence vote intentions. This potential for persuasion is in line with the strategies of candidates themselves, who air advertising primarily on programs with audiences containing many swing voters (Lovett and Peress 2010).

Synthesizing this prior work on information, persuasion, and advertising leads to several expectations. We expect that television advertising has a larger impact on election outcomes in down-ballot races for Congress, governor, and other statewide offices than in presidential races. In terms of pathways for this effect, we expect that voters are less likely to have opinions about down-ballot candidates and, when they do have opinions, they are weaker than their opinions about presidential candidates. Therefore, we expect that television advertising has a larger effect on voters' knowledge and attitudes about down-ballot candidates compared to presidential candidates. Evidence for these latter two expectations will suggest that persuasion is a key mechanism by which advertising affects election outcomes.

A contrasting expectation is that television advertising affects outcomes mainly through its effect on whether partisans turn out to vote. Although political advertising does not appear to have a significant effect on overall turnout (Ashworth and Clinton 2007; Krasno and Green 2008; Spenkuch and Toniatti 2018; Lovett and Peress 2010), it could affect the partisan composition of the electorate if candidates' ads mobilize their own partisans and de-mobilize their opponent's partisans in roughly equal amounts. Prior research has found that the partisan composition of the electorate is associated with partisan campaign activity aggregated across levels of office (McGhee and Sides 2005) as well as national party spending (Holbrook and McClurg 2011). Most relevant to this study is Spenkuch and Toniatti (2018), who find that presidential television advertising is associated with the partisan composition of the electorate in the 2004-12 elections.

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3. Beyond the direct effects of ads, they may also help inform voters by spurring people to seek information via other sources (Canen and Martin 2020).

If advertising matters mainly through partisan mobilization, then, contrary to the first expectation, advertising should have a similar relationship to election outcomes across levels of office. Assuming that partisans vote for their party's candidate at similar rates across levels of office, any shifts in partisan turnout induced by advertising should affect candidates up and down the ballot in roughly equal amounts. We test for partisan mobilization in two ways: by examining the relationship between advertising and partisan turnout across several election cycles and by examining the relationship between advertising at one level of office and outcomes at other levels. Any "spillover" across levels of office suggests that ads affect partisan turnout and thus affect races other than the one the ads are targeting.

2   Data and Research Design

To evaluate the effect of political advertising, we built a panel dataset of election returns and advertising data at the county level that substantially extends similar datasets in other work (e.g., Shaw 2006; Ridout and Franz 2011; Sides and Vavreck 2013; Fowler, Ridout, and Franz 2016; Sides, Tesler, and Vavreck 2018). This dataset's considerable temporal and geographic scope, alongside a credible research design, provides a rigorous test of the causal effect of advertising on thousands of election outcomes.

We assembled 2000-2018 national, state, and local election returns from various sources. For presidential, senate, and gubernatorial elections, we used data from CQ's Voting and Elections Collection. For House elections during this period, we used data from the Atlas of U.S. Elections (Leip 2016), which break the congressional election returns down by county.[4] For other state offices (i.e., attorney general and treasurer), we used crowd-sourced county-level data from OurCampaigns.com.[5]

Our primary treatment variable is the net Democratic advantage in the number of broadcast television ad airings in a county over the last two months (64 days) of the campaign.

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4. Both the CQ and Atlas of U.S. Elections data were obtained under a restricted license.
5. Thirty-six states elect state treasurers and 43 elect attorneys general.

Similar measures have been used in prior research on advertising effects (e.g., Franz and Ridout 2007; Spenkuch and Toniatti 2018; Lovett and Peress 2010). To be sure, this measure does not capture all advertising, an increasing percentage of which is aired on local cable outlets or online. But broadcast television advertisements constituted the vast majority of campaign advertising during this time period (Fowler, Ridout, and Franz 2016).

We calculate the net Democratic advertising advantage by taking the difference between the number of Democratic and Republican ad airings for a particular race in each media market using advertising data obtained under license from the Wesleyan Media Project and the Wisconsin Advertising Project (Fowler, Franz, and Ridout 2020).[6] These data include the top 75 media markets in the 2000 election cycle, the top 100 markets in the 2002, 2004, and 2006, cycles, and all 210 media markets since 2008.[7] Figure 1 displays the net Democratic ad advantage in each media market for an illustrative set of offices and years. It shows not only the comprehensiveness of our data but how much advertising volume varies across offices and geography.

We include all general election advertising supporting the Democratic and Republican candidates in each race, including ads aired by the candidate's campaign, parties, and outside groups.[8] Our focus on advertising in the last two months of the campaign reflects the extant finding that ads aired closer to Election Day are more effective than ads aired earlier in the election cycle (e.g., Sides and Vavreck 2013; Sides, Tesler, and Vavreck 2018).[9]

One limitation of this measure is that it does not account for the size of the television

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6. The Wisconsin Ads Project data can be obtained at `https://elections.wisc.edu/wisconsin-advertising-project/` and the Wesleyan Media Project can be obtained at `https://mediaproject.wesleyan.edu/dataaccess/`.

7. We assign counties to media markets based on the Nielsen definitions of media markets. We use data on these assignments from Sood (2016) and manually checked how these assignments vary over time based on individual Broadcasting and Cable Yearbooks.

8. The Wesleyan Media Project and Wisconsin Advertising Project data include a variable that identifies primary and general elections ads in 2000 and 2012-2020. We used this variable to drop primary election ads from our analysis in those years. In other years (2002-2010) we dropped all ads that were aired before the primary election date in each state.

9. In Appendix G, we provide more evidence, showing that ads aired in the summer have no effect on election outcomes, but ads aired in September and in October both affect outcomes and to roughly the same extent.

(a) Presidential Race, 2012

(b) Senate Races, 2012
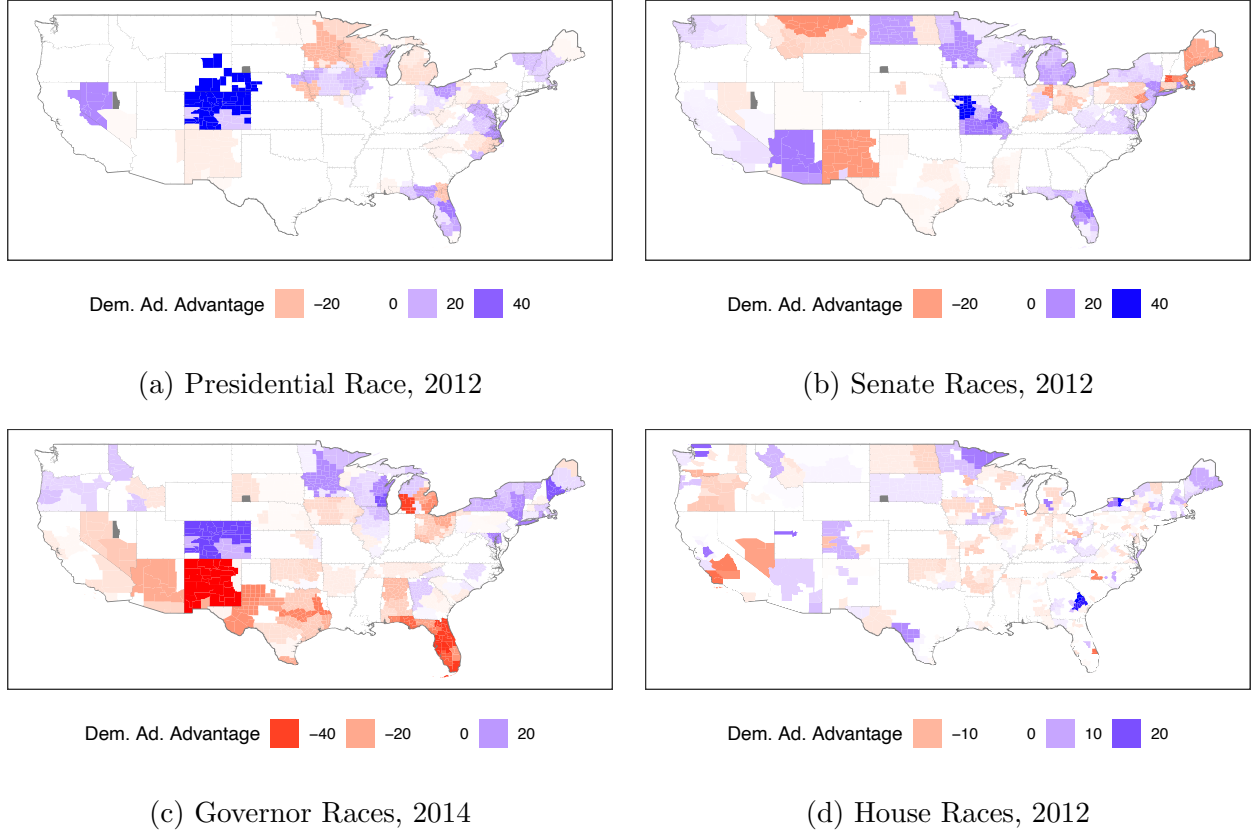
(c) Governor Races, 2014

(d) House Races, 2012

Figure 1: Democratic Advertising Advantage (in 100s of ads) across Geography in an Illustrative Set of Offices and Years. Positive (bluer) values show a pro-Democratic advantage and negative (redder) values show a pro-Republican advantage.

audience that could have seen each ad airing. However, counts of ad airings are highly correlated with measures, such as gross ratings points, that do attempt to account for the number of people possibly exposed.[10] For instance, the correlation between airings and GRP's at the candidate-market-day level was .99 in the 2012 presidential race.

We use two parallel research designs to estimate the causal effect of television advertising on election outcomes. The first design includes all U.S. counties in the media markets

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10. In 2006, we have measures of both ad airings and gross ratings points (GRP's) for 69 candidates in 9 media markets across 5 states (MI, MN, OH, IL, IN). These candidates were running for U.S. House of Representatives (60), Senate (4), and Governor (5). Across the 42 days leading up to election day, the correlation at the candidate-market-day level between ad airings and GRP's ranges from .89 to 1.0 for candidates who ran ten or more ads. The average correlation across all candidate-market-days is .97. In 2012, the correlation between ads aired and GRP's for presidential candidates Barack Obama and Mitt Romney was similarly high. In the 159 days leading up to the 2012 general election, the correlation between airings and GRP's at the candidate-market-day level was .99 for both Obama and Romney. We estimate that each ad airing was worth 3-4 GRP's in the 2012 presidential race.

contained in the advertising data (e.g., all counties starting in 2008 and a subset of counties before that). We include either county fixed effects to account for time-invariant confounders in each county or a lagged outcome variable in lieu of county fixed effects.[11] These account for the overall partisan orientation of each county. We also include state-year fixed effects to control for time-varying confounders at the state and national levels (Fowler and Hall 2018; de Benedictis-Kessner and Warshaw 2020). The state-year fixed effects account for trends in the political preferences of each state across election years, such as the pro-Republican trend in Ohio or the pro-Democratic trend in Arizona. They also account for race-specific dynamics in each state, such as the strength of the candidates and any incumbency advantage. In our analysis of congressional districts, we use district-year fixed effects to account for the strength of the candidates in each race. Thus, this research design isolates the effects of advertising from other aspects of candidates' quality and spending.[12]

Although this panel design addresses a host of possible confounders, it may miss the effect of unobserved time-varying confounders at the media market or county levels that could bias our estimates. In particular, campaigns could be strategically targeting their spending in areas of a state where they expect to do well by using information, such as internal polls, that is unavailable to researchers.

Our second research design accounts for this possibility by restricting the sample to counties in the same state that are adjacent to one another but on different sides of the border of a media market. Spenkuch and Toniatti (2018) use this design to study the effects of television advertising in the 2004-2012 presidential elections. Similarly, Huber and Arceneaux (2007) use media market boundaries to study the effects of television advertising in the 2000

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11. We do not include county fixed effects in the model with the lagged outcome variable to avoid issues of Nickell bias that can arise in datasets with a small number of time periods (Nickell 1981; Beck and Katz 2011).

12. We cluster our standard errors at the county level to account for serial correlation in errors. We also cluster by media market-year to account for the fact that each county in a market receives the same dosage of advertising during a particular election year (Abadie et al. 2017). In Appendix A, we show how the standard errors for our point estimates of advertising effects in presidential races vary using different clustering strategies. In general, different clustering strategies produce similar standard errors and much smaller standard errors than if we did not cluster at all.

presidential election. Other studies have used discontinuities in treatment exposure across county or state boundaries to study the incumbency advantage (Ansolabehere, Snowberg, and Snyder 2006) and the effects of policies like Medicare expansion and right-to-work laws (e.g., Clinton and Sances 2018; Feigenbaum, Hertel-Fernandez, and Williamson 2018).

The intuition behind the border county design is that within a state, adjacent counties that straddle the border of a media market are likely to be similar to one another except that they are on different sides of the media market boundary and therefore may be exposed to different levels of television advertising. Moreover, this variation in advertising spending is plausibly exogenous to characteristics of these border counties. It seems unlikely that advertising is targeted based on the characteristics of specific border counties, especially because the counties on media market boundaries exclude the urban cores of most media markets. Only about 5% of the nation's population lives in a county on a within-state media market boundary (Spenkuch and Toniatti 2018). For evidence that border county designs achieve balance on many characteristics of counties that could also affect election outcomes, see Spenkuch and Toniatti (2018).

To illustrate this design, Figure 2 shows the border counties in Pennsylvania (shaded in grey). It confirms that most major cities (e.g., Philadelphia, Pittsburgh, Erie, and Scranton) are not in border counties. The adjacent counties that do lie along media market borders tend to be similar to one another. For example, Indiana and Cambria counties are adjacent to each other along the boundary between the Pittsburgh and Johnstown-Altoona media markets. Both counties are largely rural areas where Mitt Romney received about 58% of the vote in the 2012 presidential election.

To execute the border county design, we match each county in a state with every other adjacent county that lies on the other side of a media market boundary. The unit of analysis becomes the border county pair, with the two counties on opposite sides of a media market boundary. Thus, a particular county could be in this sample multiple times if it borders multiple counties in this fashion. For this reason, the overall sample size is larger in this

Figure 2: Illustration of the Border Counties Design in Pennsylvania. The dark lines indicate media market boundaries. The shaded counties, which lie along a media market boundary next to another county in Pennsylvania, are the ones included in the border county sample.
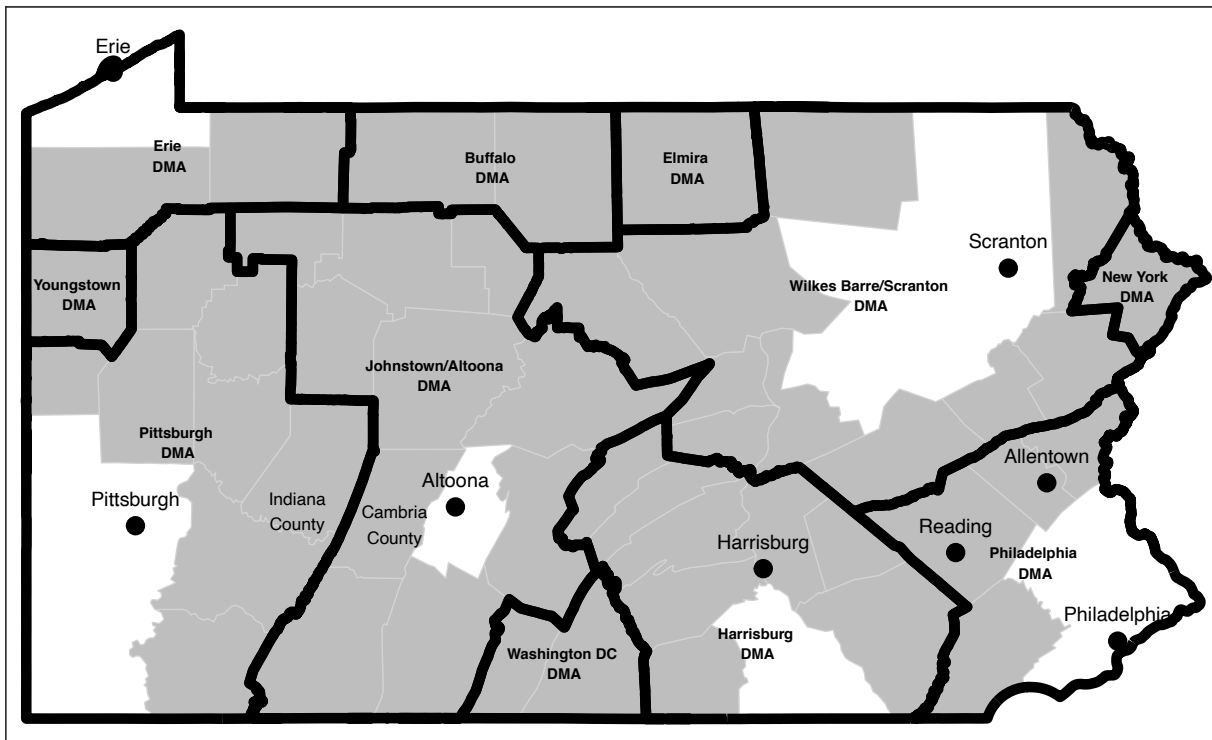
design than the first design.[13] In analyzing this sample of border counties, we include county fixed effects to account for time-invariant confounders in each county. Crucially, we also include year-specific fixed effects for each pair of border counties. This accounts for the effect of any year-specific unobserved confounders in each border-pair of counties, such as trends in their partisanship or ideology. Thus, only confounders that vary between border counties within a particular election cycle could bias our results using this design. While it is impossible to rule out these confounders, there appears to be no correlation between changes in political advertising and border counties' time-varying observable characteristics (Spenkuch and Toniatti 2018).

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13. We cluster standard errors in the border county sample by county and media market border-year to ensure that this process does not artificially increase our statistical precision (Abadie et al. 2017).

To test the assumption that there are no time-varying confounders, typically called the parallel trends assumption, we examined whether future values of television advertising appear to have a significant effect on current outcomes. For both designs, we find that future advertising has no effect on election results (see Appendix B). The fact that both research designs generally pass this "placebo test" suggests that time-varying confounders are not biasing our results. Overall, we believe that the "border county design" is more rigorous than the "all counties" design. But it relies on a much smaller set of counties and could have less external validity. As a result, we use both designs throughout the analysis.

Table 1: Summary Data on Broadcast Television Advertising (2000–2018) (in hundreds of ads)

	Levels of Ads		**Dem. Ad Advantage**					
	Dem Ads.	Rep. Ads	Dem. Ad. Adv.	Std. Dev.	Std. Dev.	Min.	Max.	Sample
	(Mean)	(Mean)	(Mean)	(across county)	(within county)			
All Counties								
President	15.79	11.71	4.08	11.80	6.09	-26.89	105.17	12,652
Senate	17.58	16.37	1.21	12.07	5.41	-49.53	145.00	17,133
Governor	17.79	17.88	-0.08	12.13	5.07	-88.27	42.56	11,373
House	4.49	3.75	0.75	5.56	2.08	-34.71	74.47	28,642
Attorney Gen.	3.05	2.96	0.11	4.09	1.84	-18.56	15.24	7,984
Treasurer	0.88	0.79	0.11	2.05	0.89	-10.00	7.48	5,331
Border Counties								
President	15.96	11.82	4.15	11.97	4.68	-26.89	105.17	17,689
Senate	15.41	14.45	0.96	11.08	4.34	-49.53	145.00	23,910
Governor	15.92	16.74	-0.82	11.53	4.09	-88.27	42.56	15,880
House	3.75	3.16	0.58	5.07	1.75	-34.71	74.47	38,138
Attorney Gen.	2.64	2.71	-0.08	3.70	1.40	-18.56	15.24	11,557
Treasurer	0.86	0.76	0.12	2.03	0.70	-10.00	7.48	7,520

Note: This table shows the average numbers of Democratic and Republicans ads (in 100s) at the county-level over the last two months of the campaign, and various statistics on the Democratic advertising advantage at the county-level over the last two months of the campaign. The sample in the top panel includes all counties with elections for each office, and the sample in the bottom panel includes all border county pairs with elections for each office.

Table 1 shows summary statistics of advertising across offices in all counties and in border county pairs (in hundreds of ads) across 2000-2018. Our treatment variable — the Democratic advertising advantage in the last two months before the election — captures the balance of ads favoring each of the opposing major-party candidates. On average, there is considerable balance, such that the mean Democratic advantage is close to 0 in most levels of office other than presidential elections. In presidential elections, Democrats have a modest advantage on average, driven in particular by their advantages in the 2004, 2008, and 2016

elections. But there is considerable variation both across counties and within counties and border county pairs.[14] This variation is particularly large in races for president, Senate, and Governor, where there is more advertising overall.

3   Advertising Effects in Presidential Elections

We begin by examining the effects of advertising on the Democratic candidate's major-party vote share in presidential elections between 2000 and 2016. The first four columns of Table 2 show the results of regression models using all counties where we have advertising data. The first column shows a naive model with just fixed effects for year. This model suggests that a 100-airing advantage yields an additional 0.159 percentage points of vote share. The next column shows the results of a model with year and county fixed effects. The county fixed effects, which address time-invariant confounders, dramatically decrease the estimated effect to 0.043 points, or about four-hundredths of a percentage point. The third column shows the results of a model that includes state-year fixed effects and a lagged outcome variable. In this model, a 100-airing advantage for the Democratic candidate is associated with a 0.037-point increase in vote share over the candidate's vote share in the previous election. The fourth column includes state-year fixed effects, which address time varying confounders at the state-level, as well as county fixed effects. Here, the same advantage is associated with a 0.026-point increase in vote share.

The next three columns show the estimated effects of presidential ad airings among pairs of counties along media market borders. In the model that includes state-year fixed effects and a lagged outcome variable, a 100-airing advantage for the Democratic candidate is associated with a 0.027-point increase in vote share (column 5). Including state-year fixed effects and county fixed effects produces an estimate of 0.020 points (column 6). Including border-pair-year fixed effects and county fixed effects produces an estimate of 0.018 points

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14. The standard deviations within counties or border pairs are based on the residuals in ad advantage from the fixed effect regression models in Table 3. For more on using this kind of standard deviation, see Mummolo and Peterson (2018).

Table 2: The Effects of Television Advertising in Last Two Months of Presidential Elections (2000-2016). The treatment variable is Democratic ad advantage in terms of hundreds of ads.

	Dependent variable: Dem. Vote Share						
	All counties				Border counties		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Dem. Ad. Adv. (100 ads)	0.158**	0.043**	0.037**	0.027**	0.027**	0.020**	0.018**
	(0.036)	(0.013)	(0.007)	(0.008)	(0.005)	(0.006)	(0.005)
Year FE	X	X					
State-year FE			X	X	X	X	
County FE		X		X		X	X
Lagged Outcome			X		X		
Border-Pair-Year FE							X
Observations	12,652	12,652	12,650	12,652	17,652	17,689	17,689
R^2	0.076	0.930	0.953	0.962	0.956	0.968	0.993

*p<0.05; **p<0.01

Standard errors are clustered by county and DMA-year in the left panel, and by county and DMA border-year in the right panel.

(column 7).[15]

These results show that a more stringent modeling strategy produces a smaller effect of televised advertising on presidential election outcomes. This illustrates the importance of either employing fixed effects or isolating border counties (or both) to avoid overstating the effect. It also bolsters a causal interpretation of our results that we recover similar estimates with two different identification strategies. Ultimately, televised advertising in presidential elections appears to have a modest but detectable relationship to vote share, as previous literature has found.[16]

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15. The results in column (7) closely resemble the results in Spenkuch and Toniatti (2018), who use a similar design. They find that a one standard deviation shift in advertising is associated with a shift in vote margin of about 0.5 percentage points, which is equivalent to a change in two-party vote share of 0.25 percentage points. Our results imply that a one standard deviation (across counties) change in advertising advantage leads to a change in two-party vote share of 0.22 percentage points. The similarity of the two results is notable because Spenkuch and Toniatti (2018) employ a more refined measure of advertising that uses auxiliary data on television audiences to estimate the number of times the average person in each county saw ads for each candidate. Thus, the difference between this measure and our simpler measure of advertising advantage does not seem to affect the results.

16. We find similar results in models in which we first-difference the treatment and outcome variables to calculate changes from the previous election cycle, and in models that include a linear time trend for each county. We also investigated whether advertising effects are changing over time (see Appendix I). We find no evidence of any decrease in advertising effects in more recent election cycles. Finally, for presidential elections from 2004-2016, we examined whether accounting for the presence of Democratic candidate field

Our results also place a rough upper bound on the real-world effects of advertising in presidential general elections. Assuming that the effects of ads are linear, our findings imply that moving from three standard deviations below the average advertising advantage to three standard deviations above the average (a 6 standard deviation shift) within border pairs would lead to a 0.5-point change in two-party vote share.

4   Advertising Effects in Down Ballot Elections

How does the effect of televised advertising in presidential elections compare to its effects in other types of elections? The top panel of Table 3 shows the effect of advertising across different offices using the all county sample. Here, we use the specification with both county and state-year fixed effects (column 4 of Table 2). The bottom panel of Table 3 shows the effect of advertising across different offices using the border county sample and the specification with county and adjacent-county-year fixed effects (column 7 of Table 2).[17]

The results from both designs tell the same story: a similar sized ad airing advantage has much larger effect in down-ballot elections than in presidential elections. Column (1) recapitulates the earlier finding that a 100-airing advantage in presidential elections leads to about a 0.02-point increase in two-party vote share. But this advantage leads to a 0.04-0.06 point increase in vote share in Senate elections (column 2), a 0.06-0.09 point increase in gubernatorial elections (column 3), a 0.08-0.09 point increase in House elections (column 4), a 0.19-0.26-point increase in Attorney General elections (column 5), and a 0.34-0.35 point increase in state Treasurer elections (column 6). The effect of a particular ad advantage can be anywhere between 2.5 and 19 times greater in down-ballot races than in presidential races.[18]

Figure 3 shows the results graphically based on the border counties design in Table 3.[19]

offices affects our results (see Appendix C). We found no evidence for this, suggesting that the estimated effects of ads are not confounded by the campaign activity associated with field offices, such as canvassing.

17. In Appendix D, we show the results using all the models we reported for presidential races in Table 2.

18. We find substantively similar results using regression models that are weighted by county population.

19. For this figure, we first calculate the residuals based on the fixed effects models in Table 3. This approach

Table 3: Effects of Aggregate Television Advertising in Last Two Months of Election Across Offices (2000-2018). The treatment variable is Democratic ad advantage in terms of hundreds of ads.

	President	Senate	Governor	House	Attorney Gen.	Treasurer
	Dependent variable: Dem. Vote Share					
	(1)	(2)	(3)	(4)	(5)	(6)
All Counties						
Dem. Ad. Adv. (100 ads)	0.027**	0.055**	0.087**	0.091**	0.260**	0.337**
	(0.008)	(0.010)	(0.014)	(0.018)	(0.046)	(0.087)
County FE	X	X	X	X	X	X
State-year FE	X	X	X	X	X	X
Observations	12,652	17,133	11,373	28,641	7,984	5,331
R^2	0.962	0.960	0.941	0.953	0.967	0.971
Border Counties						
Dem. Ad. Adv. (100 ads)	0.018**	0.038**	0.055**	0.084**	0.192**	0.352**
	(0.005)	(0.007)	(0.010)	(0.022)	(0.031)	(0.056)
County FE	X	X	X	X	X	X
Border-Pair-Year FE	X	X	X	X	X	X
Observations	17,689	23,910	15,880	38,131	11,557	7,520
R^2	0.993	0.990	0.986	0.991	0.991	0.993

*p<0.05; **p<0.01

Standard errors are clustered by county and DMA-year in the top panel, and by county and DMA border-year in the bottom panel.

Specifically, it shows the effect of variation in each party's advertising between -3 and +3 within-unit standard deviations of the mean within border pairs. We noted earlier that this effect of advertising was about 0.5 percentage points in presidential races. It is larger down-ballot: about 1 point in Senate races, 1.35 points in governor races, 0.9 points in House races, 1.6 points in Attorney General races, and 1.5 points in Treasurer races.[20]

Not only does advertising have a larger effect in down-ballot races, but it does so at a lower cost.[21] For presidential races, we estimate that the cost per vote is about $365, or

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is similar to Figure 1 in Gerber et al. (2011). We then plot the relationship between the residualized treatment and outcome variables. We show the binned residuals to make the graphs simpler, but the fit lines on each graph are based on all of the data.

20. The differences across levels of office in the shifts associated with a 6-standard deviation change appear smaller than the differences in the regression coefficients themselves. This is because there are fewer ads in down-ballot races and thus the variation in either party's advantage is more limited. As a result, a standard deviation shift in a state treasurer race entails a smaller change in the raw balance of advertising compared to a higher level of office like the presidency.

21. These calculations are based on the estimated average cost per ad in the Wesleyan Median Project data in 2016, the average population of DMAs where ads were aired, and the point estimates from the border counties model in Table 3.

Figure 3: Effect of Democratic Advertising Advantage on Democratic Vote Share. These graphs show the implied effects of a ±3 standard deviation shift in Democratic ad advantage for each office. They are based on the residuals from the border counties models in Table 3. The x-axes are the same across plots to enhance comparability. The sizes of the dots reflect the number of paired county-year observations in the respective x-axis bin.
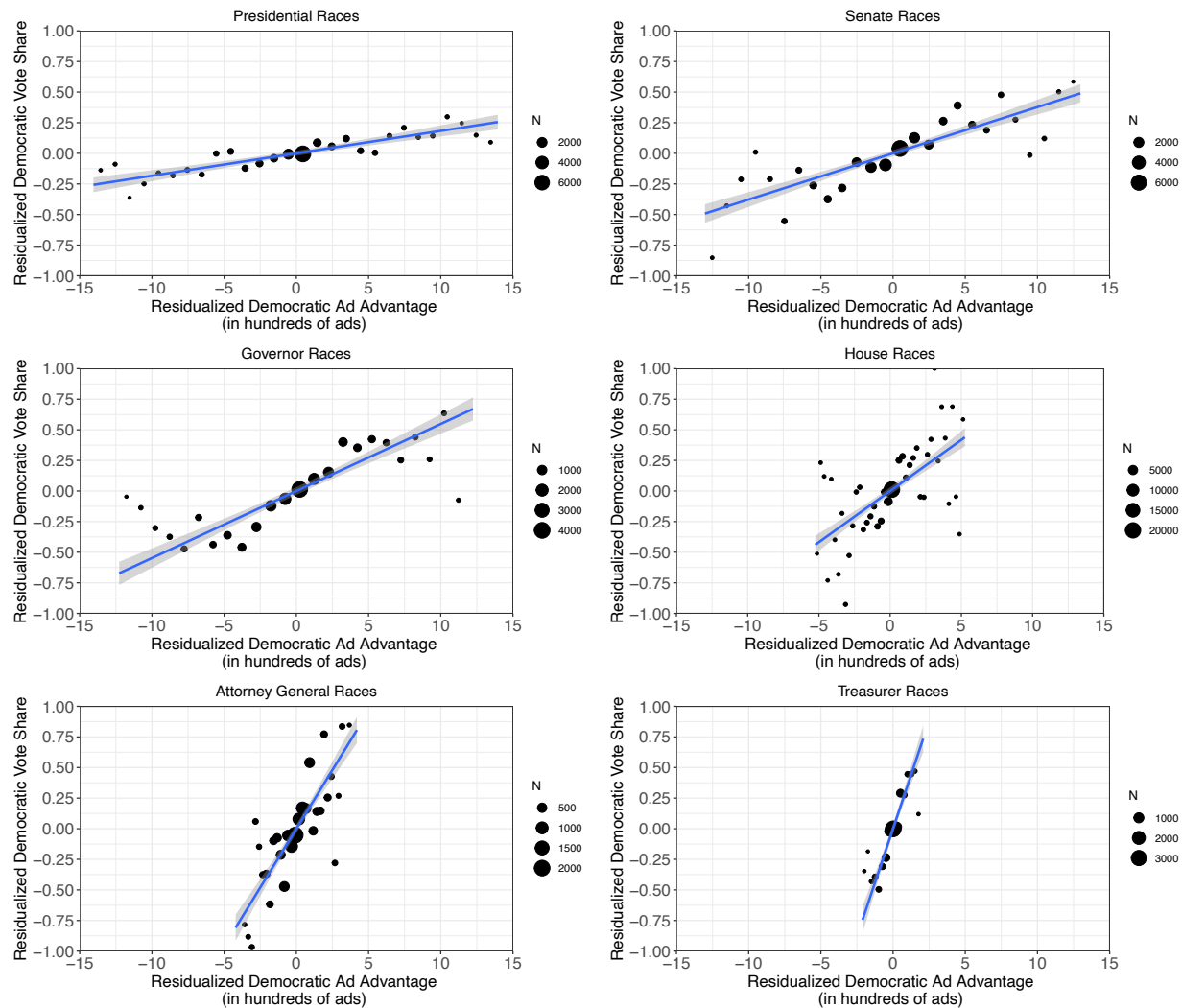
somewhat more than the $170 per vote estimated by Spenkuch and Toniatti (2018) based on the cost of advertising in the 2008 presidential election. A $10 million advantage in an individual state might gain a candidate 27,000 votes, or enough to tip Nevada, Maine, Michigan, Wisconsin, and New Hampshire in the 2016 election. The cost per vote is much lower in other offices: about $200 in Senate races and $125 in gubernatorial races. This suggests that a very plausible ad advantage of $2 million in a Senate race would gain a

candidate about 10,000 votes, which is also enough to tip several races in recent years. In addition, the cost per vote from advertising, especially in down-ballot races, is comparable to other campaign activities (Green and Gerber 2019, Table 12-1). This may explain why campaigns continue to spend so much on television advertising.

To be sure, these calculations of advertising effects and the implied cost-per-vote assume that the marginal returns to advertising are constant—that is, they do not diminish as the number of ads aired in a race increases. Figure 3 suggests that advertising advantage does have a fairly linear relationship with vote share. In Appendix E, we examine this question in more detail and find little apparent evidence of diminishing returns. Only at very high levels of advertising do there appear to be diminishing returns. But even at these high levels, vote share is almost always increasing at the margins, suggesting that candidates are still getting something for their dollar. Moreover, these high levels of advertising rarely translate into an advertising advantage for either candidate because the two sides typically match each other's advertising. Thus, there is little reason for candidates to cease advertising, especially if their opponent continues to stay on the air.[22]

5   Mechanisms: Persuasion and Partisan Mobilization

What mechanism best accounts for the fact that the effect of television advertising on election outcomes differs across levels of office? We first provide evidence for the mechanism of persuasion—that is, advertising provides information that helps persuade existing voters to support a particular candidate.

Testing for this mechanism requires measures of voters' knowledge and perceptions of candidates at multiple levels of office. Although only a few surveys include such measures—and, any relationship between individual-level voter attitudes and advertising is necessarily correlational—the evidence suggests that television advertising provides voters information

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22. Spenkuch and Toniatti (2018, Appendix C) also show that advertising in presidential races has approximately linear effects.

and shapes their views of candidates. Moreover, these effects are larger in down-ballot races than in presidential races.

5.1 Lower Levels of Opinion Formation and Strength in Down-Ballot Races

One expectation is that voters should be less likely to have opinions about down-ballot candidates and, if they do, less likely to have strong opinions. This creates riper conditions for persuasion.

We test this expectation in three sets of surveys that contain identical measures of attitudes toward candidates at various levels of office. Two surveys, the 2000 National Annenberg Election Study (NAES) and the American National Election Study (ANES), include measures of favorability toward presidential, U.S. Senate, and U.S. House candidates using a feeling thermometer. We measure whether voters have an opinion based on whether they were able to rate candidates. We also measure the strength of opinions based on whether respondents gave strongly favorable or unfavorable opinions (0-10 or 90-100 on the feeling thermometer).

A third survey, the Cooperative Congressional Election Study (CCES), asks respondents to place presidential, Senate, and House candidates on a seven-point ideological scale ranging from very liberal to very conservative. Again, because respondents could express no opinion, we can measure their level of information about or familiarity with the candidates. We also capture a rough proxy for the strength of their opinion—here, whether they placed a candidate at one of the endpoints of the scale (1 or 7).

To illustrate the general pattern, we average the results in two ways. First, we average the ANES and CCES surveys across years, although the same patterns do hold within the individual survey years.[23] Second, we average views of the opposing candidates to create

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23. For the ANES, we focus on years where we have advertising data and comparable measures of attitudes across levels of office (2000, 2004, 2008, 2012, and 2016). We rely only on the ANES face-to-face interviews to help ensure comparability over time.

one quantity for each level of office, acknowledging that there can be variation within levels of office depending on the visibility of the individual candidates.

Table 4 presents the percentage of respondents who could not rate or place the candidate and the percent of respondents who had an "extreme" rating or placement (among those who had an opinion). The findings confirm expectations. First, a much larger percentage of respondents fail to rate House and Senate candidates or place them on this ideological scale, compared to presidential candidates. For example, almost all respondents could rate the presidential candidates on feeling thermometers, but between 20% and 40% could not race House or Senate candidates. Senate candidates were marginally more familiar than House candidates. It was also much harder for respondents to place House or Senate candidates on ideological scales. Indeed, an average of nearly half (47%) of CCES respondents could not place House candidates.

Table 4: The Existence and Extremity of Views about Presidential, Senate, and U.S. House Candidates

	President	Senate	House
Percent cannot rate on feeling thermometer			
2000 National Annenburg Election Study	4%	28%	39%
2000-2016 American National Election Study	1%	20%	31%
Percent cannot place on ideological scale			
2006-2018 Cooperative Congressional Election Study	15%	37%	47%
Percent with extreme rating (among those with who rated)			
2000 National Annenburg Election Study	34%	28%	27%
2000-2016 American National Election Study	21%	10%	8%
Percent with extreme placement (among those who placed)			
2006-2018 Cooperative Congressional Election Study	35%	27%	22%

Second, among those who could rate or place the candidates, a larger percentage had extreme views of presidential candidates than Senate or House candidates. In the ANES data, for example, an average of 21% of respondents rated the presidential candidates very unfavorably or very favorably, but 10% or less did this for Senate or House candidates. In the CCES, a smaller fraction placed Senate or House candidates at the endpoints of the ideological scale as well.

To be sure, these results are hardly definitive. Because the surveys are conducted during or after the election campaign in each year, they cannot capture attitudes before exposure to campaign advertising. However, this likely militates against finding information asymmetries across levels of office, especially given the stronger relationship between advertising and voter attitudes about down-ballot candidates, which we report below. Thus, these results still suggest that the persuasive potential of advertising should be larger in down ballot races.

5.2 Larger Effects of Advertising on Views of Down-Ballot Candidates

If advertising helps persuade voters, the other key empirical implication is that it will have larger effects on knowledge about and feelings toward candidates in down-ballot races relative to presidential races. We evaluate this claim in two ways.

First, we evaluate whether advertising provides helps inform voters about the candidates. For each respondent in the 2006-18 CCES surveys, we calculate the percentage of candidates for each office for whom they provide an ideological placement. We then regress this percentage on the total number of ads at each level of office aired in the month prior to the survey interview. These models also include constituency-year-period fixed effects and controls for pre-treatment demographic characteristics of respondents (gender, race, education, and age).

We find that ads reduce the percentage of "don't know" responses at each level of office, but do so much more in down-ballot races (Table 5). For every additional 100 ads aired, there is a very modest (and statistically insignificant) decline in the proportion of presidential candidates that the respondents cannot place on this ideological scale. But the same number of ads creates a decline that is about 7 times larger in Senate races and 16 times larger in House races. In the ANES data, advertising also reduces the proportion of respondents who cannot rate the candidates on a feeling thermometer and, again, especially in down-ballot races. Advertising appears to increase knowledge to a greater extent in exactly those races where knowledge is less prevalent.

Table 5: The Effects of Advertising on Knowledge of the Candidates

	President	Senate	House
	(1)	(2)	(3)
Dependent Variable: Don't Know Ideology			
Total Ads per race (100 ads)	−0.011	−0.118***	−0.261***
	(0.012)	(0.017)	(0.039)
Years	2006-2018	2006-2018	2006-2018
Constituency-year FE	X	X	X
Individual-level controls	X	X	X
Observations	144,236	248,708	309,798
R^2	0.084	0.273	0.264
Source: CCES Surveys			
Dependent Variable: Don't Know on Feeling Thermometer			
Total Ads per race (100 ads)	−0.005*	−0.084**	−0.443**
	(0.003)	(0.018)	(0.054)
Years	2000-2016	2000-2016	2000-2016
State FE	X	X	X
Year FE	X	X	X
Individual-level controls	X	X	X
Observations	8,190	4,870	6,863
R^2	0.029	0.145	0.145
Source: ANES Surveys			

Standard errors clustered by DMA-year.
*$p<0.05$; **$p<0.01$

Second, we evaluate whether advertising appears to have a larger impact on voters' attitudes about down-ballot candidates compared to its impact on attitudes about presidential candidates. We operationalize attitudes in terms of both candidates' valence (likability, quality, experience, etc.) and their ideological proximity to voters. We examine these two characteristics because they derive from prominent theories of how voters make decisions (e.g., Buttice and Stone 2012). (To be sure, we are not testing these theories or making claims about their explanatory power.)

We assess valence in the NAES and ANES surveys by subtracting the Republican candidate's favorability score from the Democrat's score to produce the Democrat's valence advantage. We then regress this valence advantage on the Democratic ad advantage in a

model that also includes state and year fixed effects and pre-treatment demographic characteristics (gender, race, education, and age).[24]

Table 6: The Effects of Advertising on Candidate Valence and Ideological Proximity

	President	Senate	House
	(1)	(2)	(3)
Dependent Variable: Democratic Feeling Therm. Advantage			
Dem. Ad. Adv. (100 ads)	0.011	0.234*	0.523*
	(0.079)	(0.090)	(0.196)
Year	2000-16	2000-16	2000-16
State FE	X	X	X
Year FE	X	X	X
Individual-level controls	X	X	X
Observations	8,145	3,259	2,899
R^2	0.160	0.122	0.113
Source: ANES Cumulative File (Face-to-Face/Phone Samples)			
Dependent Variable: Democratic Favorability Advantage			
Dem. Ad. Adv. (100 ads)	0.238	0.839**	1.205
	(0.146)	(0.254)	(0.861)
Year	2000	2000	2000
State FE	X	X	X
Individual-level controls	X	X	X
Observations	24,077	4,653	1,093
R^2	0.079	0.093	0.111
Source: NAES			
Dependent Variable: Democratic Ideological Advantage			
Dem. Ad. Adv. (100 ads)	0.007	0.012**	0.010
	(0.004)	(0.004)	(0.007)
Years	2006-2018	2006-2018	2006-2018
Constituency-year FE	X	X	X
Individual-level controls	X	X	X
Observations	116,353	134,177	109,551
R^2	0.118	0.061	0.084
Source: CCES Surveys			

Standard errors clustered by DMA-year.
*p<0.05; **p<0.01

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24. The public-use ANES files do not include county codes. So we merged respondents with our advertising data based on their congressional districts. The measurement error in this matching process likely slightly attenuates our results using the ANES.

The top panel of Table 6 shows the results from the ANES. A 100 ad advantage has no effect on the Democrats' valence advantage in the 2000-16 presidential elections, but increased valence advantages by much more in Senate elections (0.23) and House elections (0.52). In the NAES, the effect of ads on candidates' favorability ratings is also larger for down-ballot candidates than for presidential candidates, although the point estimates have larger standard errors due to smaller sample sizes.

Next, we examine whether advertising affects the ideological proximity between voters and candidates. Using the 2006-2018 CCES surveys, we calculate proximity as the absolute distance between the self-placement of respondents and their placement of candidates on the 7-point ideology scale. We then calculate the ideological advantage of the Democratic candidate as respondents' ideological congruence with Democratic candidates minus their congruence with Republican candidates. We regress this proximity advantage on the Democratic ad advantage, constituency-year and county fixed effects, and demographic characteristics of respondents (gender, race, education, and age).

The bottom panel of Table 6 shows the results. A 100 ad Democratic advantage in presidential elections is associated with a 0.007 increase in the Democratic candidate's proximity advantage (p=0.07). This same ad advantage is associated with an 0.012 shift in Senate elections and a 0.010 shift in House elections (p=0.20). Although these results are not as clear-cut as the valence results, they also suggest that television advertising can influence perceived spatial proximity to the candidates, and more so in down-ballot races than presidential races.

5.3 Partisan Turnout as an Alternative Mechanism

Finally, we examine whether television advertising influences election outcomes by altering the balance of Democrats and Republicans who vote. This mechanism is not consistent with the results thus far, especially the differing effects of ads across levels of office, but it deserves a formal test nonetheless. To conduct a test, we obtained administrative data from state

voter files compiled by the firm Catalist. These data contain the percentage of Democrats and Republicans that voted in each county in the elections between 2008-2018. This includes the 31 states that record party registration and 18 states where Catalist models partisanship based on demographics and local voting patterns.[25] We calculate the Democratic Party's turnout advantage as the difference between the percentage of Democrats that turn out to vote and the percentage of Republicans that turn out. We then model this as a function of the Democratic Party's overall advertising advantage, summing all advertising across presidential, Senate, governor, House, Attorney General, and Treasurer races. This does not capture every advertisement, as there are a small number of ads for other offices, ballot propositions, and so on, but it does capture the vast majority of ads that could affect partisan turnout. To estimate these models, we use the entire set of counties from these states as well as the relevant border county pairs, just as in our analyses of advertising and election outcomes.

Table 7: Mechanism: The Effects of Advertising on Partisan Turnout

	Dependent variable:	
	Dem. Turnout Adv.	
	All Counties	Border Counties
	(1)	(2)
Dem. Ad. Adv. (100 ads)	0.015**	0.002
	(0.003)	(0.002)
Observations	18,338	25,976
R^2	0.880	0.942

*p<0.05; **p<0.01

Standard errors clustered by county and DMA-year in top panel and county and DMA border-year in bottom panel.

Overall, the results are mixed (Table 7). In the model with all counties, a Democratic ad advantage is associated with a small turnout advantage for Democrats (and vice versa for

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25. The modeled partisanship scores are based on a model that gives each voter a single partisanship score from 2008-2020. The results are similar if we focus only on states that record party registration. For a similar approach, see Hall and Thompson (2018), who examine whether partisan turnout is the mechanism that explains the poor performance of ideological extremists in House elections. Finally, note that we were unable to obtain administrative data on turnout in California.

Republicans), but in the model with border county pairs, there is no relationship. This latter null result is arguably more credible because this model is less vulnerable to time-varying confounders or trends than is the all-counties model. For instance, if one party's candidates all tend to target more ads to a county that is trending in their direction, this could lead to a spurious finding of advertising effects. But even in the all-counties model, the size of the point estimate (b=0.015) is small enough that partisan turnout cannot explain advertising's effect on election outcomes, particularly in down-ballot elections. This is because a small effect of advertising on partisan turnout, combined with the modest relationship of partisan turnout to election outcomes, implies a small total effect on election outcomes (see Appendix F for more details).[26]

A second test of whether advertising affects partisan turnout is whether advertising aired to influence one level of office "spills over" and affects outcomes at other levels.[27] For example, if a Democratic advantage in presidential election advertising increases the Democratic advantage in turnout overall, this should help Democratic candidates down the ballot. We estimate the same county-level models of election outcomes including not only advertising in that race but also advertising in other races. If advertising spills over across races, we would expect that advertising in other offices would affect vote margins.

We do not find consistent spillover at any level of office (Table 8). In the model using all counties, there is evidence of small spillover effect, but the border counties model shows no such effects. This is consistent with the evidence in Table 7.[28] Taken together, advertising's effect on election outcomes—and especially its differential effect across levels of office—has more to do with persuasion than the mobilization of partisans.

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26. In Appendix F, we also show that controlling for the relative turnout of Democrats and Republicans barely changes the relationship between advertising and election outcomes, suggesting again that partisan turnout is unlikely to be the main mechanism underlying advertising effects.

27. Spillover has not been explored in the literature on political advertising, but studies of commercial advertising find evidence of spillover—in particular from the advertiser to competitors who sell similar products (e.g., Sahni 2016; Shapiro 2018), which mirrors what we would expect if advertising from a political candidate helped other candidates in the same party.

28. In Appendix H, we also show that there are no clear differences between ad effects in presidential and midterm election years, as might be expected if differential turnout was driving our results and especially if presidential advertising affected turnout in down ballot races.

Table 8: Spillover of Television Advertising Across Offices (2000-2018)

	Dependent variable: Dem. Vote Share				
	President	Senate	Governor	Att. Gen.	Treasurer
	(1)	(2)	(3)	(4)	(5)
All Counties					
Dem. Ad. Adv. (100 ads)	0.024**	0.052**	0.075**	0.200**	0.334**
	(0.008)	(0.010)	(0.013)	(0.041)	(0.082)
Dem. Ad. Adv. in other Races	0.016*	0.017**	0.030**	0.033**	0.029**
	(0.007)	(0.006)	(0.007)	(0.007)	(0.007)
County FE	X	X	X	X	X
State-year FE	X	X	X	X	X
Observations	12,652	17,133	11,373	7,984	5,331
R^2	0.962	0.960	0.941	0.967	0.971
Border Counties					
Dem. Ad. Adv. (100 ads)	0.018**	0.038**	0.054**	0.187**	0.348**
	(0.005)	(0.007)	(0.010)	(0.031)	(0.057)
Dem. Ad. Adv. in other Races	−0.0002	−0.001	0.003	0.004	0.006
	(0.004)	(0.005)	(0.005)	(0.005)	(0.005)
County FE	X	X	X	X	X
Border-Pair-Year FE	X	X	X	X	X
Observations	17,689	23,910	15,880	11,557	7,520
R^2	0.993	0.990	0.986	0.991	0.993

$^*p<0.05$; $^{**}p<0.01$

Standard errors clustered by county & DMA-year in top panel; county, DMA border-year in bottom.

6 Conclusion

Television advertising is the cornerstone of many campaigns for political office in the United States. As scholars have developed more detailed data and sophisticated estimation strategies, they have shown that television advertising is related to election outcomes: the larger a candidate's advantage in advertising compared to their opponent, the larger their share of the vote. The extant literature has demonstrated this in some presidential and U.S. Senate elections. But no study has systematically examined the effect of advertising across levels of office, including different types of down-ballot races.

We have provided the most comprehensive analysis of advertising effects to date. We find that television advertising affects election results across all levels of office but that

the effects of advertising are substantially larger in down-ballot elections than presidential elections. Despite increasing partisanship in the electorate, there are still persuadable voters that respond to television advertising—especially in down-ballot elections, where voters have less information about candidates. Of course, this relative difference in advertising's effect does not mean that its effect is "large" in some absolute sense or large enough to potentially change the outcome of an election. That would be most likely in close races where one party is able to muster a substantial advertising advantage. But we do not claim that this is a common occurrence.

We also provide important evidence for the mechanism that underlies this relationship between advertising and election outcomes. We show that advertising has larger effects in down-ballot races because it provides new information and changes voters' attitudes about the candidates. We show that voters clearly have less information and weaker opinions about candidates in down-ballot races. We also show that advertising has a stronger relationship with the formation and direction of attitudes about the candidates. In short, advertising appears to persuade voters. We find less evidence for a competing mechanism—that advertising mobilizes partisans to vote.

This evidence about mechanisms is important in at least two ways. For one, it helps clarify how a central form of campaign communication influences voters. Campaigns obviously care about both persuasion and mobilization, albeit to varying degrees. But different campaign tactics can be more or less effective at these different tasks. Our evidence suggests that the primary benefit of television advertising is providing voters with information and shifting their attitudes about the candidate.

Second, evidence about individual-level mechanisms speaks to the forces that create over-time changes in aggregate election outcomes. As Hill, Hopkins, and Huber (2021) note, "Changes in partisan outcomes between consecutive elections must come from changes in the composition of the electorate or changes in the vote choices of consistent voters." Both of these pathways are important, but even in recent elections, including 2012 and 2016,

persuasion has been particularly important (Hill, Hopkins, and Huber 2021). Television advertising is thus potentially important in explaining both the choices of individual voters and why outcomes shift from election to election.

We are also mindful of the limitations of our analysis. Our findings do not necessarily speak to the impact of advertising in other media, such as online media. Some evidence suggests that advertising online reflects different strategic goals than persuasion, such as fundraising (Ridout, Fowler, and Franz 2021, 8). It is also the case that current political trends—such as the rise of online electioneering and the decline of split ticket voting (Jacobson 2021)—could eventually lead to a decrease in the effect of television advertising on elections. However, we do not yet see evidence that its effect has changed over the 18-year period that we study (see Appendix I).

Our findings also do not speak to the effects of the specific messages in ads, such as which issues they focus on or whether they primarily support or attack a candidate. Our data and research design are well-suited to identifying the effects of advertising volume but not these other characteristics.[29] Future studies can build on our research to specify what components of ads most help to persuade voters (see, e.g., Gordon et al. 2019).

Notes

The authors affirm this research did not involve human subjects. The authors declare no ethical issues or conflicts of interest in this research. Research documentation and most of the data that support the findings of this study are openly available in the APSR Dataverse at https://doi.org/10.7910/DVN/F8JXHR. As we discussed in the main text in footnotes 4 and 6, some of the elections and advertising data for our analyses are obtained under restricted license. We provide more details in the readme file on the Dataverse about how researchers can obtain and compile these files.

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29. On the challenges of generating causal estimates of tone, see Blackwell (2013).

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Supplementary Information for "The Effect of Television Advertising in United States Elections"

John Sides, Lynn Vavreck, and Christopher Warshaw

A Clustering Strategies

In this appendix, we compare the approach we use to cluster our standard errors with other plausible approaches. For simplicity, we focus on our main results for presidential elections. Figure A1 shows that the standard errors are much smaller in a naive model that does not cluster standard errors at all. But the standard errors are similar using a variety of other clustering strategies for both the all counties and border counties designs. Moreover, the results are statistically significant using all plausible clustering strategies.

Figure A1: Comparing strategies for clustering standard errors in models of effect of advertising in presidential elections. The top plot shows the all counties design and the second plot shows the border counties design.
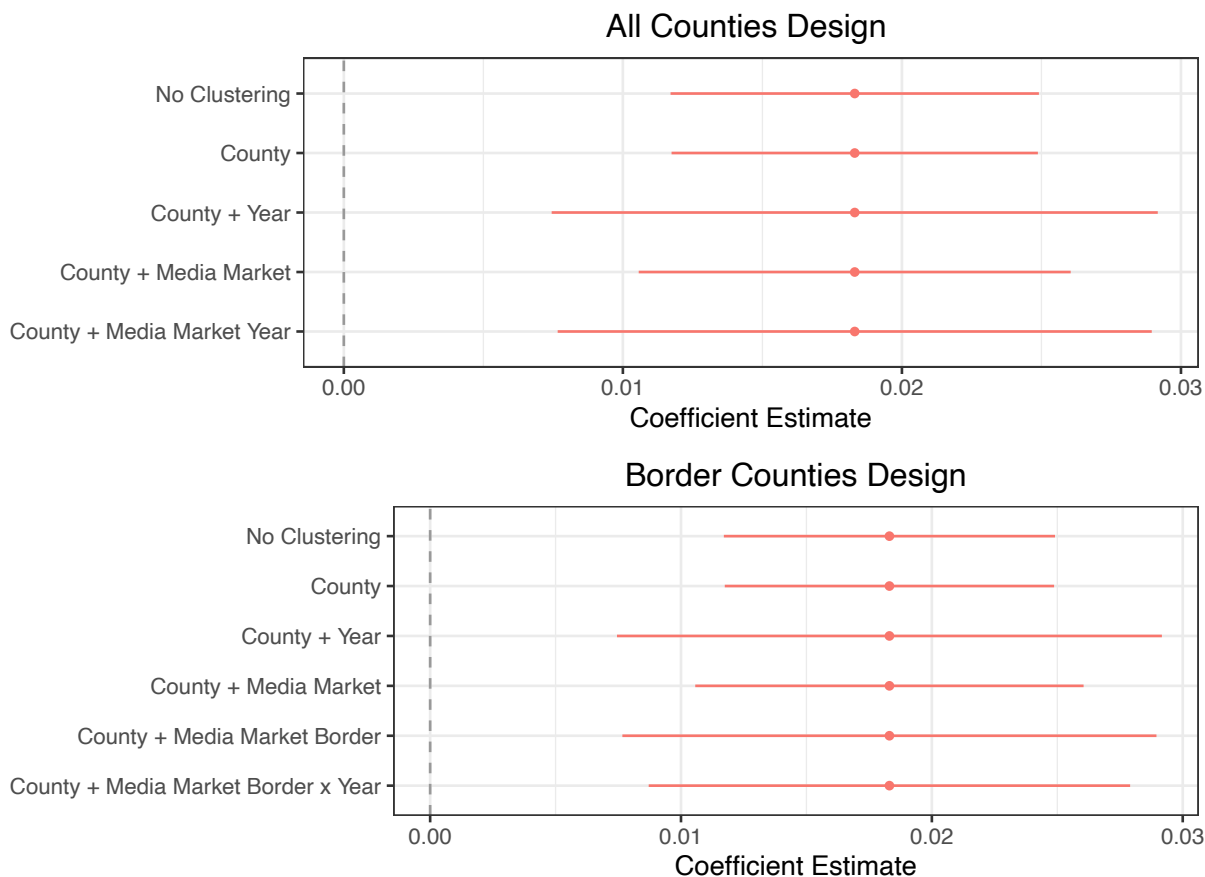
B   Placebo Checks

The identification strategy for our research design relies on the assumption that there are no time-varying confounders, typically called the parallel trends assumption. To demonstrate that this assumption is likely to be valid, researchers commonly demonstrate that there are parallel trends in pre-treatment outcomes. In the panel framework that we employ, we can demonstrate parallel trends by looking at the effects of future values of our main independent variable on contemporaneous outcomes. If future "treatments" (differing advertising advantages) affected voting in previous elections, ad placement could be affected by other factors that also affect voting, invalidating our assumptions about time-varying confounders.

Table A1: Placebo Tests: Effect of Aggregate Television Advertising in Last Two Months of the Next Election Cycle

	Dependent variable: Dem. Vote Share					
	President	Senate	Governor	House	Attorney Gen.	Treasurer
	(1)	(2)	(3)	(4)	(5)	(6)
All Counties						
Dem. Ad. Adv. (100 ads)$_{t+1}$	−0.001	−0.012	−0.008	0.012	0.059	−0.212
	(0.008)	(0.011)	(0.013)	(0.028)	(0.046)	(0.113)
County FE	X	X	X	X	X	X
State-year FE	X	X	X	X	X	X
Observations	12,693	17,118	11,997	23,344	8,685	5,868
R^2	0.959	0.961	0.939	0.959	0.963	0.965
Adjusted R^2	0.945	0.951	0.922	0.943	0.944	0.950
Border Counties						
Dem. Ad. Adv. (100 ads)$_{t+1}$	−0.002	0.0001	0.005	0.028	−0.039	−0.161*
	(0.004)	(0.007)	(0.011)	(0.038)	(0.043)	(0.069)
County FE	X	X	X	X	X	X
Border-Pair-Year FE	X	X	X	X	X	X
Observations	17,753	25,529	12,707	27,717	9,102	6,305
R^2	0.993	0.989	0.989	0.992	0.991	0.992
Adjusted R^2	0.978	0.972	0.963	0.964	0.970	0.978

Standard errors clustered by county and DMA-year in top panel; county and DMA border-year in bottom.
*p<0.05; **p<0.01

Table A1 shows placebo tests that validate the plausibility of the parallel trends assumption in difference-in-difference models for the border counties sample. There are almost no significant effects of future advertising on contemporaneous election outcomes. Moreover,

the point estimates of the effects are all very small.

We also examined models that included both future advertising and contemporaneous advertising. And we examined models of the effect of contemporaneous advertising on future election outcomes. These models all indicated no effect of past or future advertising on elections.

This evidence suggests that time-varying confounders do not bias our estimates of advertising effects in elections (see also Spenkuch and Toniatti 2018).

C Assessing Whether Field Offices Confound Advertising Effects

In this appendix, we examine the concern that field offices could confound advertising effects. We have data on Democratic presidential candidates' field offices in the 2004-2016 presidential elections (Darr and Levendusky 2014; Sides and Vavreck 2013; Sides, Tesler, and Vavreck 2018). Unfortunately, we lack consistent data on Republican presidential candidates' field offices. We also lack field office data for other races. For some of these years, we have detailed data on the number of Democratic field offices in each county, while for other years we just have an indicator for whether the Democratic presidential campaign had an office in a county. Thus, we rely on a dichotomous indicator for whether each Democratic presidential campaign had offices in each county.

To begin, we examine whether Democratic advertising advantage is correlated with the presence of Democratic field offices in presidential elections (Table A2). In both the all counties and border counties designs, we find no relationship between Democratic field offices and advertising advantage. That field offices seem to be approximately orthogonal to television advertising suggests that field activities are not likely to confound the effects of advertising.

Table A2: Relationship between Democratic Ad Advantage and Democratic Field Offices

	Dependent variable: Dem. Field Offices	
	All counties	*Border counties*
	(1)	(2)
Dem. Ad. Adv. (100 ads)	0.00002	−0.0003
	(0.0004)	(0.001)
Observations	11,194	15,809
R^2	0.736	0.868
Note:		*p<0.1; **p<0.05; ***p<0.01

In Table A3, we examine whether field offices could be confounding the effects of advertising by estimating regression models of presidential election outcomes that include both

Democratic advertising advantage and Democratic field offices. The left panel shows the all county design, while the right panel shows the border counties design. (Note that the results here slightly vary from those in the main paper because they only include counties and elections where we have data on field offices.) Including the measure of field offices does not affect the point estimates for the effect of advertising.[1]

Table A3: Models of the Effect of TV Advertising in Presidential Elections from 2004-16 with and without Controlling for Field Offices

| | Dependent variable: Dem. Vote Share | | | |
| | All counties | | Border counties | |
	(1)	(2)	(3)	(4)
Dem. Ad. Adv. (100 ads)	0.022**	0.022**	0.016**	0.016**
	(0.008)	(0.008)	(0.005)	(0.005)
Dem. Field Offices		0.690**		0.051
		(0.225)		(0.211)
Observations	11,135	11,135	15,754	15,754
R^2	0.971	0.971	0.993	0.993
Note:			*p<0.05; **p<0.01	

1. One reason for the null effect of field offices in column 4 could be that field offices conduct electioneering in both counties of a border pair.

D   Detailed Results

This appendix shows detailed results analogous to those in Table 2 for Senate, Governor, House, Attorney General, and Treasurer elections.

Table A4: Effects of Aggregate Television Advertising in Last Two Months of Presidential Elections (2000-2016)

	Dependent variable: Dem. Vote Share						
	All counties				Border counties		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Dem. Ad. Adv. (100 ads)	0.158**	0.043**	0.037**	0.027**	0.027**	0.020**	0.018**
	(0.036)	(0.013)	(0.007)	(0.008)	(0.005)	(0.006)	(0.005)
Year FE	X	X					
State-year FE			X	X	X	X	
County FE		X		X		X	X
Lagged Outcome			X		X		
Border-Pair-Year FE							X
Observations	12,652	12,652	12,650	12,652	17,652	17,689	17,689
R^2	0.076	0.930	0.953	0.962	0.956	0.968	0.993

Standard errors clustered by county and DMA-year in top panel; county and DMA border-year in bottom.
$^*p<0.05$; $^{**}p<0.01$

Table A5: Effects of Aggregate Television Advertising in Last Two Months of Senate Elections (2000-2018)

	Dependent variable: Dem. Vote Share						
	All counties				Border counties		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Dem. Ad. Adv. (100 ads)	0.383**	0.189**	0.031**	0.055**	0.035**	0.053**	0.038**
	(0.044)	(0.042)	(0.011)	(0.010)	(0.009)	(0.009)	(0.007)
Year FE	X	X					
State-year FE			X	X	X	X	
County FE		X		X		X	X
Lagged Outcome			X		X		
Border-Pair-Year FE							X
Observations	17,133	17,133	17,128	17,133	23,847	23,910	23,910
R^2	0.114	0.696	0.919	0.960	0.922	0.964	0.990

Standard errors clustered by county and DMA-year in top panel; county and DMA border-year in bottom.
$^*p<0.05$; $^{**}p<0.01$

Table A6: Effects of Aggregate Television Advertising in Last Two Months of Governor Elections (2000-2018)

| | Dependent variable: Dem. Vote Share | | | | | | |
| | All counties | | | | Border counties | | |
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Dem. Ad. Adv. (100 ads)	0.265**	0.249**	0.081**	0.087**	0.067**	0.073**	0.055**
	(0.039)	(0.031)	(0.016)	(0.014)	(0.012)	(0.012)	(0.010)
Year FE	X	X					
State-year FE			X	X	X	X	
County FE		X		X		X	X
Lagged Outcome			X		X		
Border-Pair-Year FE							X
Observations	11,373	11,373	11,332	11,373	15,784	15,880	15,880
R^2	0.156	0.773	0.890	0.941	0.897	0.949	0.986

Standard errors clustered by county and DMA-year in top panel; county and DMA border-year in bottom.
$^*p<0.05$; $^{**}p<0.01$

Table A7: Effects of Aggregate Television Advertising in Last Two Months of House Elections (2000-2018)

| | Dependent variable: Dem. Vote Share | | | | | | |
| | All counties | | | | Border counties | | |
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Dem. Ad. Adv. (100 ads)	0.534**	0.325**	0.069**	0.088**	0.069**	0.078**	0.084**
	(0.050)	(0.033)	(0.017)	(0.019)	(0.014)	(0.024)	(0.022)
Year FE	X	X					
CD-year FE			X	X	X	X	
County FE		X		X		X	X
Lagged Outcome			X		X		
Border-Pair-Year FE							X
Observations	28,642	28,642	24,004	28,642	31,719	38,138	38,138
R^2	0.061	0.690	0.963	0.953	0.963	0.962	0.991

Standard errors clustered by county and DMA-year in top panel; county and DMA border-year in bottom.
$^*p<0.05$; $^{**}p<0.01$

Table A8: Effects of Aggregate Television Advertising in Last Two Months of Attorney General Elections (2006-2018)

| | *Dependent variable: Dem. Vote Share* | | | | | | |
| | *All counties* | | | | *Border counties* | | |
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Dem. Ad. Adv. (100 ads)	0.992**	0.612**	0.208**	0.260**	0.193**	0.230**	0.192**
	(0.181)	(0.127)	(0.049)	(0.046)	(0.035)	(0.032)	(0.031)
Year FE	X	X					
State-year FE			X	X	X	X	
County FE		X		X		X	X
Lagged Outcome			X		X		
Border-Pair-Year FE							X
Observations	7,984	7,984	7,453	7,984	10,848	11,557	11,557
R^2	0.123	0.758	0.925	0.967	0.928	0.971	0.991

Standard errors clustered by county and DMA-year in top panel; county and DMA border-year in bottom.
$^*p<0.05$; $^{**}p<0.01$

Table A9: Effects of Aggregate Television Advertising in Last Two Months of Treasurer Elections (2006-2018)

| | *Dependent variable: Dem. Vote Share* | | | | | | |
| | *All counties* | | | | *Border counties* | | |
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Dem. Ad. Adv. (100 ads)	1.772**	1.415**	0.366**	0.337**	0.391**	0.421**	0.352**
	(0.346)	(0.315)	(0.113)	(0.087)	(0.081)	(0.058)	(0.056)
Year FE	X	X					
State-year FE			X	X	X	X	
County FE		X		X		X	X
Lagged Outcome			X		X		
Border-Pair-Year FE							X
Observations	5,331	5,331	4,601	5,331	6,478	7,520	7,520
R^2	0.124	0.695	0.912	0.971	0.922	0.975	0.993

Standard errors clustered by county and DMA-year in top panel; county and DMA border-year in bottom.
$^*p<0.05$; $^{**}p<0.01$

E   Marginal Returns to Advertising

In this appendix, we examine more closely the degree to which advertising has diminishing marginal effects. We use three different analyses to probe different elements of diminishing returns.

One way to conceptualize diminishing returns is based on the scale of one candidates' advertising advantage in a particular race. Figure 3 in the main body of the paper provided an initial visual evaluation of returns to scale for advertising advantage. It indicated that there is little apparent evidence of diminishing returns. For many types of offices, the relationship between advertising advantage and vote share is reasonably linear. Only at extreme levels of advertising advantage, where there are very few cases, do the points deviate much from the linear regression line. Moreover, a non-parametric loess curve is generally close to the linear regression line for each type of office for levels of advertising advantage within about two standard deviations of the mean (see Figure A2 below). This suggests that advertising has approximately constant returns to scale across the range of plausible variation in advertising advantage for either party.

Another way to conceptualize diminishing returns is based on the volume of each candidate's advertising in a race. To assess this, Table A10 disaggregates the advertising advantage measure and examines the effects of Democratic advertising and Republican advertising separately. We allow for non-linearity by including both linear and quadratic terms for each party's advertising. The quadratic terms should capture any decreasing (or increasing) returns to scale. Overall, we find that the quadratic terms are sometimes statistically significant and in the expected direction, but are nearly always very small in size.

Figure A3 provides a graphical illustration of the results from these regression out to the 99th percentile of observed advertising for each office. In general, each party's ads have their expected effect: increasing the vote share for that party.[2] More importantly, that

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2. The apparent null effect of Republican advertising in presidential elections (top left-hand panel) is in part due to the 2016 election, in which Donald Trump's advertising had little relationship to the outcome (Sides, Tesler, and Vavreck 2018). In the 2000-2012 elections, the relationship between Republican

Figure A2: Effect of Democratic Advertising Advantage on Democratic Vote Share. These graphs show the implied effects of a ± 3 standard deviation shift in Democratic ad advantage for each office. They are based on the residuals from the border counties models in Table 4.
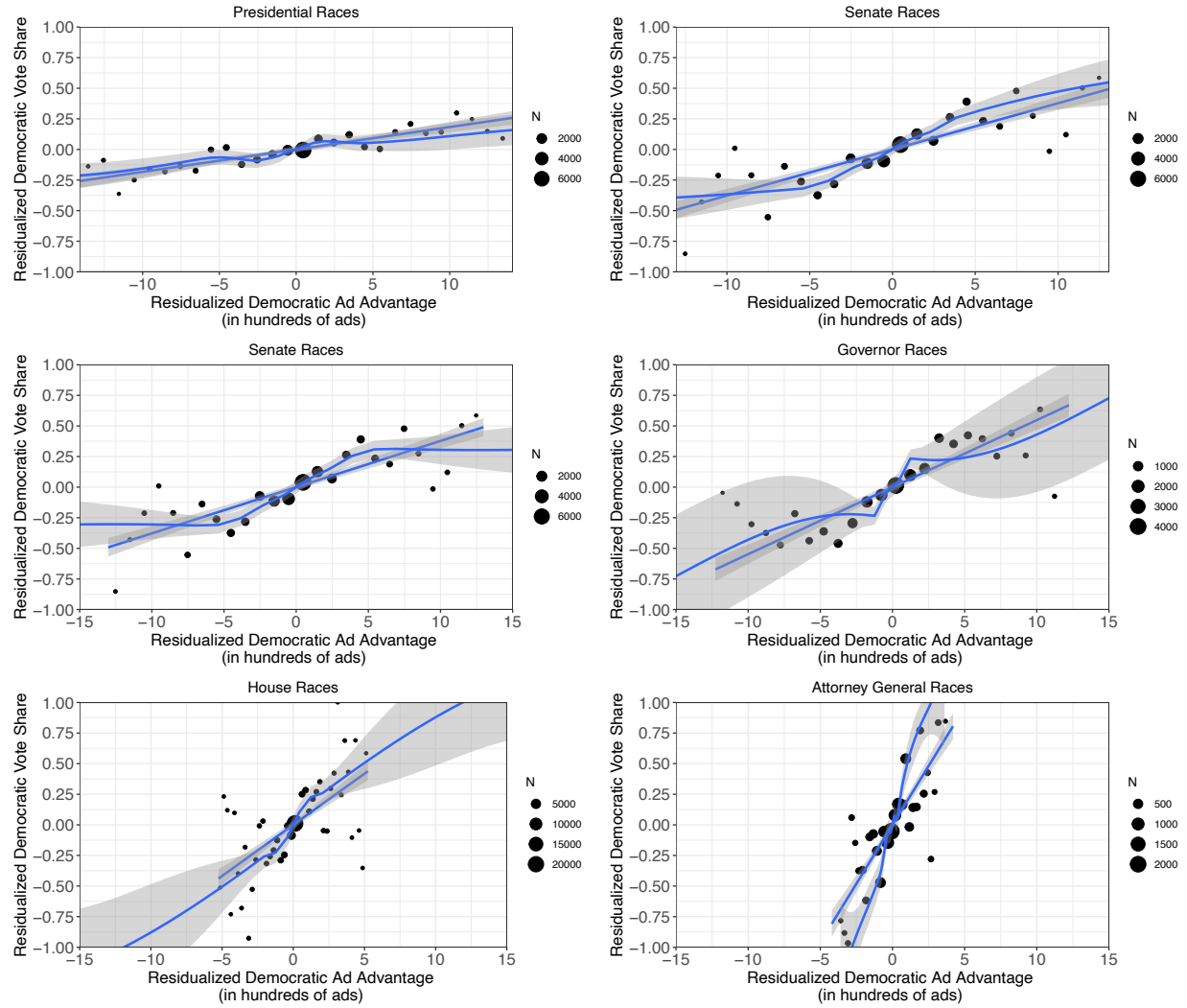
effect is approximately linear. Only at very high levels of advertising do there appear to be diminishing returns. But even at these high levels, vote share is almost always increasing at the margins, suggesting that candidates are still getting something for their dollar. Moreover, these high levels of advertising rarely translate into an advertising advantage for either candidate because the two sides typically match each other's advertising. Given that advertising advantage also has a largely linear relationship with vote share (Figure 3), there is little reason for candidates to cease advertising, especially if their opponent continues to

advertising and Democratic vote share is negative and statistically significant.

Table A10: Models Including Separate Measures of Each Party's Advertising (all counties)

	President	Senate	Governor	House	Attorney Gen.	Treasurer
	Dependent variable: Dem. Vote Share					
	(1)	(2)	(3)	(4)	(5)	(6)
All Counties						
Democrats	0.040*	0.094**	0.190**	0.163**	0.283**	0.495
	(0.016)	(0.015)	(0.028)	(0.028)	(0.083)	(0.308)
Republicans	0.003	−0.073**	−0.067**	−0.160**	−0.246**	−0.349
	(0.024)	(0.020)	(0.024)	(0.030)	(0.077)	(0.273)
Democrats squared	−0.0001	−0.0003**	−0.001*	−0.001**	0.002	−0.041
	(0.0001)	(0.0001)	(0.0004)	(0.0003)	(0.003)	(0.034)
Republicans squared	−0.0001	0.0003*	0.0004	0.002**	0.002	−0.013
	(0.0002)	(0.0001)	(0.0002)	(0.0005)	(0.002)	(0.017)
Observations	12,652	17,133	11,373	28,642	7,984	5,331
R^2	0.962	0.960	0.942	0.953	0.967	0.971
Border Counties						
Democrats	0.016	0.060**	0.124**	0.140**	0.167**	0.605**
	(0.009)	(0.011)	(0.021)	(0.032)	(0.064)	(0.198)
Republicans	0.030*	−0.079**	−0.090**	−0.176**	−0.242**	−0.343*
	(0.014)	(0.016)	(0.020)	(0.032)	(0.056)	(0.158)
Democrats squared	0.00002	−0.0002**	−0.001**	−0.001**	0.001	−0.033
	(0.0001)	(0.00005)	(0.0003)	(0.0002)	(0.003)	(0.023)
Republicans squared	−0.0003*	0.0003*	0.001**	0.002**	0.002	−0.0003
	(0.0001)	(0.0001)	(0.0002)	(0.0005)	(0.002)	(0.011)
Observations	17,689	23,910	15,880	38,142	11,557	7,520
R^2	0.993	0.990	0.986	0.991	0.991	0.993

Standard errors clustered by county and DMA-year in top panel; county and DMA border-year in bottom.
$^*p<0.05$; $^{**}p<0.01$

stay on the air.[3]

A third way to conceptualize diminishing returns is based on the total volume of ads. To assess this, the models using our border-counties design in Table A11 interact the Democratic advertising advantage with a standardized measure of the total number of ads across all races

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3. Our results for presidential races are similar to those of Spenkuch and Toniatti (2018, Appendix C), who also show that ads have approximately linear effects.

Figure A3: Effect of Democratic and Republican Advertising on Democratic Vote Share. These graphs show the implied effects of each party's spending from 0 to the 99th percentile of the within-county variation in observed ads (in hundreds of ads) for each office (Democrats in blue and Republicans in red). They are based on the border counties models in Table A9.
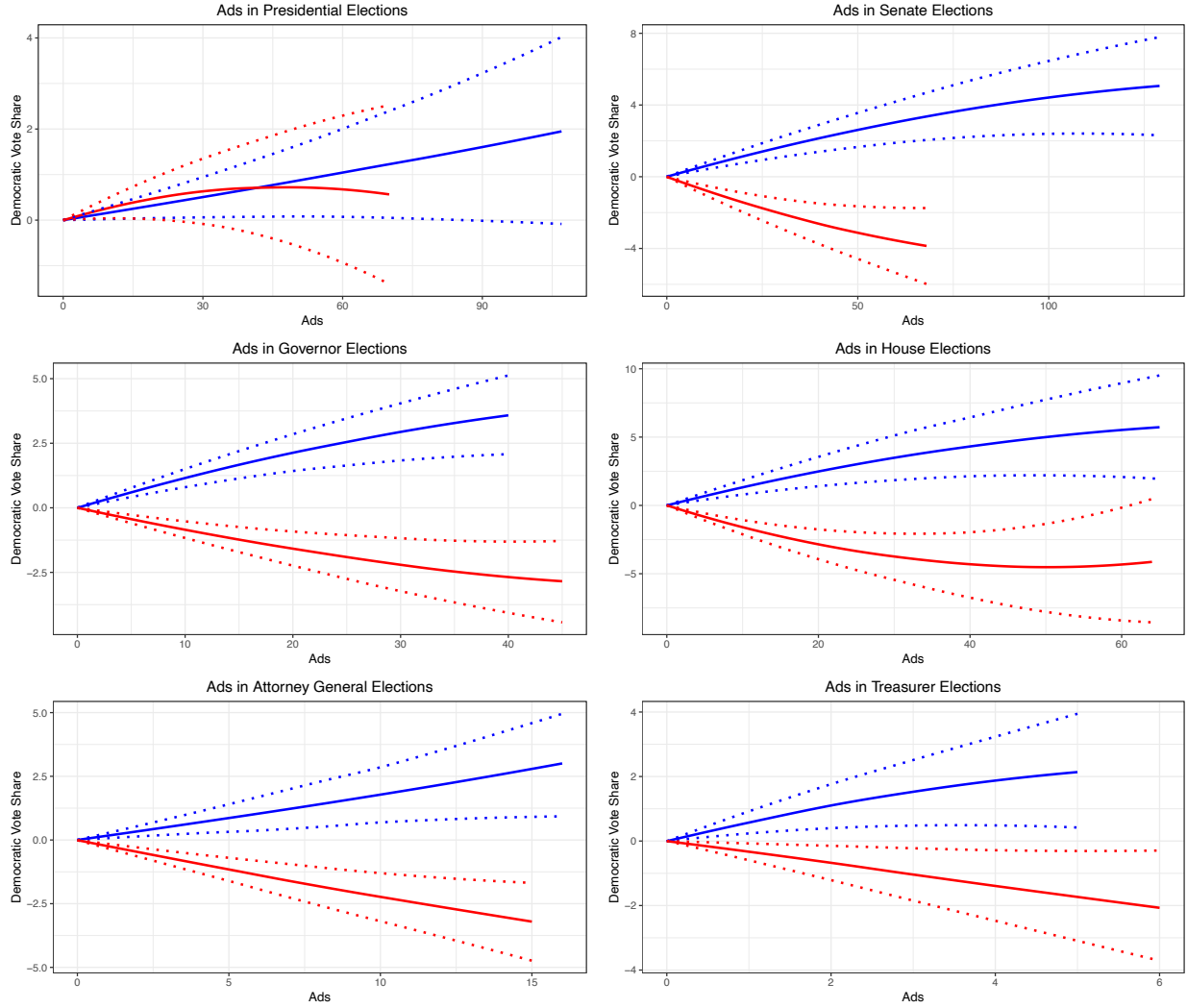
in a county. These regressions show tentative, modest evidence of diminishing returns for ads for some offices. For instance, in the border design, the apparent effect of ads in Senate races is about 10% higher when the volume of advertising is one standard deviation ads below the mean. But there is little evidence of diminishing effects due to airwave saturation for other offices (e.g., governor races). Moreover, ads continue to have positive marginal effects out to very high advertising levels for all offices.

A-13

Table A11: Diminishing Returns

	President	Senate	Governor	House	Attorney Gen.	Treasurer
	Dependent variable:					
	Dem. Vote Share					
	President	Senate	Governor	House	Attorney Gen.	Treasurer
	(1)	(2)	(3)	(4)	(5)	(6)
Dem. Ad. Adv. (100 ads)	0.017**	0.056**	0.058**	0.098**	0.286**	0.470**
	(0.006)	(0.010)	(0.013)	(0.019)	(0.054)	(0.119)
Std(Total Ads (100 ads))	0.135	−0.076	−0.035	0.128	0.026	0.056
	(0.110)	(0.115)	(0.130)	(0.102)	(0.214)	(0.207)
Dem. Ad. Adv. x Std(Total Ads)	−0.001	−0.006**	−0.002	−0.012	−0.073**	0.002
	(0.003)	(0.002)	(0.004)	(0.014)	(0.024)	(0.048)
Observations	17,689	23,910	15,880	37,933	10,848	6,478
R^2	0.993	0.990	0.986	0.991	0.978	0.984

Note: ${}^*p<0.05$; ${}^{**}p<0.01$

F Does Accounting for Partisan Turnout Affect the Main Results?

This appendix examines whether our main results are attenuated when we control for the Democratic turnout advantage. This would indicate that differential turnout could be an important mechanism underlying the relationship between advertising and election outcomes. Overall, the effect of advertising is virtually identical in a model that does not control for turnout (column 1) as in a model where we do (column 2).[4] This implies that partisan turnout is unlikely to be the main mechanism of our findings.

Table A12: Effect of Ads on Presidential Results After Controlling for Differential Turnout

	Dependent variable:	
	Dem. Vote Share	
	(1)	(2)
Dem. Ad. Adv. (100 ads)	0.017**	0.016**
	(0.005)	(0.005)
Dem. Turnout Adv.		0.102**
		(0.015)
Years	2008-16	2008-16
Observations	12,938	12,938
R^2	0.994	0.994
Note:	*p<0.05; **p<0.01; ***p<[0.***]	

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4. Note the results here slightly vary from those in the main paper because they only include counties and elections where we have data on partisan turnout from 2008-2018.

G Decay of Ad Effects

To estimate the potential decay of advertising effects, we estimate a model that divided the advertising advantage variable into three time periods: 1) ads aired between 0 and 36 days from election day ("October/November"), 2) ads aired between 37 and 69 days from election day ("September"), and 3) ads aired between 70 and 129 days before election day ("July-August"). To reduce the noise in the estimates, we combine different levels of office, in this case presidential, governor, and Senate. This allows us to more precisely estimate the effects of the ads that air closest to Election Day, which some research has found are most important, at least in presidential elections. It also allows us to determine whether there is a decline in the effect of ads as they are aired earlier and earlier, stretching back into the summer before the general election.

Table A13: Decay of Advertising Effects. This table shows the effects of advertising aired at different points during the campaign season, combining presidential, Senate, and gubernatorial elections.

	Dependent variable:	
	Dem Vote Share	
	All Counties	Border Counties
	(1)	(2)
October/November	0.061**	0.038**
	(0.014)	(0.007)
September	0.039	0.033**
	(0.022)	(0.011)
July/August	0.018	0.010
	(0.014)	(0.008)
County FE	X	X
State-Year-Office FE	X	
Border-Pair-Year-Office FE		X
Observations	41,199	57,543
R^2	0.947	0.987

Standard errors clustered by county & DMA-year-office in left panel; county & DMA border-office-year in right panel.

Note: *p<0.05; **p<0.01

As Table A13 shows, ads aired in October and November have the largest effect on election outcomes, although ads aired in September also matter. By contrast, advertising before Labor Day does not appear to affect election outcomes. These results confirm previous studies showing that advertising effects decay, although our results do not necessarily show the rapid decay evident in several studies (e.g., Gerber et al. 2011; Hill et al. 2013; Kalla and Broockman 2018; Sides and Vavreck 2013). However, it may require more sensitive data, especially surveys conducted consistently over the days and weeks before elections, to more clearly identify the exact pattern of decay. For example, our data do not give us effective purchase on the effects of advertising within October and November. That said, we can confirm the finding that ads closer to Election Day are more strongly related to election outcomes than earlier ads.

H Are Advertising Effects Different in Midterm Elections?

In this appendix, we examine whether advertising effects are different in midterm elections (Table A14). Overall, we find no clear evidence of differences between advertising effects in midterm and presidential election years.

Table A14: Are Advertising Effects Different in Midterm Elections?

	Dependent variable:		
	Dem. Vote Share		
	Senate	Governor	House
	(1)	(2)	(3)
All Counties			
Dem. Ad. Adv. (100 ads)	0.034**	0.139**	0.100**
	(0.011)	(0.032)	(0.027)
Ad Adv x Midterm	0.041*	−0.064	−0.019
	(0.016)	(0.036)	(0.029)
Observations	17,133	11,373	28,642
R^2	0.960	0.941	0.953
Border Counties			
Dem. Ad. Adv. (100 ads)	0.032**	0.102**	0.105**
	(0.008)	(0.026)	(0.033)
Ad Adv x Midterm	0.011	−0.056*	−0.032
	(0.013)	(0.028)	(0.032)
Observations	23,910	15,880	38,142
R^2	0.990	0.986	0.991
Note:	*p<0.05; **p<0.01; ***p<[0.***]		

I   Have Ad Effects Declined in Recent Years?

In this appendix, we examine whether ad effects have declined in recent years. To do so, we replicate our analysis in Table 3 but allow the effects of advertising to vary across two time periods: 2000-2008 and 2010-2018. To be sure, this is a simple periodization, but given that we do not have a long time-series of election years, it provides at least some purchase on whether the effects are smaller in more recent elections.

Table A15: Time Trends in Effects of Aggregate Television Advertising

	Dependent variable: Dem. Vote Share			
	President (1)	Senate (2)	Governor (3)	House (4)
All Counties				
Dem. Ad. Adv. (100 ads) (2000-2008)	0.022* (0.011)	−0.007 (0.027)	0.046 (0.034)	0.107** (0.034)
Dem. Ad. Adv. (100 ads) (2009-2018)	0.029** (0.009)	0.063** (0.010)	0.095** (0.015)	0.083** (0.020)
County FE	X	X	X	X
State-Year FE	X	X	X	X
Observations	12,652	17,133	11,373	28,653
R^2	0.962	0.960	0.941	0.953
Border Counties				
Dem. Ad. Adv. (100 ads) (2000-2008)	0.021** (0.007)	0.003 (0.021)	0.119** (0.030)	0.045 (0.036)
Dem. Ad. Adv. (100 ads) (2009-2018)	0.017** (0.006)	0.041** (0.008)	0.047** (0.010)	0.093** (0.025)
County FE	X	X	X	X
Border-Pair-Year FE	X	X	X	X
Observations	17,689	23,910	15,880	38,138
R^2	0.993	0.990	0.986	0.991

Standard errors clustered by county and DMA-year in top panel, and
county and DMA border-year in bottom panel.
*p<0.05; **p<0.01

However, we find no consistent evidence of any decrease in advertising effects (Table A15). In fact, in many cases—depending on the level of office and the modeling strategy—the effects are larger in 2010-2018 than in 2000-2008. Televised advertising appears to remain an effective strategy for winning votes.

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