Political Advertising and Voting Intentions:
Evidence from Exogenous Variation
in Ads Viewership *

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ABSTRACT

Mexico's campaign law assigns TV and radio ads to parties according to their
vote share in the previous election, and mandates the *time of the day* at which
ads are aired to be determined randomly. We exploit this arguably exogenous
variation in viewers' exposure to political ads by different parties and longitudi-
nal electoral survey data to estimate the effect of ads on voting intentions during
Mexico's 2012 presidential campaign. We find that political ads on both radio
and TV have a positive, significant and sizeable effect on voting intentions. This
effect is short-lived (about two weeks), and is stronger in the early weeks of the
campaign. Ads tend to have no significant impact on voters' knowledge of can-
didates' political message, and to be more effective at convincing individuals
that are more educated, and those who voted for the party in the past. Taken
together these findings suggests that ads do not influence voters by conveying
new information but that other mechanisms of persuasion, cantered around ads'
non-informative content, may be at work.

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1. INTRODUCTION

The role of money in politics has traditionally made the object of a lively debate among political commentators and ordinary citizens alike. This is especially the case in countries, like the U.S., where few limits exists on how much private interests can contribute to political parties and how much these can spend in campaigns.[1] Indeed, over the past decades, the amount of resources spent for political campaigns has grown steadily both in mature and consolidating democracies.[2] A large fraction of campaign money is spent to purchase political advertising on mass media, with television usually getting the lion's share. In light of this, any attempt to understand the impact of money in politics cannot abstract from understanding the effect of political advertising.

The mere fact that political actors invest considerable resources on ads suggests that they should have some influence on voters' attitudes and choices. Yet, empirical evidence in this respect is mixed, with most studies documenting small or short-lived effects. Furthermore, little is known on how the persuasive effect of political ads may operate, namely whether ads influence voters by providing new information about candidates and platforms, or, rather, by priming non-informative peripheral factors. This distinction is crucial since different models of persuasion have very different implications regarding the social desirability of ads and the opportunity of regulating candidates' access to them (DellaVigna and Gentzkow, 2010).

From an empirical perspective, examining the effect of political ads on voting is a challenging task due to obvious concerns of reverse causality and omitted variables. Intuitively, what resources a candidate is able to raise and spend is likely to be influenced by her electoral prospects, or to be correlated with other individual characteristics (e.g. ability) that can affect her electoral performance in ways other than through advertising. Previous work has attempted to overcome these difficulties by randomizing exposure to political ads in the context of lab or field experiments, or by exploiting arguably exogenous variation in candidates' ads or spending from real world situations (Levitt, 1994; Ansolabehere and Iyengar, 1996; Valentino et al., 2004; Brader, 2005; Gerber et al., 2007; Da Silveira and De Mello, 2011). However, most of these contributions have limited external validity or fall short of properly identifying the impact of ads either because of difficulties in defining a relevant control group, or because the variation they exploit is not truly exogenous.

In this paper we attempt to estimate the causal effect of political ads on voting intentions by ex-

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[1] Since differences in campaign spending can influence the outcomes of elections in favor of deep-pocketed candidates, one concern is that this may give candidates an incentive to cater to wealthy special interests for financial support. Insofar as elected officials may reward contributors for their support, this could cause policies to be swayed in favor of large contributors and away from ordinary citizens (Prat, 2002).

[2] In the U.S., for example, overall spending for the 2012 presidential campaign has been estimated to over $2.6 billion. Similarly in Mexico, the country this study focuses on, campaign spending by the three main parties in the 2006 presidential campaign amounted to over $300 million, accounting for an even larger share of GDP than in the U.S.

ploiting exogenous variation in viewers' exposure to parties' ads on TV and radio during the 2012 Mexican presidential campaign. In particular, we take benefit of a recent reform of Mexico's electoral campaign law which prevents parties from purchasing ads but, instead, assigns them publicly-mandated ads slots on every TV and radio stations in proportion to their vote share in the previous election. Crucially for our identification strategy, while the share of ads assigned to each party remains constant throughout the campaign, the time of the day at which each party's ads are aired on the first day of the campaign is determined by a lottery, with ads slots rolling over in subsequent days.[3] Based on the number of ads assigned to each party, on the time of the day at which each ad was aired, and on the average audience at each time of the day, we construct two measures of potential exposure to each party's ads on TV and radio respectively. To estimate the effect of ads on voting intentions, we combine this information with electoral survey data available for each week of the campaign for a subset of 160 polling stations distributed across 28 of Mexico's 32 states. In particular, we examine how weekly voting intentions for each of the top three candidates evolve over time as a function of each candidate's audience-weighted ads share in the previous weeks. The availability of longitudinal data at a very small level of aggregation allows us to identify the effect of ads by comparing voting intentions in the same polling station at different times of the campaign controlling for both candidate/polling station and candidate/week fixed effects, i.e. for the average popularity of each candidate in each location, and for any shock to candidates' popularity at the national level.

Our unique empirical design allows us to improve upon previous studies along several dimensions. First, unlike studies based on lab experiments, we examine the effect of political ads in the context of a campaign for a real and high-stake election. Second, we exploit random variation in exposure to political ads that affects the entire voting population and is unquestionably exogenous to both candidates and elections' characteristics. Third, our setting allows us to explore how the effect of ads may operate; in particular, due to the availability of longitudinal data for the entire duration of the campaign and of detailed information on respondent's political awareness and personal characteristics we can shed light on: i) how persistent is the effect of ads, ii) how it evolves over the course of the campaign, iii) whether it results from improved voters' information, iv) what groups of voters are more vulnerable to ads.

We find that political ads have a positive and significant effect on voting intentions. The effect is similar for TV and radio and is quite sizeable: a one percentage point increase in exposure to a candidate's ads in the previous two weeks increases respondents' reported probability of voting for

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[3] It is important to note that in states where only federal elections were held (17 out of 32), parties ads share were based on their vote share in the previous federal election, and the distribution of airtime was determined by a unique lottery. Instead, in each of the 15 states in which gubernatorial elections were held concurrently with presidential elections, parties' ads share were based on their vote share in both the previous federal and state elections, and time slots were assigned via a separate lottery.

that candidate by 0.55% for TV and by 0.62% for radio.[4] In line with previous findings (Gerber et al., 2007), we find that the effect of ads appears is rather short-lived: controlling for exposure to ads in the two weeks prior to the interview, ads aired in the preceding two weeks have no significant impact on voting intentions. Quite surprisingly, with regard to the evolution of the effect of ads over time, we find that ads aired earlier on in the campaign have a larger effect than ads aired later on, including in the final stretch of the campaign. We also examine whether ads influence voters by informing them about parties and candidates. To this end, we test whether exposure to ads is associated with better knowledge of candidates' campaign slogans - possibly the most basic and recurrent element of their political message - but find no evidence in this respect. Finally, using information on respondents' personal characteristics and previous voting behavior, we look at what segments of the voting population are more vulnerable to ads. In this regard, in contrast with some previous work, we find that people that are less educated and less politically informed tend to be less rather than more responsive to political ads. Furthermore, we find that a party's ads has larger effect on individuals that voted for that party in the past; this suggests ads are more effective at mobilizing party sympathisers than persuading others.

Our findings confirm that political ads are influential in shaping individual voting intentions. Furthermore, they qualify this result in several ways, providing new and rather nuanced insights on the relative impact of ads' informative vs. non-informative content. Most of our results are rather inconsistent with standard models of Bayesian updating; in particular, that ads have a short-lived effect, have a larger impact on more informed and sophisticated voters, and do not improve voters' knowledge of candidates' message seems at odds with the predictions of such models. That the effect of ads decreases over time is instead consistent with a theory of informative persuasion according to which ads should be especially effective in shaping voters' attitudes when their opinions are not fully-formed; yet, this result could also be rationalized by models of non-informative persuasion under the assumption that viewers are affected by ads fatigue. [5]

Taken together, the evidence presented here, though not conclusive, does not support the view that ads influence voters by conveying new information; rather, it suggests that other mechanisms of persuasion, cantered around ads? non-informative content, may be at work. These findings call for further rigorous empirical research on the channels through ads affect voters' opinion, and suggests some ways along which conventional models of informative persuasion may be extended.

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[4] The estimated effect does not seem to capture a spurious correlation between exposure to ads and respondent's general political leaning; in fact, we find no systematic relation between exposure to ads and party preferences in the 2006 presidential election which, naturally, should not be affected by ads in 2012.

[5] That Mexican voters may have suffered from ads fatigue during the 2012 campaign has been suggested by several commentators (Arellano et al. 2013). This hypothesis seems especially compelling in light of the elevated number of ads slots assigned to parties in the 2012 campaign, corresponding to about seven times those aired in the previous presidential campaign.

The remainder of the paper is organized as follows. Section 2 surveys previous empirical studies on the impact of political ads on voting, emphasizing their strengths and limitations. Section 3 provides some background information on Mexican political landscape and on the recent campaign reform, and describes the data used in our analysis. Section 4 illustrates our empirical strategy and describe our main results, and section 5 concludes.

2. RELATED LITERATURE

As mentioned above, understanding the effect of ads on voting intentions, and the channels through which this may operate, is a challenging task from both a theoretical and an empirical perspective. From the theoretical perspective, scholars have developed models and theories that can be grouped into two broad categories (see Della Vigna and Gentzkow, 2010 for a review of this literature). On one hand, some papers show that advertising can have an effect on behavior by providing information to voters about candidates' characteristics. On the other, some studies suggest that advertising has a persuasive effect, making individuals more likely to cast their vote for a specific candidate when exposed to her ads, even in contexts in which the ads have no informational content. Identifying which of the two channels prevails has important policy implications for campaign regulation. Empirical studies then, not only face the challenge of estimating the reduced-form effect of political advertising on voting outcomes, but also if such results are supportive of the informative or persuasive view.

These two sets of models deliver rather different predictions which, however, are hard to test empirically. For example, the informative view suggests that advertising should have a larger effects on voters with less precise prior beliefs about candidate quality. The persuasive view predicts that ads may have an impact on voters' behavior even in contexts in which ads contain no information about the candidates' quality. Identifying voters prior beliefs, or defining if the content of advertising is informative is a challenging task, and generally requires strong structural assumptions (when trying to estimate voters' priors) or subjective judgements (when evaluating if the ads have informational content). Nonetheless, indirect evidence may contribute to shed light on which of these models best fits the data.

A large stream of literature has investigated the effect of political advertisement on voting using different empirical approaches. Some studies, such as Ansolabehere and Iyengar (1996), Valentino et al. (2004) and Brader (2005), are based on evidence from laboratory experiments and document large and significant effects of TV ads have considerable effect on voters' choices. Ansolabehere and Iyengar (1996) find a large effect of ads on vote intentions, but do not attempt to identify the precise channels through which the ads affect voters. Brader (2005) finds support for the persuasive view, by experimentally showing that, by appealing different emotions, advertising can have

4

differing effects on voters' behavior. On the contrary, Valentino et al. (2004) presents evidence in support of the informational channel, as advertising seems to have larger effects on less informed individuals. Given the superior control that well-designed lab experiments can provide, these studies have strong internal validity; however, apart from the conflicting results, since they do not involve real-world electoral competitions, their external validity is rather limited.

A range of non-experimental studies have also looked at the impact of ads on voters' attitudes and electoral behavior, generally finding evidence of small effects, and little evidence disentangling the channels through which advertising is affecting voters' behavior. It is unclear to what extent these results might be driven by limitations of the research design related to the choice of the elections examined or to the nature of the instrumental variables used. For example, Gerber (1998) uses candidate wealth as an instrument in order to estimate the reduced for effect of campaign spending on voting outcomes. However, to the extent that a candidate's fortune is correlated with her vote-getting ability through channels other than campaign spending, these estimates may be biased. Levitt (1994) uses data from multiple U.S. congressional races and exploits differences between races involving the same two candidates to also identify reduced form effects of campaign spending on voting. Although fixing candidates' identity allows Levitt to control for any time-invariant candidate (or district) attributes, identification requires that any factor that could potentially correlate with both ad spending and popularity does not vary differently for the two candidates between two elections, a much more demanding assumption.

Huber and Arceneaux (2007) estimate the effect of political ads in the context of the 2000 U.S. presidential campaign by exploiting differences in exposure to ads between media markets (in non-swing states) that are respectively adjacent to and isolated from swing states. The authors find that, although ads do not appear to make viewers more informed about key campaign issues, they can alter their assessments of candidates' personal characteristics and, ultimately, their voting decisions. They interpret these findings as supportive of the persuasive view. A potential limitation of their empirical approach is that proximity to battleground states may be related to political preferences in ways other than through exposure to ads during the campaign, and that, hence, treatment and control groups may not be fully comparable. Larreguy et al. (2014) estimate the reduced form effects of advertising on voting outcomes in the same context as the one studied in this paper, comparing neighboring polling stations with varying TV and radio stations reception, finding relatively large effects. As in Huber and Arceneaux (2007), the extent to which political preferences may differ across polling stations with different radio and TV reception may question the validity of their findings. Da Silveira and De Mello (2011) examines the impact of political ads on voting in the context of Brazilian run-off gubernatorial elections between 1998 and 2006. Apart from not attempting to identify the specific channels through which ads may impact vote intentions, their empirical strategy is threatened by the fact that other electoral dynamics occurring between first and second round

may interfere with the identification of the effect of ads.[6] Martin (2012) investigates the relative importance of the informational and the persuasive channels. However, the study uses the price of advertising in different media markets as an instrument for advertising. The extent to which the price of advertising is correlated with their potential impact threatens the consistency of his estimates. Other studies have used randomized field experiments to examine the relation between ads and voting. In the largest of these experiments, and possibly the closest study to ours, Gerber et al. (2007) randomize the assignment across media markets of $2 million dollar worth of TV and radio ads for the incumbent candidate in the 2006 Texas gubernatorial campaign. Combining the information on the distribution of ads with data from daily electoral surveys, the authors find that ads have a positive but short-lived impact on candidate evaluations. The short-liveness of the impact of the ads is interpreted by the authors as evidence supporting the persuasive view.

Our analysis employ similar approaches to those in the existing literature, trying to test both if advertising has an impact on both intentions, and providing evidence that may contribute to identify if this effect is better explained by the informational or persuasive views. As explained later, we will not only be able to test for the impact of ads on vote intentions, but also if such effect is short-lived, if ads have an impact on the voters' knowledge of the candidate's positions, and if the effect is larger on individuals with more prior information about candidates' qualities. The next section describes in detail the context and the characteristics of the data that allow us to do so.

3. BACKGROUND AND DATA

In this section we provide some background information on the Mexican institutional and political context. Mexico is a multi-party competitive democracy with three major political parties disputing most of the positions at stake in local and federal elections: the Institutional Revolutionary Party (*Partido Revolucionario Institucional*, PRI), The National Action Party (*Partido Acción Nacional*, PAN), and the Party of the Democratic Revolution (*Partido de la Revolución Democrática*, PRD). With regard to the parties' ideological position, while PAN is right-to-center and PRD left-to-center PRI is generally considered as centrist. National elections - for the election of the president and the federal parliament - are held every six years and are organized by the Federal Electoral Institute (IFE). The last national elections, which our analysis focuses on, were held in 2012. State elections are held every three years and in some states are concurrent with federal elections; this was the case for 16 of Mexico's 32 states in 2012. Crucially for our analysis, while the organization of state electoral campaigns is the responsibility of state electoral institutes, the allocation of TV ads to candidates is managed by the IFE for both local and federal elections.

Following the highly contested presidential election of 2006, and the animated debate on the role

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[6] See Durante and Gutierrez (2014) for more details.

that money and the media had played in it, in 2007 the Mexican parliament adopted a comprehensive electoral reform which, among other things, completely changed the regulation of campaign advertising. The new legislation prevents party competing in any election (at the federal, state, or municipal level) from purchasing airtime on radio and TV directly from private broadcasters. Rather, the law requires broadcasters to devote 45 minutes of their airtime - evenly distributed between 6:00am and midnight - to "government programs" during the 90 days of the campaign. This time is divided in 30-second slots which the IFE assigns to all parties competing in the election. How time slots are divided among parties is determined as follows. To guarantee visibility to all political forces, including small and new ones, 30% of the slots is divided equally among all candidates. The remaining 70% of airtime is instead assigned to candidates in proportion to their parties' vote share in the previous election.[7][8] Hence, as displayed in Figure 1,[9] the number of time slots assigned to each party remained very much stable over the course of the campaign, with the PRI, the most prominent force in congress, enjoying a larger share of the ads, than the PAN and the PRD.

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[7] In states where only federal elections are held, airtime is assigned to candidates in proportion to their parties' vote share in the last federal congressional elections. In states where state elections are held concurrently, airtime is instead assigned to candidates in proportion to their parties' vote share in both the previous federal and state elections.

[8] When slots cannot be divided exactly among competing parties, the residual time is used for IFE's information campaign.

[9] The figure reports the distribution of time slots for the states in which only federal elections were held which was based on parties' vote share in the last congressional elections.

Figure 1: Number of daily ads assigned to the top three parties (federal election lottery)
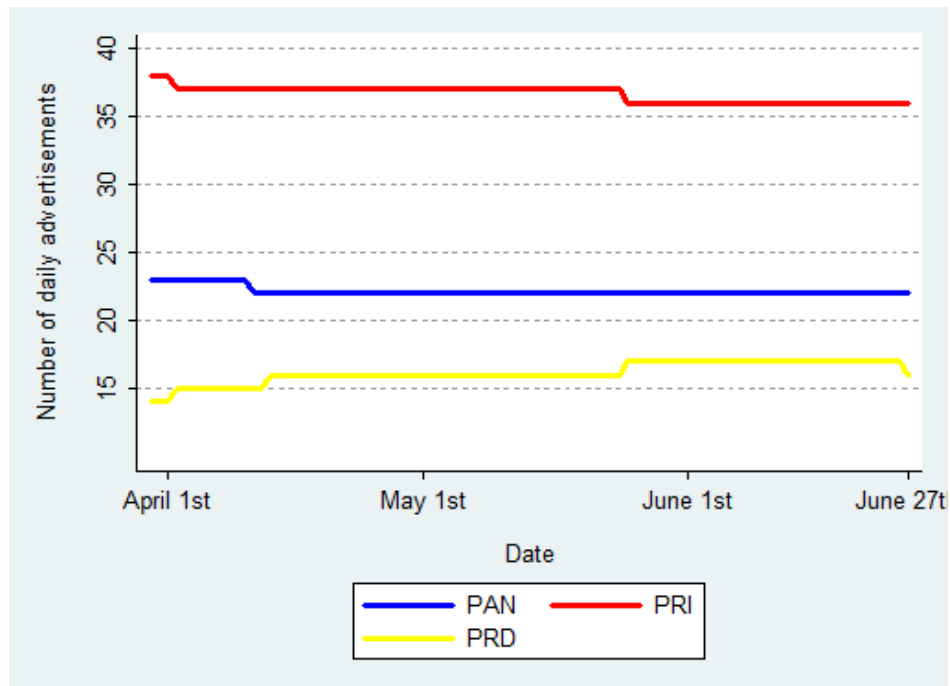
Our empirical strategy exploits another feature of Mexico campaign law, the fact that the *time of the day* at which each party's ads are aired is randomly determined. In particular, a lottery is used to determine how different time slots are allocated to party ads on the first day of the campaign, and ads slots are rolled over in subsequent days. It is important to note that, while the allocation of slots to parties for the states were only federal elections were held was determined by a unique national lottery, a separate lottery took place in each of the states in which state elections were held concurrently (which we report in Figure 2). To illustrate the outcome of a lottery, in Figure 3 we report the allocation of time slots to parties over the first fifteen campaign days for the time comprised between 6:00am and 9:00am, as determined by the federal election lottery.

8

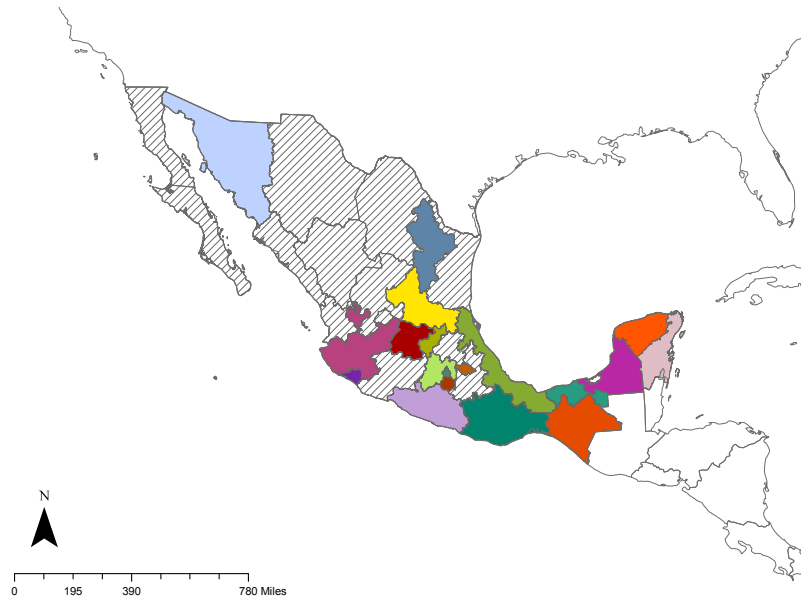Figure 2: States with different assignment lotteries

Figure 3: Random assignment of airtime slots

Since various states held local elections alongside the federal ones in 2012, one source of variation

we can exploit comes from differences in a party's vote share in previous local elections across different states, based on which state-level ads were assigned. However, the main source of exogenous variation in exposure to ads that we exploit in our analysis is within-state and derive from the fact that the audience for TV and radio varies substantially throughout the day, so that ads aired at different times will reach a very different number of viewers. For example, if in a given day a party's ads are assigned to be aired early in the morning or late at night, i.e. when audience is low, many fewer voters will watch them than if they are aired during prime time. To quantify this variation, we collect detailed data on the distribution of audience by time of the day on both radio and TV. This information is available from Nielsen/IBOPE and is based on the monitoring of a representative sample of the Mexican population.[10] Figure 4 summarizes the distribution of audience by time of the day for TV and radio and illustrates quite clearly the differences between the two media with radio's audience peaking in the morning and TV's in the late evening.

Figure 4: TV and Radio audience by time of the day (2011)
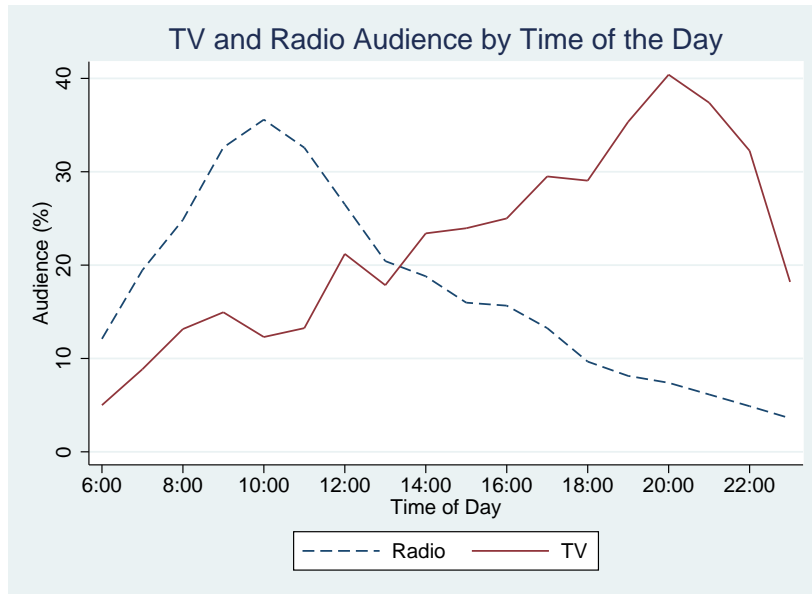
Combining the information on the day and time at which parties ads were aired in each state with that on the distribution of TV and radio audience, we construct a daily measure of audience-adjusted share of ads to each party's ads in each state. Formally, defining $A_{i,j,t,k}$ as an indicator variable for whether time slot k in region j in day t is assigned to candidate i, $TVaudience_k$ as the average audience in time slot k, and $\sum_L TVaudience_l$ as the total audience of all time slots assigned to

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[10] For purpose of robustness we also replicate our empirical analysis for radio using data from an additional source: INRA Investigación de Mercados, S.C.

candidates in one day, viewers' exposure to ads by candidate i in region j on day t, can be written as:

$$A_{i,j,t} = \sum_k w_k A_{i,j,t,k}$$

where $w_k = \frac{TVaudience_k}{\sum_L TVaudience_l}$ represents the relative audience of time slot k with respect to the sum of all slots.

Figure 5 summarizes the evolution of our measure for the top three candidates over the course of the campaign. Although, as depicted in Figure 1, the number of ads remains extremely stable throughout the campaign, the picture varies considerably when differences in viewership across times of the day are accounted for, with the PRI benefiting from greater exposure at the beginning of the campaign, the PAN in the middle, and the PRD towards the end.

Figure 5: Evolution of TV audience-adjusted ads share by party
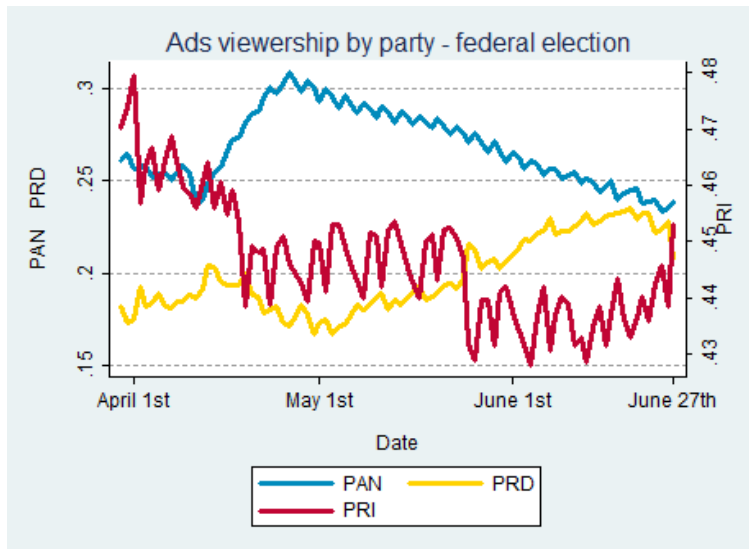
Furthermore, as mentioned above, additional variation comes from differences in the initial distribution of airtime across states where local elections were held and for which separate lotteries were implemented. To illustrate this aspect, Figure 6 reports the evolution of audience-adjusted ads share for the same party, the PRD, separately in different states.

Figure 6: PRD estimated audience per state
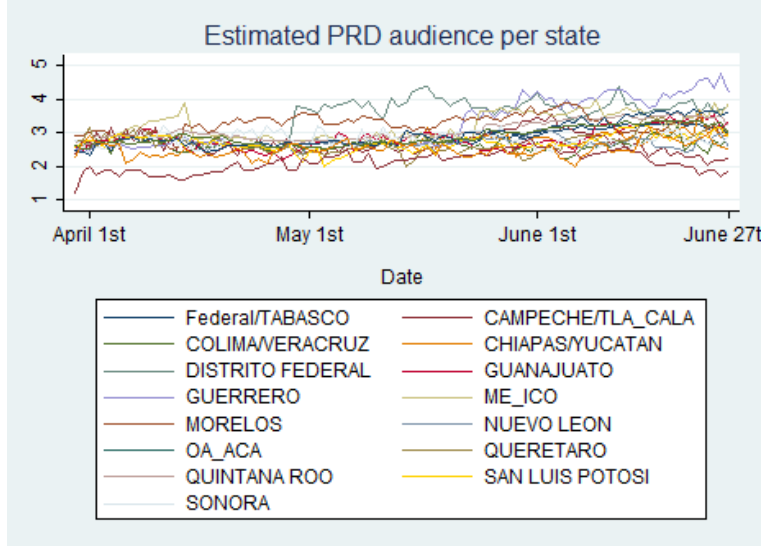
To investigate the effect of ads on voting intention, we we combine the information on political ads described above with data from the DEFOE 2012 Presidential Campaign Survey, a weekly rolling panel electoral survey conducted during the 2012 presidential campaign. The DEFOE data refer to a sample of 160 polling stations (*casillas*) distributed across 28 out of the 32 Mexican states representative at the national level. For each polling station a different set of respondents was selected each week, so that the longitudinal dimension refers to the polling station, not the individuals. The survey includes a range of questions on respondents' evaluation of presidential candidates, their political preferences, previous voting behavior, media consumption habits, as well as information on a range of individual socio-economic characteristics. In particular, to elicit what candidate they would vote for, respondents were prompted to participate in a simulated election and to cast a ballot in an actual urn.

4. EMPIRICAL STRATEGY AND RESULTS

We start by exploring whether respondents' voting intention is influenced by exposure to ads in the weeks prior to the interview. The following equation summarizes our econometric strategy:

$$S_{i,b,s,t} = \beta \sum_{T=1}^{\tau} Ad_{i,s,t-T} + \alpha_{i,b,s} + \gamma_{i,t} + \eta_i X_{b,s,t} + \varepsilon_{i,b,s,t} \tag{1}$$

$S_{i,b,s,t}$ denotes the share of respondents in polling station b in state s and period t reporting their intention to vote for candidate i. $Ad_{i,s,t}$ is the audience-weighted share of ads assigned to candidate

12

i in state s in day $t - T$, so that $\sum_{T=1}^{\tau} Ad_{i,s,t-T}$ indicates total exposure to ads during the τ days prior to day t. $\alpha_{i,b,s}$ and $\gamma_{i,t}$ represent respectively candidate $\times$ polling station and candidate $\times$ time period fixed effects. These two sets of fixed effects allow us to control for the (time-invariant) relative popularity of a candidate in a given place, and for any nation-wide shock to a candidate's popularity. Finally, $X_{b,s,t}$ represent average socio-demographic characteristics of the respondents in polling station b in state s at time t; these include gender, age, income, education, Internet access). In all regressions standard errors are clustered at the state level. [11]

In Table 1 we estimate this specification for TV (Table 1) pooling observations for all candidates together. In the first two columns we examine the effect of ads aired in the four weeks before, and in the last two that of ads aired in the two weeks before. As depicted in column 1, exposure to ads by a candidate in the month before has a positive and significant effect on the respondent's intention to vote for that candidate. The results remains largely unchanged in column 2 when, in addition to the two sets of baseline fixed effects, we also control for the interaction between candidate dummy and average socio-economic characteristics of respondents in a given polling station in a given week; this allow us to account for possible (time-varying) differences in candidate's popularity among different segments of the local population. With regard to the magnitude of the effect, our result indicate that a 1 percentage point change in ads share is associated to a 0.666% (0.545%) increase in voting intention. The results are quite similar, both in terms of magnitude and significance, in columns 3 and 4 where we focus on the ads aired in the two weeks before.

In Table 8 we look at the effect of radio ads. In this case our regressor of interest is the share of ads assigned to a candidate (which is the same as for TV) weighted by radio audience. All results are very similar to those for TV, both in terms of significance and magnitude (if anything slightly larger for radio when the full set of controls is included). Such similarity is particular interesting given the difference in the distribution of TV and radio audience over the course of the day (see Figure 4).

To rule out the possibility that the estimated effect may be capturing a spurious correlation between exposure to ads and respondent's general political leaning, we then examine the relation between exposure to ads and party preferences in the 2006 presidential election which, naturally, should not be affected by ads in 2012. The results, reported in appendix Tables A.1 and A.2, indicate no significant impact of exposure to a candidates' ads in 2012 on the probability of having voted for that candidate's party in 2006; this is reassuring of the fact that our estimate is in fact capturing the causal effect of ads on voting intentions.

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[11] It is important to note that, although data for individual respondents' are available, we decide to use the polling station as our unit of analysis since the main treatment (exposure to ads) is determined at that level. Hence for all variables we compute the average of all respondents in any given polling station at any given time. All results presented below remain unchanged when replicating the analysis using individual data (available upon request).

Table 1: Effect of TV Ads on Voting Intentions

Dependent Variable:	Share of Respondents Intending to Vote for Candidate			
Potential TV Audience (previous four weeks)	0.666 [0.247]**	0.545 [0.191]**		
Potential TV Audience (previous two weeks)			0.582 [0.243]**	0.525 [0.215]**
Candidate*Section Fixed Effects	Yes	Yes	Yes	Yes
Candidate*Week Fixed Effects	Yes	Yes	Yes	Yes
Candidate*Socio-economic variables		Yes		Yes
Observations	1200	1200	1200	1200
R-squared	0.620	0.630	0.620	0.630

Socio-economic controls include: fraction of respondents without high school, fraction of respondents earning less than 6,000 pesos a month, fraction of respondents who are female, fraction of respondent with access to the internet, and average age of respondents. Robust standard errors clustered at the state level in brackets * Significant at 10%; ** Significant at 5%; *** Significant at 1%.

Table 2: Effect of Radio Ads on Voting Intentions

Dependent Variable:	Share of Respondents Intending to Vote for Candidate			
Potential Radio Audience (previous four weeks)	0.572 [0.270]*	0.622 [0.266]**		
Potential Radio Audience (previous two weeks)			0.522 [0.234]**	0.590 [0.248]**
Candidate*Section Fixed Effects	Yes	Yes	Yes	Yes
Candidate*Week Fixed Effects	Yes	Yes	Yes	Yes
Candidate*Socio-economic variables	Yes	Yes	Yes	Yes
Observations	1200	1200	1200	1200
R-squared	0.620	0.630	0.620	0.630

Socio-economic controls include: fraction of respondents without high school, fraction of respondents earning less than 6,000 pesos a month, fraction of respondents who are female, fraction of respondent with access to the internet, and average age of respondents. Robust standard errors clustered at the state level in brackets * Significant at 10%; ** Significant at 5%; *** Significant at 1%.

The longitudinal dimension of our data allow us to explore another important but under-investigated question: how persistent is the effect of advertising. This aspect, interesting in itself, can also be informative with regard to the possible channel(s) through which the effect of ads may operate since, according to most theories centered around the informative value of ads, their effect should be rather long-lasting. To test this issue empirically we estimate the following variant of our baseline specification:

$$S_{i,b,s,t} = \beta_1 \sum_{T=1}^{\tau} Ad_{i,s,t-T} + \beta_2 \sum_{T=\tau+1}^{2\tau} Ad_{i,s,t-T} + \alpha_{i,b,s} + \gamma_{i,t} + \eta_i X_{b,s,t} + \varepsilon_{i,b,s,t} \tag{2}$$

Here β_1 and β_2 measure respectively the effect of the ads aired in the τ days before the interview, and in the τ days before then.

Table 3 reports the results for TV. In column 1 and 2 we replicate the results for ads aired respectively in the four and in the two weeks prior to the interview. In column 3 we test whether, conditional on ads aired in the two weeks prior to the interview, ads aired in the preceding two weeks have any effect on voting intention. The results suggest that the effect documented in column 2 is primarily driven by ads aired in the last two weeks (the magnitude of the coefficient is very similar to that in column 2), while ads in the preceding two weeks have virtually no impact on voting intention (coefficient very close to zero); though none of the two coefficient is, on its own, a test of joint significance confirm that they are jointly significantly different from zero. To further explore the persistence of the effect of ads, we then regress voting intention on the candidate's share of ads aired in the week prior to the interview both alone (column 4), and in a horse-race with ads aired in the preceding week (column 5). Once again, the results indicate that the effect of ads is short-lived: ads aired in the last week have a large and significant impact on voting intention (at the 10% level), and accounts for much of the overall effect of ads aired in the last two weeks (again the coefficient are jointly though not individually significant). Replicating the same analysis for radio (Table 4) we obtain results that are very similar to those found for TV and, in some cases, more significant.

These findings seems hard to reconcile with the predictions of standard models of persuasion in which ads influence viewers by informing viewers' about candidates' qualities and platforms. Indeed in these models, unless agents' memory is assumed to be (very) limited, the effect of new information on viewers' beliefs should not evaporate so quickly.

One way to shed further light on the informative value of ads is to explore whether exposure to ads is associated with better knowledge of candidates' political message. In particular, in Table 5 we test whether ads aired on TV and radio respectively in the four and two weeks prior to the interview

Table 3: Effect of TV Ads on Voting Intentions: Persistence

Dependent Variable:	Fraction of Respondents Intending to Vote for Candidate				
Potential TV Audience (previous four weeks)	0.525 [0.187]**				
Potential TV Audience (previous two weeks)		0.507 [0.213]**	0.491 [0.389]		
Potential TV Audience (two weeks prior to previous two)			0.028 [0.402]		
Potential TV Audience (previous week)				0.471 [0.258]*	0.393 [0.886]
Potential TV Audience (week prior to previous)					0.106 [0.948]
Candidate*Section Fixed Effects	Yes	Yes	Yes	Yes	Yes
Candidate*Week Fixed Effects	Yes	Yes	Yes	Yes	Yes
Candidate*Socio-economic variables	Yes	Yes	Yes	Yes	Yes
Observations	1200	1200	1200	1200	1200
R-squared	0.63	0.63	0.63	0.63	0.63

Socio-economic controls include: fraction of respondents without high school, fraction of respondents earning less than 6,000 pesos a month, fraction of respondents who are female, fraction of respondent with access to the internet, and average age of respondents. Robust standard errors clustered at the state level in brackets * Significant at 10%; ** Significant at 5%; *** Significant at 1%.

Table 4: Effect of Radio Ads on Voting Intentions: Persistence

Dependent Variable:	Fraction of Respondents Intending to Vote for Candidate				
Potential Radio Audience (previous four weeks)	0.630 [0.274]**				
Potential Radio Audience (previous two weeks)		0.601 [0.254]**	0.594 [0.329]*		
Potential Radio Audience (two weeks prior to previous two)			0.017 [0.405]		
Potential Radio Audience (previous week)				0.606 [0.284]**	0.597 [0.562]
Potential Radio Audience (week prior to previous)					0.011 [0.479]
Candidate*Section Fixed Effects	Yes	Yes	Yes	Yes	Yes
Candidate*Week Fixed Effects	Yes	Yes	Yes	Yes	Yes
Candidate*Socio-economic variables	Yes	Yes	Yes	Yes	Yes
Observations	1200	1200	1200	1200	1200
R-squared	0.63	0.63	0.63	0.63	0.63

Socio-economic controls include: fraction of respondents without high school, fraction of respondents earning less than 6,000 pesos a month, fraction of respondents who are female, fraction of respondent with access to the internet, and average age of respondents. Robust standard errors clustered at the state level in brackets * Significant at 10%; ** Significant at 5%; *** Significant at 1%.

had an effect on the likelihood that a respondent recalled candidates' campaign slogans - possibly the most basic and recurrent element of their political message. With regard to TV (columns 1 and 2), exposure to ads in the four and one week prior to the interview display a positive coefficient though in neither case this is far from significant. The point estimates are small (and actually negative) and insignificant for radio (columns 3 and 4). Hence, though limited to campaign slogans, our findings indicate that ads were not particularly effective at informing voters, and suggest that their persuasive effect may operate through other non-informative elements of the message.

Table 5: Effect of Ads on Voters' Information: Campaign Slogan

Dependent Variable:	Share of Respondents Recalling the Candidate's Slogan			
	TV		Radio	
Potential Audience (previous four weeks)	0.264 [0.191]		-0.031 [0.125]	
Potential Audience (previous week)		0.084 [0.170]		-0.053 [0.116]
Candidate*Section Fixed Effects	Yes	Yes	Yes	Yes
Candidate*Week Fixed Effects	Yes	Yes	Yes	Yes
Candidate*Socio-economic variables	Yes	Yes	Yes	Yes
Observations	1200	1200	1200	1200
R-squared	0.54	0.54	0.53	0.54

Socio-economic controls include: fraction of respondents without high school, fraction of respondents earning less than 6,000 pesos a month, fraction of respondents who are female, fraction of respondent with access to the internet, and average age of respondents. Robust standard errors clustered at the state level in brackets * Significant at 10%; ** Significant at 5%; *** Significant at 1%.

Another question that we explore is how the effect of ads evolves over the course of the campaign, i.e. whether ads aired early on in the campaign are more (less) effective than those aired in the last part of it. To test this aspect in the data empirically we estimate another variant of our baseline specification:

$$S_{i,b,s,t} = \beta_1 \sum_{T=1}^{\tau} Ad_{i,s,t-T} + \beta_2 \sum_{T=1}^{\tau} Ad_{i,s,t-T} * week + \alpha_{i,b,s} + \gamma_{i,t} + \eta_i X_{b,s,t} + \varepsilon_{i,b,s,t} \tag{3}$$

where *week* denotes the number of weeks of campaign elapsed at the time of the survey. Hence, β_1 captures the effect of ads at the beginning of the campaign and β_2 how that effect decreases

(increases) for every additional week in the campaign. Table 6 reports the results for TV. While In columns 1 and 3 we replicate the results presented in Table 1 respectively for ads aired in the four and two weeks before, in columns 2 and 4 we also include the interaction with the indicator *week*. When doing so, the coefficient on ads becomes much larger (though it looses significance) while the interaction term displays a negative and insignificant coefficient. This suggests that the impact of ads on voting intentions decreases as the campaign unfolds and, given the magnitude of the coefficients, it reaches zero after approximately ten weeks (precisely the number of weeks in our sample). Once again, we find consistent results for radio (Table 7) although the coefficients are generally smaller in magnitude and more significant.

These findings are open to different interpretations. On the one hand, they seem consistent with at theory of informative persuasion which would predict ads to be especially effective in shaping voters' attitudes in the early stage of the campaign, when their opinions about candidates are not fully-formed, and to become less influential as more voters make up their mind. On the other hand, they can also be rationalized by al models of non-informative persuasion under the assumption that viewers are affected by ads fatigue and, while receptive to (the non-informative content of) ads early on, they become less attentive and responsive later on.[12]

Another indirect way to investigate whether ads influence viewers through information is to look at what categories of individuals are more likely to be influenced by ads, especially with regard to differences in cognitive abilities and prior political information. In particular, we examine whether ads have a larger (smaller) effect on i) more educated people (who can be expected to be more informed about politics), ii) individuals that voted for the same party in the previous election (who can be expected to be more familiar with the party political platform). To this end we estimate the following variant of our baseline specification:

$$S_{i,b,s,t} = \beta_1 \sum_{T=1}^{\tau} Ad_{i,s,t-T} + \beta_2 \sum_{T=1}^{\tau} Ad_{i,s,t-T} * X_{i,b,s,t} + \alpha_{i,b,s} + \gamma_{i,t} + \eta_i X_{b,s,t} + \varepsilon_{i,b,s,t} \qquad (4)$$

where $X_{i,b,s,t}$ represents the average score for respondents in station s at time t with respect to either education (dummy for less than high school diploma) or previous vote (dummy for having voted for the same party in 2007). Hence β_2 captures how larger (smaller) is the effect of ads on the least educated or for previous party supporters.

Table 8 reports the results for both TV and radio with respect to education (columns 1 and 2) and previous vote (columns 2 and 4). The first set of results indicates, rather surprisingly, that individuals with higher levels of education are more vulnerable to the effect of ads while the effect;

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[12] The latter view, advanced by several Mexican commentators (Arellano et al. 2013), seems especially compelling in light of the elevated number of ads slots assigned to parties in the 2012 campaign, corresponding to about seven times those aired in the previous presidential campaign.

Table 6: Effect of TV Ads on Voting Intention: Evolution over the Course of the Campaign

Dependent Variable: Fraction of Respondents Intending to Vote for Candidate				
Potential TV Audience (previous four weeks)	0.525 [0.187]**	3.114 [1.830]		
Potential TV Audience (Previous four weeks)*Week of Campaign		-0.237 [0.162]		
Potential TV Audience (previous two weeks)			0.507 [0.213]**	1.955 [1.010]*
Potential TV Audience (Previous two weeks)*Week of Campaign				-0.144 [0.094]
Candidate*Section Fixed Effects	Yes	Yes	Yes	Yes
Candidate*Week Fixed Effects	Yes	Yes	Yes	Yes
Candidate*Socio-economic variables	Yes	Yes	Yes	Yes
Observations	1200	1200	1200	1200
R-squared	0.630	0.630	0.630	0.630

Socio-economic controls include: fraction of respondents without high school, fraction of respondents earning less than 6,000 pesos a month, fraction of respondents who are female, fraction of respondent with access to the internet, and average age of respondents. Robust standard errors clustered at the state level in brackets * Significant at 10%; ** Significant at 5%; *** Significant at 1%.

Table 7: Effect of Radio Ads on Voting Intention: Evolution over the Course of the Campaign

Dependent Variable: Fraction of Respondents Intending to Vote for Candidate				
Potential Radio Audience (previous four weeks)	0.63 [0.274]**	1.552 [0.727]**		
Potential Radio Audience (Previous four weeks)*Week of Campaign		-0.093 [0.067]		
Potential Radio Audience (previous two weeks)			0.601 [0.254]**	0.798 [0.740]
Potential Radio Audience (Previous two weeks)*Week of Campaign				-0.021 [0.067]
Candidate*Section Fixed Effects	Yes	Yes	Yes	Yes
Candidate*Week Fixed Effects	Yes	Yes	Yes	Yes
Candidate*Socio-economic variables	Yes	Yes	Yes	Yes
Observations	1200	1200	1200	1200
R-squared	0.630	0.630	0.630	0.630

Socio-economic controls include: fraction of respondents without high school, fraction of respondents earning less than 6,000 pesos a month, fraction of respondents who are female, fraction of respondent with access to the internet, and average age of respondents. Robust standard errors clustered at the state level in brackets * Significant at 10%; ** Significant at 5%; *** Significant at 1%.

in fact, for the least educated the positive coefficient on ads is counterbalanced by the large and negative coefficient on the interaction term. With regard to previous voting choices, our results indicates that ads only persuade individuals that voted for the party in the past, but have virtually no effect on others. To the extent that more educated people and previous party supporters are more informed about politics, in general, and about specific party's platform, in particular, this evidence seems inconsistent with the effect of ads operating through information, a thesis which would predict larger effects on individuals whose initial prior beliefs are less precise.

Table 8: Effect of TV and Radio Ads on Voting Intention: Differences by Education and Past Vote

Dependent Variable: Fraction of Respondents Intending to Vote for Candidate				
	TV	Radio	TV	Radio
Potential Audience (previous four weeks)	2.418 [0.522]***	1.964 [0.320]***	-0.013 [0.119]	0.114 [0.219]
Potential Audience (previous four weeks)* Fraction Low Education	-3.640 [1.297]**	-2.429 [0.663]***		
Potential Audience (previous four weeks)* Voted for Cadidate's Party in Past Election			1.338 [0.098]***	1.326 [0.091]***
Candidate*Section Fixed Effects	Yes	Yes	Yes	Yes
Candidate*Week Fixed Effects	Yes	Yes	Yes	Yes
Candidate*Socio-economic variables	Yes	Yes	Yes	Yes
Observations	1200	1200	1200	1200
R-squared	0.640	0.640	0.740	0.740

Socio-economic controls include: fraction of respondents without high school, fraction of respondents earning less than 6,000 pesos a month, fraction of respondents who are female, fraction of respondent with access to the internet, and average age of respondents. Robust standard errors clustered at the state level in brackets * Significant at 10%; ** Significant at 5%; *** Significant at 1%.

5. CONCLUSION

To what extent do political ads influence voting intentions? Do ads influence people because of the information they provide or because of the persuading power of their non-informative content? Despite a rather large body of literature on the effect of campaign spending and political advertising these questions remain largely unanswered and very scant evidence exists on the impact of ads in countries other than the US, particularly in consolidating democracies.

This research investigates these questions in the context of Mexico's 2012 presidential elections by exploiting exogenous variation in the time of the day at which ads by different parties were aired.

We combine data on the share of TV and radio ads assigned to each party in each of the 90 days of the campaign with data on TV and radio audience at different times of the day and longitudinal electoral survey data at the polling station level. This allow us to cleanly identify the effect of exposure to ads on voting intentions controlling for geographical differences in partisan preferences and for shocks to candidates' popularity at the national level. Furthermore, our empirical design and the longitudinal dimension of our data allow us to shed light on whether this effect can be attributed to ads improving voters' information or, rather, to the persuasive power of ads' non-informative content.

Our analyses delivers a set of rich and rather multifaceted results which indicate that: i) exposure to a candidate's political ads, both on TV and radio, have a positive large and significant impact on voters' self-reported intentions to vote for that candidate; ii) this effect is rather-short lived, evaporating two weeks after exposure; iii) the effect is stronger at the beginning of the campaign but tends to vanish as the campaign unfolds; iv) ads have no significant impact on voter's awareness of candidates' political message, namely of their campaign slogan; v) ads are especially effective at persuading individuals with higher level of education and those that had voted for the party in the past.

Taken together these findings suggest that campaign ads can be influential in shaping individual voting intentions, but that this effect may be due not so much to the information they convey but, rather, to the persuasive power of other non-informative elements of their message.

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Table A.1: TV Ads on Past Vote

Dependent Variable:	Fraction That Voted for Candidate's Party in Past Election			
Potential TV Audience (previous four weeks)	0.236	0.284	0.252	0.146
	[0.220]	[0.212]	[0.236]	[0.207]
Constant	0.405	0.755	0.353	0.054
	[0.128]***	[0.270]**	[0.066]***	[0.088]
Candidate*Section Fixed Effects	Yes	Yes	Yes	Yes
Candidate-Specific Quadratic Time Trend	Yes			
Candidate-Specific Cubic Time Trend		Yes		
Candidate*Week Fixed Effects			Yes	Yes
Candidate*Socio-economic variables				Yes
Observations	1200	1200	1200	1200
R-squared	0.49	0.49	0.5	0.53

Socio-economic controls include: fraction of respondents without high school, fraction of respondents earning less than 6,000 pesos a month, fraction of respondents who are female, fraction of respondent with access to the internet, and average age of respondents. Robust standard errors clustered at the state level in brackets * Significant at 10%; ** Significant at 5%; *** Significant at 1%.

Table A.2: Radio Advertising and Past Vote

Dependent Variable:	Fraction That Voted for Candidate's Party in Past Election			
Potential Radio Audience (previous four weeks)	0.164	0.147	0.121	0.183
	[0.306]	[0.295]	[0.322]	[0.313]
Constant	0.395	0.742	0.389	0.03
	[0.196]*	[0.269]**	[0.108]***	[0.155]
Candidate*Section Fixed Effects	Yes	Yes	Yes	Yes
Candidate-Specific Quadratic Time Trend	Yes			
Candidate-Specific Cubic Time Trend		Yes		
Candidate*Week Fixed Effects			Yes	Yes
Candidate*Socio-economic variables				Yes
Observations	1200	1200	1200	1200
R-squared	0.49	0.49	0.5	0.53

Socio-economic controls include: fraction of respondents without high school,
fraction of respondents earning less than 6,000 pesos a month, fraction of respondents who are female,
fraction of respondent with access to the internet, and average age of respondents.
Robust standard errors clustered at the state level in brackets
* Significant at 10%; ** Significant at 5%; *** Significant at 1%

Table A.3: Radio Advertising and Past Vote

Dependent Variable:	Fraction That Voted for Candidate's Party in Past Election			
Potential Radio Audience (previous two weeks)	0.23	0.18	0.172	0.239
	[0.266]	[0.256]	[0.277]	[0.274]
Constant	0.365	0.692	0.372	0.011
	[0.162]**	[0.316]**	[0.091]***	[0.132]
Candidate*Section Fixed Effects	Yes	Yes	Yes	Yes
Candidate-Specific Quadratic Time Trend	Yes			
Candidate-Specific Cubic Time Trend		Yes		
Candidate*Week Fixed Effects			Yes	Yes
Candidate*Socio-economic variables				Yes
Observations	1200	1200	1200	1200
R-squared	0.49	0.49	0.5	0.53

Socio-economic controls include: fraction of respondents without high school,
fraction of respondents earning less than 6,000 pesos a month, fraction of respondents who are female,
fraction of respondent with access to the internet, and average age of respondents.
Robust standard errors clustered at the state level in brackets
* Significant at 10%; ** Significant at 5%; *** Significant at 1%