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Abstract

This paper considers how electoral competition affects voters' turnout and candidate choice. We do so via an instrumental-variable (IV) bivariate probit with selection which *jointly* estimates both processes. Our analysis controls for individual and election characteristics, campaigning, and election day weather. We focus on the effects of negative advertising (tone) and overall spending (intensity) on several aspects of voter behavior, including abstentions. Our findings: tone increases turnout of Independents only, and can strengthen partisanship among non-voters. Campaign intensity matters more than tone. Overall, there is evidence that Democrats, Independents and Republicans have different propensities to react to campaigning, which do not follow a straightforward pattern. We also show that failure to consider turnout in voter choices leads to erroneous conclusions.

> "The act of voting requires the citizen to make not a single choice but two. He must choose between rival parties or candidates. He must also decide whether to vote at all." (Campbell et al., 1960, page 89.)

> "Partisanship is the single most important influence on political opinions and voting behavior." (Flanigan and Zingale, 1998, page 53.)

1 Introduction

During elections, citizens take two related choices: whether to vote or not, and if so for whom. Given information on voter preferences (e.g. polling), candidates may employ different stratagems to win votes. They may choose campaign themes that enfranchise the base, swing the undecided, or disenchant the opponent's supporters. As a result, tactics politicians employ may have effects on turnout and candidate choice that vary across groups of voters. Our goal is to investigate the extent to which this is true. Our interest is in understanding which voters are more likely to respond to political campaigning by either candidate, and how they respond (e.g. whether they are enfranchised, swung, or disenchanted).

To do so we need to allow potential correlation between turnout and candidate choice. To this end, we empirically model the voter's decision as a two-stage process: (i) turnout, and (ii) choice of the candidate. We perform an instrumental variable (IV) bivariate probit with sample selection on voter choices, taking into account demographics, election and candidate characteristics, campaigning, and weather variations. We focus on two indicators of campaign tactics and intensity: tone (percent negative statements by *each* candidate. [1]) and campaign spending.

An IV bivariate probit is appealing for two reasons: first we can empirically estimate and test the correlation coefficient. If it is not zero, turnout is correlated with voter choice, and its omission gives rise to selection bias. Second, it is possible to look at the effect of various covariates on *conditional* outcomes (e.g. the percentage who voted Democrat conditional upon turnout) and on *counterfactual* outcomes (e.g. the percentage who *would have* voted Democrat but stayed home on election day). This affords us a richer understanding of candidates' campaigns and voters' responses. Hence we consider this preferable to related approaches such as a multinomial probit or logit. [2]

We tackle two additional issues. First, candidates' tone and spending are potentially endogenous variables. We employ instrumental variables to

address this. Second, we determine the extent of selection bias by comparing our findings against a probit on voters' choice of candidate.

Our analysis is based upon calculating the distribution of marginal effects on each voter. [3] We find that:

1. Turnout and candidate choice are indeed correlated. Unobservable shocks that raise the turnout of a partisan voter also swing her in favor of the opposing candidate. This has two interpretations: news (scandals) that causes the voter to switch sides, or more subtly, non-voters optimally choosing abstention over the opposing party's candidate.

2. Generally, negative campaigning does not appear to be more effective than positive campaigning.

3. Tone increases the turnout of Independents only;

4. Tone does not swing voters towards any candidate, but can strengthen partisanship among non-voters.

5. Independents are the most responsive to campaigning, Republicans are the least.

6. Our results differ significantly from a probit of voter's choice of candidate, indicating that selection is an important issue.

This paper merges together two branches of literature that deal with the effect of tone on: (i) turnout [4] and (ii) voters' selection of candidates. [5] Our paper develops on these works in the following methodological and substantive respects: (i) the literature has tended to treat these two questions separately, and to our knowledge, ours is the first attempt at a joint estimation; [6] (ii) we also differ in that we use candidate tone and not aggregate tone. Whereas previous work implicitly takes the view that voters value the overall conduct of the campaign, in this paper we assume that voters are primarily interested in individual candidates' actions.

Recent decades have seen an increase in negative campaigning and decrease in voter turnout. This has raised concerns that negative campaigning might be a key contributor to an increasingly disenchanted electorate. Our results do not support this *demobilizing* view. Partisans are more likely to use abstention as a signal of dissatisfaction with their party's candidate, rather than as a response to "dirty politics." Contrary to previous work, we find that Independents may be mobilized by negative campaining. Our findings also show that overall, negative campaigning is not more effective at winning votes.

The remainder of the paper is organized as follows: section 2 describes the various sources of data, section 3 introduces the econometric model,

while section 4 contains our results. Section 5 compares the bivariate probit with a simple probit on citizens' choice of candidate. Last, section 6 offers some concluding remarks.

2 The data

We merge data from several different sources providing information on voters, candidates and weather conditions.

The data on voter characteristics comes from The American National Election Studies (2005) Cumulative Data Fle (ANES-CDF). We selected covariates reflecting individual voters' demographic characteristics and party affiliations, as well as their choices about turnout and the candidates, for the time period ranging from 1988 to 1998.

Our selected candidates' characteristics include campaign tone, projections of the competitiveness of the race, candidates' incumbency status, and campaign spending. Measures of campaign tone are from Franklin (1991) (for the period 1988-1990) and Lau and Pomper (2004) (for the period 1992-1998). These data account for the statements that either the candidate or his [7] spokesperson made during the last eight weeks of the campaign, as reported in the largest newspapers in the state where the election was

held (Franklin (1991)) or in all articles sampled from the online databases Nexis/Lexis and Dow Jones (Lau and Pomper (2004)). These statements were coded as either positive (about the candidate) or negative (about the opponent). For each candidate, tone is defined as the percentage of negative statements made. From Lau and Pomper (2004) we also gathered the Congressional Quarterly Spring and Fall projections about each race. Information about incumbency was gathered from Moore et al. (2001), while those about candidate spending were collected from the Federal Elections Commission (FEC) web-site. [8]

To address the effect of election day weather conditions on voter turnout, we use data from the US National Climatic Data Center (NCDC). [9] We obtained daily summary measures of precipitation, snow and maximum/minimum temperature at some 20,000 stations across the US on election day in each of the election years from 1988 to 1998. We also constructed moving averages (and hence election-day deviations from them) of each weather measure by averaging over the first 10 days of November, over the twenty preceding years. [10] In this way we capture large deviations of weather indicators from their norms, as we expect that extraordinary weather conditions may have caused changes in turnout decisions.

Since weather data is more meaningful with small geographical units, we

merged weather information with voter and race characteristics according to the county, which is the smallest geographical unit available in the ANES CDF. However this information was available only for the period 1988 to 1998, thus determining our sample period. [11]

Table 1 reports summary voter and candidate statistics that are used in the estimation.

[Table 1 about here.]

Voter characteristics include demographics such as age, gender, race, religious attendance, house ownership, marital status, urban location, education and occupation. With the exception of age, all are dummy variables which equal 1 if the condition implied by the variable name is satisfied. For example, "Religious" equals 1 if voters attend religious services weekly or almost weekly.

Reported average turnout is about 68 percent, which is well above the average turnout rates that are observed. This is in large part due to the well-known problem of turnout inflation in self-reported surveys. Nonetheless, these surveys provide the most useful source of micro-level data. Opinion on turnout misreporting is divided. Sigelman (1982) shows that misreporting may not seriously affect estimates of the turnout decisions, but Palfrey and Poole (1987) are more cautious, and show that candidates choices condi-

tional on turnout can be fairly well estimated, whereas problems may arise when looking at turnout only. Unfortunately, our sample offers little information about vote validation (only validating turnout in the years 1988 and 1990). [12] Observe also that in spite of turnout misreporting, Democrat share of the vote in the survey is 53 percent, which is not too far from the actual figure (about 49 percent).

The second panel of table 1 depicts voters' party affiliation as from the seven-point scale from the ANES. Dem3 (Rep3), Dem2 (Rep2) and Dem1 (Rep1) are respectively "strong Democrat (Republican)," "weak Democrat (Republican)" and "Independent leaning to Democrat (Republican)." The omitted category consists of Independents. About 50 percent of the sample identifies themselves as Democrats, while 40 percent identify themselves as Republican. Independents are around 10 percent.

Finally, the bottom panel reports summary statistics of candidates' characteristics. For each candidate, we show the number of terms as an incumbent, where zero stands for challenger. The variables labeled "Fall/Spring Favored Candidate" are dummy variables indicating whether the candidate polled higher in those polls, and are obtained by converting the seven-point scale of the Fall and Spring Congressional Quarterly assessment of the closeness of the race into a three-point scale. Total disbursements are campaign

disbursements reported to the Federal Elections Commission. Tone is fraction of one candidate's statements about the opponent over all his statements.

Table 2 reports weather averages over some 2500 counties in the USA for which the weather data was available.

[Table 2 about here.]

We consider three weather measures: precipitation, snowfall, and minimum temperature of the day. [13] Looking at the right panel, mean and standard deviation of our weather measures during the first 10 days of November are fairly constant. The left panel provides an idea of weather variation across the US on election day. As we can see, 1990, 1992 and 1998 appear to have particularly large variances (and means) in precipitation, 1990 and 1992 for snowfall.

3 The Empirical Method

In this section we present the bivariate probit model with selection. Let d_{i1} be a binary variable such that $d_{i1} = 1$ if individual i voted, and $d_{i2} = 1$ if she voted Democrat, and zero if she voted Republican. Define the indicator

function $1[A] = 1$ if A holds and 0 otherwise. The empirical model is as follows:

$$\begin{aligned} \text{Turnout} \quad &: \quad d_{i1}^* = w_{i1}'\alpha_1 + \varepsilon_{i1}, \quad d_{i1} = 1[d_{i1}^* > 0], \\ \text{Dem or Rep} \quad &: \quad d_{i2}^* = w_{i2}'\alpha_2 + \varepsilon_{i2}, \quad d_{i2} = 1[d_{i2}^* \geq 0], \end{aligned} \tag{1}$$

where the regressors w_{i1} and w_{i2} need not be identical. The data observed is the vector

$$(d_{i1},\ d_{i1}d_{i2},\ w_{i2}',\ w_{i2}')', i = 1, ..., N,\ \text{iid}.$$

Censoring occurs because d_{i2} is observed only when $d_{i1} = 1$. We will often omit the subscript i in the following. Let $\varepsilon \equiv (\varepsilon_1, \varepsilon_2)'$ denote the matrix of error terms. The conventional assumption is made:

$$\text{Normality of error} : \varepsilon \sim N(0, \Omega),\ \Omega \equiv \begin{bmatrix} 1 & \rho \\ \rho & 1 \end{bmatrix},\ \text{independently of } w,$$

We will estimate the parameters $(\alpha_1', \alpha_2', \rho)'$ with MLE using turnout and voting outcomes $(d_{i1}, d_{i1}d_{i2})$, along with the other covariates. This selection problem is similar to that found in Van De Ven and Van Praag (1981), Boyes et al. (1989), and Dubin and Rivers (1989). Meng and Schmidt (1985) also discuss MLE under this and other types of censoring in bivariate probit models.

3.1 Likelihood Function

Define $\psi(\varepsilon_1, \varepsilon_2, \rho)$ as the standard bivariate normal density function with correlation ρ, and let

$$\Psi\left(\varepsilon_1, \varepsilon_2, \rho\right) \equiv \int_{-\infty}^{\varepsilon_2} \int_{-\infty}^{\varepsilon_1} \psi(t_1, t_2, \rho) dt_1 dt_2.$$

denote the standard bivariate normal distribution. The log-likelihood function ($\ell\ell h$) is maximized over the parameters $(\alpha_1, \alpha_2, \rho)$ and consists of three terms corresponding to the three cases: $d_{i1} = 0$, $(d_{i1} = 1, d_{i2} = 0)$, and $(d_{i1} = 1, d_{i2} = 1)$. Specifically, letting $\Phi(\cdot)$ denote the c.d.f. of a standard normal distribution, we have that

$$\begin{aligned} \ell\ell h \quad = \quad & \sum_{i=1}^{N} (1 - d_{i1}) \cdot \ln \Phi\left(-w_{i1}' \alpha_1\right) \\ & + d_{i1} \left(1 - d_{i2}\right) \cdot \ln P\left(-w_{i1}' \alpha_1 < \varepsilon_{i1},\ \varepsilon_{i2} < -w_{i2}' \alpha_2\right) \\ & + d_{i1} d_{i2} \cdot \ln P\left(-w_{i1}' \alpha_1 < \varepsilon_{i1},\ \varepsilon_{i2} > -w_{i2}' \alpha_2\right). \end{aligned} \tag{2}$$

The first term represents the likelihood contribution of not voting, the second term represents the likelihood contribution of an individual voting Republican, and the third term represents the likelihood contribution of an

individual voting Democrat. Let

$$p_1 = \Phi\left(-w_1'\alpha_1\right) = \Pr\left(\text{didn't vote}\right)$$

$$p_2 = \Phi\left(-w_2'\alpha_2\right) = \Pr\left(\text{voted R or would have voted R if turned out.}\right)$$

$$p_3 = \Psi\left(-w_1'\alpha_1, -w_2'\alpha_2, \rho\right) = \Pr\left(\text{didn't vote and would have voted R if turned out}\right)$$

Then the probability of voting Republican is

$$\begin{aligned} P\left(-w_1'\alpha_1 < \varepsilon_1,\ \varepsilon_2 < -w_2'\alpha_2\right) &= P\left(\varepsilon_2 < -w_2'\alpha_2\right) - P\left(\varepsilon_1 < -w_1'\alpha_1, \varepsilon_2 < -w_2'\alpha_2\right) \\ &= p_2 - p_3; \end{aligned}$$

and the probability of voting Democrat is

$$\begin{aligned} P\left(-w_1'\alpha_1 < \varepsilon_1,\ \varepsilon_2 > -w_2'\alpha_2\right) &= 1 - P\left(\varepsilon_1 < -w_1'\alpha_1\right) - P\left(-w_1'\alpha_1 < \varepsilon_1,\ \varepsilon_2 < -w_2'\alpha_2\right) \\ &= 1 - p_1 - \left(p_2 - p_3\right). \end{aligned}$$

3.2 Predicting Turnout and Voter Choice

Let $\Psi_{jk}\left(w_1'\alpha_1, w_2'\alpha_2, \rho\right)$ denote the probability associated with the turnout choice j and candidate choice k. Thus for example, $\Psi_{11}(\cdot)$ is the probability of the event "voted Democrat." Suppressing arguments, the values of these

probabilities are given by:

$$\begin{aligned}
\Psi_{00} &= \Pr(d_1 = 0, d_2 = 0) = p_3 \\
\Psi_{01} &= \Pr(d_1 = 0, d_2 = 1) = p_1 - p_3 \\
\Psi_{10} &= \Pr(d_1 = 1, d_2 = 0) = p_2 - p_3; \\
\Psi_{11} &= \Pr(d_1 = 1, d_2 = 1) = 1 - p_1 - (p_2 - p_3).
\end{aligned}$$

Ultimately, candidates are interested in winning elections. We measure the Democrat share of the vote by the conditional probability

$$\Pr(d_2 = 1 | d_1 = 1) = \frac{\Pr(d_1 = 1, d_2 = 1)}{\Pr(d_1 = 1)} = \frac{\Psi_{11}}{1 - p_1}.$$

An interesting counterfactual that we examine is the candidate choice among non-voters. The proportion of non-voters who *would have* voted Democrat is

$$\Pr(d_2 = 1 | d_1 = 0) = \frac{\Pr(d_1 = 0, d_2 = 1)}{\Pr(d_1 = 0)} = \frac{\Psi_{01}}{p_1}.$$

3.3 Marginal Effects of Tone

We calculate the effect of negative campaigning on three events of interest: probability of turnout; probability of voting Democrat conditional on turning out; and probability of voting Democrat, conditional upon abstention. Let α_{1t_l} and α_{2t_l} be the coefficients of tone in equation (1), $l \in \{d, r\}$. The

corresponding value of tone is t_d or t_r. Then

$$\frac{\partial \Psi_{jk}}{\partial t_l} = \psi_{jk,1}\alpha_1 + \psi_{jk,2}\alpha_2$$

where $\psi_{jk,1}$ and $\psi_{jk,2}$ are the derivatives of Ψ_{jk} w.r.t. the 1st and 2nd arguments respectively.

The marginal effect of any variable w_1 on p_1 is

$$\frac{\partial p_1}{\partial w_1} = -\phi(\cdot)\alpha_1;$$

and the marginal effect of w_2 on p_2 is

$$\frac{\partial p_2}{\partial w_2} = -\phi(\cdot)\alpha_2;$$

and the marginal effect of a particular w_i on p_3 (if it appears in both equations) is

$$\frac{\partial p_3}{\partial w_i} = -\psi(\cdot,\cdot)(\alpha_1 + \alpha_2).$$

Therefore the marginal effect of tone on voting Democrat (conditional on turning out) is

$$\begin{aligned} \frac{\partial\left(\frac{\Psi_{11}}{1-p_1}\right)}{\partial t_l} &= -\frac{(1-p_1)\left(\frac{\partial p_2}{\partial t_l} - \frac{\partial p_3}{\partial t_l}\right) + (p_2 - p_3)\frac{\partial p_1}{\partial t_l}}{(1-p_1)^2} \\ &= \frac{(1-p_1)\left[\phi(\cdot)\alpha_2 - \psi(\cdot,\cdot)(\alpha_1+\alpha_2)\right] + (p_2-p_3)\phi(\cdot)\alpha_1}{(1-p_1)^2}. \end{aligned} \tag{3}$$

Similarly, the marginal effect of tone on the probability of voting Democrat

among those who stayed home on election day is

$$\begin{aligned}\frac{\partial\left(\frac{\Psi_{01}}{p_1}\right)}{\partial t_l} &= -\frac{p_1\frac{\partial p_3}{\partial t_l}-p_3\frac{\partial p_1}{\partial t_l}}{p_1^2} \\ &= \frac{p_1\psi\left(\cdot,\cdot\right)\left(\alpha_1+\alpha_2\right)-p_3\phi\left(\cdot\right)\alpha_1}{p_1^2}.\end{aligned}$$

4 Estimation

Before we report the results of our analysis, we discuss the IV procedure.

4.1 First Stage

Our measures of tone, t_d and t_r, and of campaign spending s_d and s_r, are potentially endogenous. Candidates may adjust their campaign strategies according to new information (news, polling data), and not taking this behavior into account may introduce biases which have unclear signs. If, for instance, a candidate behind in the polls is more likely to attack his opponent (perhaps if negative campaigning is more effective than its positive counterpart), this would bias coefficients downwards. If positive campaigning were more effective, the opposite would result. A similar problem arises with campaign spending: a weak incumbent is more likely to be matched with a strong and well-financed challenger, so that the impact of campaign spending on the probability of winning for the challenger will be overesti-

mated. A strong incumbent is more likely to face weak competition, and therefore may need less resources for campaigning. As a result, the impact of campaign spending on the incumbent's probability of winning may be underestimated.

There are two ways to address the endogeneity problem: via either a full-information or a limited-information maximum likelihood (FIML/LIML) approach. A FIML approach involves simulating from a multivariate normal distribution of order 6, which is numerically intensive and can be unstable. Therefore we opt for the more feasible two-stage LIML approach. In this case, the standard errors need to be computed according to an alternative procedure. The first stage is to estimate the following by seemingly unrelated regression (SUR).

$$t_d = X\beta_{t_d} + u_{t_d} \tag{4}$$

$$t_r = X\beta_{t_r} + u_{t_r} \tag{5}$$

$$s_d = X\beta_{s_d} + u_{s_d} \tag{6}$$

$$s_r = X\beta_{s_r} + u_{s_r} \tag{7}$$

where $(u_{t_d}, u_{t_r}, u_{s_d}, u_{s_r})$ follows $N(0, \Sigma)$. In this stage, suitable instruments would be variables that affect candidate strategy but not voter behavior. For spending, we mainly follow Gerber (1998) and Lau and Pomper (2004) by

including spring favored candidate, the log of voting age population in each state, the logs of candidates' starting campaign funds, and total spending in the last Senate race. [14] As for tone, using lagged tone would cost too many observations. Hence we follow an alternative approach: as tone may be linked to the amount raised in the election, we consider a dummy for the richer candidate, and the log of total spending by the same party's candidate in the previous two Senate elections (thus one race will be for the same seat). Unlike Lau and Pomper (2004) we do not include dummies for pollsters and campaign consultants as these choices are potentially endogenous to the type of campaign the candidate wants to run. Lastly, we include as controls the number of terms served by each candidate, and dummy variables for the year and state. Table 3 shows the results of this stage.

[Table 3 about here.]

The SUR achieves fairly high R-squared values: around 0.5 for the tone equations, and above 0.68 for the spending equations. Lagged spending in the two previous Senate races does a good job at predicting current spending, while Spring polling does a good job at predicting tone. Even in the weakest equation, Republican tone, we have at least two instruments significantly different from zero. The estimated correlation coefficient $corr(t_d, t_r) = 0.303$ coincides with previous findings that candidates tend to respond to attacks

with other attacks (Lau and Pomper (2001b)).

4.2 Second Stage

In the second stage we estimate the bivariate probit via MLE of equation (2) using the fitted measures of tone and spending obtained in the first stage. This will yield consistent estimates of α_1 and α_2.[15] Let $\beta = (\beta_{t_d}, \beta_{t_r}, \beta_{s_d}, \beta_{s_r})$, $\theta = (\alpha_1', \alpha_2', \rho)'$ and $Z = X \cup w_1 \cup w_2$. Following Newey (1984), we can write the two stage estimation as an M-estimation such that

$$\begin{aligned} g(X_i, \beta) &\equiv u_i \otimes X_i = (t_i - \beta' X_i) \otimes X_i,\ E\left[g(X_i, \beta)\right] = 0 \\ h(Z_i, \beta, \theta) &\equiv \frac{\partial \ell\ell h_i(\beta, \theta)}{\partial \theta},\ E[(Z_i, \beta, \theta)] = 0 \end{aligned}$$

The estimated asymptotic covariance matrix is given by the following formula

$$\begin{aligned} \mathbf{AVAR}(\widehat{\theta}) &= H_\theta^{-1} V_{hh} H_\theta^{-1\prime} + H_\theta^{-1} H_\beta \left[G_\beta^{-1} V_{gg} G_\beta^{-1\prime}\right] H_\beta' H_\theta^{-1\prime} \\ &\quad - H_\theta^{-1} \left[H_\beta G_\beta^{-1} V_{gh} + V_{hg} G_\beta^{-1\prime} H_\beta'\right] H_\theta^{-1\prime} \end{aligned}$$

where $H_\theta = \frac{1}{n} \sum_{i=1}^{n} \frac{\partial h(Z_i, \hat{\beta}, \hat{\theta})}{\partial \theta'}$, $H_\beta = \frac{1}{n} \sum_{i=1}^{n} \frac{\partial h(Z_i, \hat{\beta}, \hat{\theta})}{\partial vec(\beta')'}$, $G_\beta = \frac{1}{n} \sum_{i=1}^{n} \frac{\partial g(X_i, \widehat{\beta})}{\partial vec(\beta')'}$, $V_{gg} = \frac{1}{n} \sum_{i=1}^{n} g(X_i, \widehat{\beta}) g(X_i, \widehat{\beta})'$, $V_{gh} = \frac{1}{n} \sum_{i=1}^{n} g(X_i, \widehat{\beta}) h(Z_i, \widehat{\beta}, \widehat{\theta})'$, $V_{hg} = V_{gh}'$, and $V_{hh} = \frac{1}{n} \sum_{i=1}^{n} h(Z_i, \hat{\beta}, \hat{\theta}) \partial h(Z_i, \hat{\beta}, \hat{\theta})'$. All of these can be evaluated analytically or numerically. [16]

The second stage comprises two equations. The following covariates are common to both of them: voters' demographics such as age (and its square), gender, education, dummies for white voters, religious attendance, home ownership, marriage, urban residency status, unemployment, retirement, homemaker, students, the seven-point scale party identification, year dummies, and the fitted values of our endogenous variables tone (and its square) and campaign spending. The turnout equation additionally includes election day weather deviations from its historical mean, dummies for elections with an incumbent and Fall favored candidate. The voting equation also includes dummies for the Democrat and the Republican incumbents, and dummies for Democrat and Republican favored candidates in the Fall polls. Table 4 reports the estimates of the IV bivariate probit.

[Table 4 about here.]

Refer to the columns labeled "full sample." Most of the variables have a significant effect on turnout, whereas voters' choice of candidates is most affected by party affiliation, campaign tone and spending. As to be expected, stronger party affiliation is associated with higher turnout and higher likelihood of voting along party lines. Democrat tone has a convex effect, while Republican tone has a concave effect.

Since party affiliation has a strong effect on voter turnout and candidate

choice, and the estimated correlation coefficient between turnout and voting Democrat is not significantly different from zero, we may suspect that the estimate of the correlation coefficient reflects the aggregate behavior of two groups of opposing voters. This leads us to replicate our estimation by splitting our sample into three groups, according to the three-point scale party identification variable from ANES: Democrats (consisting of voters self-identified as *dem3* and *dem2*), Republicans (consisting of voters *rep3* and *rep2*), and Independents (consisting of *dem1*, *rep1* and the excluded category, *ind*). In doing so we obtain roughly balanced sample sizes. The results are still reported in table 4, and labeled "Democrat", "Independent" and "Republican" respectively. The estimates suggest that tone does not affect turnout but has differential effects on candidate choice. In particular, Republican tone affects Democrat voters' candidate choice, Democrat tone affects Independent voters' candidate choice, and Republican voters appear to be unresponsive to negative campaigning by either party. Likewise, there is some evidence that Republican spending reduces the Democrat share of the vote.

Finally observe that ρ is different across the three samples. In the Democrat and Republican samples they are opposite in sign and significantly different from zero while for Independents it is close to zero. A value of

-0.65 for Democrats and 0.78 for Republicans implies that any unobserved factors that make partisans turn out also induce them to vote across party lines. We can interpret this as news, possibly scandals about one candidate, which cause partisans to vote for the opposing candidate. There is another more subtle interpretation, illustrated in figure 1. The four quadrants on the $x - y$ plane represent four voter actions as indicated. Voters A, B, (Democrat) C and D (Republican) are hypothetical non-voters. The arrows pointing south-east (north-east) represent the direction of shocks ϵ to Democrats (Republicans). It is possible that a partisan has rationally chosen abstention. However a large enough shock to ϵ that induces her turnout, can result in her voting for the opposite candidate, as in the case of B and C. This suggests that abstention is used by partisans to signal their dissatisfaction with their own candidates.

[Figure 1 about here.]

Since the bivariate probit is a nonlinear model, care should be taken in interpreting these estimates. In particular, they do not reflect marginal effects of covariates. Since different voters will have different marginal effects, we find it is more useful to provide an idea of the distribution of the marginal effects. We do so by evaluating them for every voter in the sample, and then reporting the 20th, 50th and 80th percentiles. [17]

We thus turn to the analysis of marginal effects of several covariates of interest, focusing on the three voting outcomes, turnout, probability of voting Democrat conditional on turnout, and probability that a voter would have voted Democrat, conditional on abstention. These results are in tables 5, 6 and 7.

[Table 5 about here.]

Referring to table 5, we see that turnout among whites, males and religious voters is higher, with the exception of the Democrat sample, where the effects are the opposite of Independents and Republicans. Voters whose party identification is strongest are much more likely to turn out. These results are in line with previous findings on turnout.

Moving to our variables of interest, we see that Democrat and Republican tone generate inconclusive results (since the 20-80 quantile range contains zero in all samples) for partisan voters. However increases in tone raises Independents' propensity to vote. Spending by Democrat candidates increases Democrat turnout, but decreases Independent turnout. Spending by Republican candidates reduce both Democrat and Independent turnout.

Overall Republicans seem to be the least responsive to campaigning. Independents are the most responsive. In particular, Independents are more likely to stay home when the intensity of the campaign (as measured by

spending) increases. We interpret this fact as evidence that contested races (which tend to have higher campaign intensity) generate a convergence towards the median, which in turn can induce some Independents to rationally abstain.

Interestingly, different from much of the literature, our findings support a *limited mobilizing hypothesis*. The composition of the campaign matters for Independent turnout. Negative campaigning can mobilize Independents, although its effect on partisans is not clear.

We now turn to table 6 which reports the marginal effects on individuals' likelihood of voting Democrat conditional on turning out. Voters who are more strongly affiliated to their party are more likely to vote for their own candidate. White, male and religious Independent voters are less likely to vote Democrat.

[Table 6 about here.]

Turning to the variables of interest, we see again that tone generates inconclusive results on each category of voters, whereas spending affects the conditional probability of voting for the Democrat candidate. However even though the effect of tone is most dispersed among Independent voters, the Democrat candidate's tone is more apt to decrease his share of votes among Independent voters.

Moreover, spending by both candidates increases the probability of a favorable vote from the Independents, whereas the effect on partisans is different. Whenever either candidate increases his spending, Republican voters tend to vote for him, whereas Democrat voters tend to vote against him. If we look the effect of additional spending on partisans, the votes gained from one candidate's spending, roughly equals the votes lost by the opponent's spending. There are two related findings here. Firstly, the battleground is over Independent voters. Campaign intensity wins them over. We interpret this as further evidence that candidates are campaigning towards the median. Secondly, while campaign intensity matters for Independents, its composition does not. Whereas tone was important in mobilizing Independent turnout, here it does not prove to be more effective in swaying Independents towards any candidate.

Finally we consider in table 7 the marginal effects on the probability that a non-voter supported the Democrat candidate.[18]

[Table 7 about here.]

Here we are concerned with understanding which candidate would be more disadvantaged by abstentions when he increases campaign tone and intensity. The effects of Republican tone are inconclusive, and Independents who stay home are not responsive to either candidate's tone. It is interesting to

observe the effect of tone by the Democrat candidate. It increases the probability of getting a favorable vote by Democrat non-voters and a negative vote by Republican non-voters. Put another way, Democrat tone increases the share Democrat supporters among Democrat non-voters, and decreases the the share of Democrat supporters among Republican non-voters. Thus it appears that Democrat tone has a polarizing effect among abstentions.

The effects of campaign spending are clearer. As each candidate's campaign intensity increases, the probability of getting a favorable vote among those who stayed home increases.

In sum, our findings are in line with previous findings about turnout. But additionally, we find that overall, the intensity of the campaign (spending) matters more than the composition of the campaign (tone). To a large extent voters are willing to receive messages where the opponent is criticized or even accused, as much as messages where one candidate promotes himself.

Tone appears to have its greatest effect on the turnout of Independent voters. However, its influence on voters' choice is less clear. Spending leads to lower turnout by Independent voters. We also find that citizens prefer to stay home on election day rather than to vote for the opponent's candidate. Hence, abstention seems to be more of a sign of voters' unhappiness with their own candidate than their disenchantment with the political system.

Overall, Republican voters seem to be less responsive to campaigning, although the data does not give indications as to why this is so.

5 Probit Without Selection

Since the correlation coefficient ρ for the Democrat, Republican and Independent samples are different from each other, we may expect there to be some selection bias resulting from ignoring turnout. To investigate the extent of this bias, we compare our findings from the IV bivariate probit with those obtained from an IV probit regression on *votedem* alone. We continue to focus on marginal effects, and on the three sub-samples "Democrat", "Independent" and "Republican." Table 8 displays the marginal effects from the two estimation methods.[19]

[Table 8 about here.]

Consider Democrat tone first. Although we cannot be conclusive about the sign of the effects, in the case of the IV bivariate probit, the distribution of the effects of Democrat tone consistently lies to the left of the distribution implied by the IV probit. In other words, the IV probit overestimates the effect of Democrat tone on the Democrat share of the vote. This is because

the IV probit does not consider that there are some voters who chose to abstain instead of voting for the opposing candidate. Some of these candidates may be induced to switch sides as a response to increased tone.

The IV probit also implies that higher Republican tone increases votes for the Democrat candidate among Independents, but decreases votes for the Democrat candidate among Republican voters. The IV bivariate probit is not conclusive.

The evidence on the effects of campaign spending is stronger. In all three samples, the two methods yield opposite findings. According to the IV probit, increased spending by the Democrat candidate raises his votes among Democrat voters, but decreases his votes among Independent (the largest effect) and Republican voters (the effect of Republican spending on voters is similar, but of opposite sign). The predictions of the IV bivariate probit, in all cases, are the opposite. Spending by one candidate tends to increase his share of the vote among Independent voters and voters of the opposite party, but decreases the share of the vote from his own party. Therefore whereas the IV probit implies that campaign spending (by association, advertising) is targeted at raising votes among members of the candidate's own party, the IV bivariate probit implies that spending is targeted at changing the minds of Independents and members of the opponent's party.

In summary, the IV probit over-estimates the effect of Democrat tone, and can lead to erroneous conclusions about negative campaigning and candidate choice. In the case of candidate spending, the effects of campaign spending on turnout can overturn the IV probit results.

6 Conclusion

In this paper we estimated an IV bivariate probit with selection to examine the effects of negative campaigning by US Senate candidates on voting outcomes: turnout and the candidate voted for. Our results reflect the importance of accounting for the turnout decision. In particular, we find that: negative campaigning has a limited mobilizing effects that is confined to the turnout of Independents but not Democrats and Republican voters. We also find that the intensity of the campaign matters. (i) As spending increases, Independent turnout decreases; (ii) intense campaigns tend to focus on winning over Independents. Both findings suggest that there is campaigning towards the median.

We conclude that negative campaigning is not more effective than positive campaigning at winning votes. The distinct effects of negative campaigning appears to be confined to stimulating Independents' turnout. Par-

tisans who face an unappealing candidate of their own party prefer to stay home than vote for the opponent's party. These findings seem to suggest that when voters stay home, it is more a signal of dissatisfaction with (as is the case with partisans) or indifference towards (for the Independents) candidates than with the political system as a whole.

Given that abstention is a rational response from voters rather than a random occurrence, it follows naturally that the omission of turnout choice in voters' selection of candidates can lead to erroneous conclusions.

Our results underscore the strategic aspects of electoral competition in two ways. Firstly, candidates can (and often do) use electoral strategies to influence voters' turnout *and* candidate choices to win an election. Second, candidates' electoral strategies should be understood as a repeated game between candidates. Understanding the ways in which these strategies work, and the dynamic nature of candidates' interactions are fruitful directions of research.

Notes

[1]There is a variety of related definitions of tone in the literature. We follow Lau and Pomper (2001a)

[2]We also avoid potential independence-of-irrelevant-alternatives (IIA) issues associated with logits.

[3] (Cameron and Trivedi, 2005, page 122-3) suggest that this is more informative than than presenting marginal effects evaluated at the mean.

[4]The effects of *aggregate* tone (measured as the fraction of *both* candidates' messages that criticize their opponent) on turnout have been intensively studied under a variety of settings, with different content analyses of the campaigns. Ansolabehere et al. (1994), Ansolabehere and Iyengar (1995), and Ansolabehere et al. (1999) find evidence for the *demobilizing hypothesis* (the more negative the campaign, the lower the turnout). Freedman and Goldstein (1999), Lau and Pomper (2001a), and Goldstein and Freedman (2002) find evidence for a *mobilizing hypothesis*, while Finkel and Geer (1998), Wattenberg and Brians (1999), and Brooks (2006) find evidence for the *neutral hypothesis*. Kahn and Kenney (1999) find that the content of the advertising matters: turnout increases when advertising is informative, while it decreases with mudslinging. Similarly, Freedman and Lawton (2000) find that turnout decreases only when candidates engage in unfair charges and responses.

[5] Lau et al. (1999) offer a meta-analysis of the literature and find that results are inconclusive: negative political advertising does not seem to work better than its positive counterpart. Lau and Pomper (2002) estimate a probit model of voting for the incumbent

Senator, and find some possible effects of negative advertising on electoral outcomes. Subsequently, Lau and Pomper (2004) find also that candidate tone does not affect the choice of Independent voters.

[6] Palfrey and Poole (1987) use a conditional logit to model turnout and candidate choice. Their methodology is similar even though their question is different.

[7]In this paper we will use the convention that voters are female and candidates are male.

[8] http://www.fec.gov/.

[9]http://www.ncdc.noaa.gov/oa/ncdc.html.

[10]For example, for 1988, the weather measures of November 1 to 10 in each of the years from 1968 to 1988 are used to obtain the average. In 1990, the years 1970 to 1990 are used, and so on.

[11]The next smallest geographical unit available is the congressional district, which we deem too large. There are 20,000 weather stations in over 3000 counties compared with 435 congressional districts. We were able to successfully match more than 90 percent of voters in the sample.

[12]We verified that there were no significant differences in 1988 and 1990 summary statistics by self-reported turnout and validated turnout. These are available upon request.

[13]One may argue that maximum temperature may be a better indicator of weather conditions as it is more likely to observed during the opening of polling stations (see Knack (1994)). We performed the same analysis using maximum temperature and the diurnal

temperature range. The results were basically unchanged, with minimum temperature having the two advantages of being easier to interpret, and having slightly better results.

[14]Levitt (1994) alternatively instruments campaign spending by focusing on Congressional races where the same two candidates face each other in consecutive races. While this may be common for House elections, it is an unlikely scenario in Senate elections.

[15]As with the IV probit, the estimates are identifiable only up to a normalization.

[16]We are very grateful to Kyoo-il Kim for his generous help in deriving the asymptotic covariance matrix.

[17]Many software packages report marginal effects at the mean which measures the effect on the voter with *average characteristics*. We have instead opted for the *average effect* on all voters which we consider more informative.

[18]This is also the negative of the marginal effect on having a Republican vote among nonvoters.

[19]Estimates of the IV probit are available from the authors upon request.

References

Ansolabehere, S. and S. Iyengar (1995). *Going Negative : How Political Advertisements Shrink and Polarize the Electorate*. NEw york: Free Press.

Ansolabehere, S., S. Iyengar, and A. Simon (1999). Replicating experiments using aggregate and survey data: The case of negative advertising and turnout. *American Political Science Review 93*(4), 901–909.

Ansolabehere, S., S. Iyengar, A. Simon, and N. Valentino (1994). Does attack advertising demobilize the electorate? *American Political Science Review 88*(4), 829–838.

Boyes, W. J., D. L. Hoffman, and S. A. Low (1989). An econometric analysis of the bank credit scoring problem. *Journal of Econometrics 40*, 3–14.

Brooks, D. J. (2006). The resilient voter: Moving toward closure in the debate over negative campaigning and turnout. *The Journal of Politics 68*(3), 684–696.

Cameron, A. C. and P. K. Trivedi (2005). *Microeconometrics: Methods and Applications*. Cambridge University Press.

Campbell, A., P. E. Converse, W. E. Miller, and D. E. Stokes (1960). *The American Voter Unabridged Edition*. The University of Chicago Press.

Dubin, J. A. and D. Rivers (1989). Selection bias in linear regression. *Sociological Methods and Research 18*, 360–390.

Finkel, S. E. and J. G. Geer (1998). A spot check: Casting doubt on the demobilizing effect of attack advertising. *American Journal of Political Science 42*(2), 573–595.

Flanigan, W. H. and N. H. Zingale (1998). *Political Behavior of the American Electorate* (9 ed.). CQ Press.

Franklin, C. H. (1991). Eschewing obfuscation? campaings and the perception of U.S. Senate incumbents. *American Political Science Review 85*, 1193–1214.

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

Freedman, P. and L. D. Lawton (2000). Campaign advertising, perceived fairness, and voter turnout. Prepared for presentation at the 2000 Annual Meeting of the Midwest Political Science Association. Chicago, April 27-30.

Gerber, A. (1998). Estimating the effects of campaign spending on sen-

ate election outcomes using instrumental variables. *American Political Science Review 92*(2), 401–411.

Goldstein, K. and P. Freedman (2002, August). Campaign advertising and voter turnout: New evidence for a stimulation effect. *The Journal of Politics 64*(3), 721–740.

Kahn, K. F. and P. J. Kenney (1999). Do negative campaigns mobilize or suppress turnout? clarifying the relationship between negativity and participation. *American Political Science Review 93*(4), 877–889.

Knack, S. (1994). Does rain help the republicans? theory and evidence on turnout and the vote. *Public Choice 79*(1–2), 187–209.

Lau, D., L. Sigelman, C. Heldman, and P. Babbitt (1999). The effects of negative political advertisements: A meta-analytic assessment. *American Political Science Review 93*(4), 851–875.

Lau, R. R. and G. M. Pomper (2001a). Effects of negative campaigning on turnout in U.S. Senate elections, 1988-1998. *The Journal of Politics 63*(3), 804–819.

Lau, R. R. and G. M. Pomper (2001b). Negative campaigning by U.S. Senate candidates. *Party Politics 7*(1), 69–87.

Lau, R. R. and G. M. Pomper (2002). Effectiveness of negative campaigning in U.S. Senate elections. *American Journal of Political Science 46*(1), 47–66.

Lau, R. R. and G. M. Pomper (2004). *Negative Campaigning: An Analysis of U.S. Senate Elections*. Rowman & Littlefield Publishers.

Levitt, S. D. (1994, aug). Using repeat challengers to estimate the effect of campaign spending on election outcomes in the u.s. house. *The Journal of Political Economy 102*(4), 777–798.

Meng, C.-L. and P. Schmidt (1985, February). On the cost of partial observability in the bivariate probit model. *International Economic Review 26*(1), 71–85.

Moore, J. L., J. P. Preimesberger, and D. R. Tarr (2001). *Guide to U.S. Elections* (fourth ed.). Washington, D.C.: CQ Press.

Newey, W. K. (1984). A methods of moments interpretation of sequential estimators. *Economics Letters 14*, 201–206.

Palfrey, T. R. and K. T. Poole (1987, aug). The relationship between information, ideology, and voting behavior. *American Journal of Political Science 31*(3), 511–530.

Sigelman, L. (1982, feb). The nonvoting voter in voting research. *American Journal of Political Science 26*(1), 47–56.

The American National Election Studies (2005). The 1948-2004 ANES cumulative data file [dataset]. Stanford University and the University of Michigan [producers and distributors]

Van De Ven, W. P. M. M. and B. M. S. Van Praag (1981). The demand for deductibles in private health insurance: A probit model with sample selection. *Journal of Econometrics 17*, 229–252.

Wattenberg, M. P. and C. L. Brians (1999). Negative campaign advertising: Demobilizer or mobilizer? *American Political Science Review 93*(4), 891–899.

Figure 1: Voter Responses to Shocks.

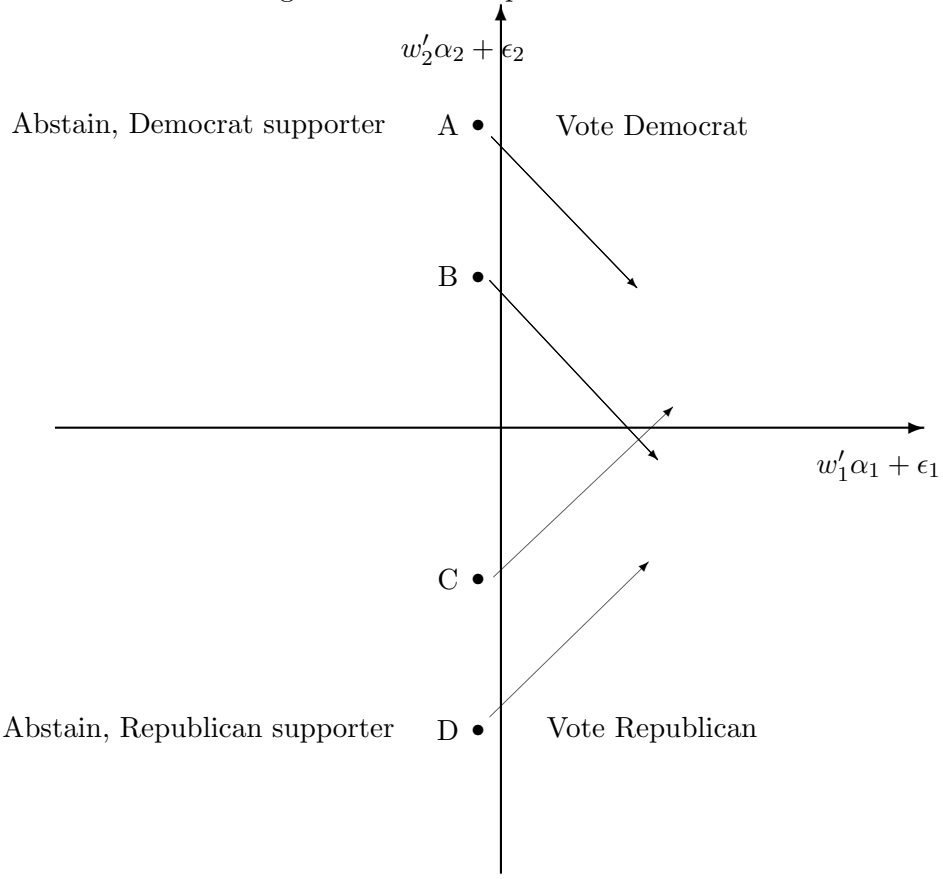

Table 1: Voter Demographics and Candidate Characteristics.

	mean	s.e.
Individual Demographic Characteristics.		
vote Dem (voted=1)	0.531	0.499
Voted	0.698	0.459
Age	47	17
Male	0.458	0.498
White	0.784	0.412
Religious	0.390	0.488
Ownhome	0.681	0.466
Married	0.554	0.497
Central	0.279	0.449
Suburb	0.455	0.498
Rural	0.265	0.442
Highsch	0.431	0.495
Somecoll	0.252	0.434
Collmore	0.256	0.437
Party Affliation		
Dem3	0.183	0.387
Dem2	0.191	0.393
Dem1	0.129	0.335
Rep1	0.118	0.322
Rep2	0.146	0.353
Rep3	0.137	0.343
Candidate Characteristics		
Democrat		
# terms incumbent	0.891	1.401
Fall favored candidate	0.181	0.386
Spring favored candidate	0.326	0.470
Total disbursements ($m)	2.637	2.377
Tone	0.348	0.181
Republican		
# terms incumbent	0.793	1.369
Fall favored candidate	0.181	0.386
Spring favored candidate	0.280	0.450
Total disbursements ($m)	2.820	3.037
Tone	0.388	0.205

Table 2: Precipitation, Snow and Minimum Temperature.

	Election Day			Mean Nov 1 to 10		
	PRCP	SNOW	TMIN	PRCP	SNOW	TMIN
year	(inch)	(inch)	(farenheit)	(inch)	(inch)	(farenheit)
1988	3.3	0.4	35.9	9.5	0.3	38.1
	(8.0)	(2.8)	(9.8)	(6.1)	(0.7)	(8.3)
1990	11.4	1.9	32.6	9.6	0.4	37.8
	(21.4)	(9.0)	(10.6)	(6.1)	(0.8)	(8.5)
1992	20.9	1.9	38.5	10.1	0.5	37.2
	(34.6)	(7.5)	(11.1)	(6.6)	(1.1)	(8.7)
1994	1.3	0.2	40.4	9.7	0.4	37.3
	(6.2)	(2.2)	(10.7)	(6.3)	(0.9)	(8.6)
1996	3.9	0.4	36.8	10	0.5	36.2
	(11.5)	(3.1)	(10.0)	(6.5)	(0.9)	(8.5)
1998	12.8	0.6	39.5	10.1	0.5	36.3
	(24.4)	(3.9)	(10.5)	(6.3)	(1.0)	(8.5)
Total	8.9	0.9	37.3	9.8	0.4	37.1
	(21.5)	(5.4)	(10.8)	(6.3)	(0.9)	(8.5)

*Std. err in parentheses.

Table 3: First-stage Regressions on Tone and Spending.

	D tone		R tone		D Spending		R Spending	
	coef.	std.err.	coef.	std.err.	coef.	std.err.	coef.	std.err.
D favored	-0.150	0.033	0.005	0.036	-0.290	0.233	-0.847	0.235
R favored	-0.095	0.037	-0.135	0.041	-1.523	0.265	-0.284	0.267
D rich	0.047	0.076	0.072	0.084	0.324	0.542	-0.412	0.547
R rich	0.189	0.067	0.014	0.074	-0.625	0.474	-0.843	0.478
D rich last election	0.040	0.079	0.014	0.087	0.528	0.562	0.440	0.567
R rich last election	0.003	0.076	0.147	0.084	-1.288	0.538	-0.523	0.543
D rich 6 yrs ago	-0.050	0.078	-0.035	0.086	0.005	0.555	0.074	0.560
R rich 6 yrs ago	-0.124	0.079	-0.030	0.087	-1.054	0.561	-0.605	0.566
ln(D starting cash)	0.001	0.006	0.001	0.006	-0.008	0.040	-0.060	0.041
ln(R starting cash)	-0.001	0.005	0.001	0.005	0.088	0.034	0.086	0.035
ln(D starting cash last elec)	0.001	0.006	0.007	0.006	-0.002	0.040	-0.085	0.041
ln(R starting cash last elec)	0.004	0.006	-0.012	0.007	0.093	0.044	0.032	0.044
ln(D starting cash 6 yrs ago)	0.007	0.006	-0.001	0.006	-0.005	0.041	-0.034	0.041
ln(R starting cash 6 yrs ago)	0.015	0.007	-0.001	0.007	0.093	0.048	0.040	0.048
ln(D spending last elec)	-0.003	0.008	-0.004	0.008	-0.131	0.054	0.078	0.055
ln(R spending last elec)	-0.011	0.014	-0.014	0.016	-0.020	0.102	-0.306	0.103
ln(D spending 6 yrs ago)	-0.005	0.007	0.001	0.008	0.058	0.050	-0.003	0.050
ln(R spending 6 yrs ago)	-0.027	0.015	-0.020	0.016	-0.059	0.104	0.029	0.105
D # terms incumbent	0.020	0.014	0.039	0.015	0.037	0.096	0.299	0.097
R # terms incumbent	0.006	0.015	0.001	0.016	-0.422	0.106	-0.014	0.107
ln(voting age pop)	-0.443	0.318	-0.857	0.350	1.845	2.253	2.347	2.274
Constant	7.372	4.758	13.565	5.229	-11.693	33.700	-16.930	34.006

Table 4: IV bivariate probit.

	Full Sample				Democrat				Independent				Republican			
	Votedem		Voted		Votedem		Voted		Votedem		Voted		Votedem		Voted	
	Coef.	s.e.	Coef.	s.e.	Coef.	s.e.	Coef.	s.e.	Coef.	s.e.	Coef.	s.e.	Coef.	s.e.	Coef.	s.e.
D tone	-3.273	1.468	0.635	1.182	-2.513	3.678	2.828	2.663	-5.294	2.428	0.344	1.825	-1.860	3.193	-2.307	2.670
D tone2	4.757	1.923	-0.034	1.582	4.077	4.997	-3.706	3.667	6.460	3.167	0.878	2.443	2.591	4.429	4.104	3.581
R tone	3.030	1.271	1.466	1.106	6.566	2.216	0.995	2.171	2.302	2.252	0.997	1.768	-1.450	2.875	3.105	2.433
R tone2	-3.109	1.572	-1.208	1.320	-7.359	2.733	-0.492	2.531	-2.494	2.747	-0.277	2.107	1.776	3.514	-3.937	2.919
l(D Spend)	0.101	0.058	-0.044	0.041	0.144	0.099	-0.047	0.071	0.055	0.102	-0.067	0.070	0.121	0.106	-0.003	0.083
l(R Spend)	-0.151	0.056	-0.015	0.039	-0.222	0.104	0.011	0.067	-0.096	0.097	-0.032	0.063	-0.114	0.101	-0.001	0.086
d(PRCP)			-0.023	0.020			-0.045	0.032			-0.028	0.033			0.028	0.049
d(PRCP2)			0.001	0.002			0.002	0.002			0.004	0.003			-0.005	0.005
d(SNOW)			-0.144	0.210			-0.627	0.429			-0.082	0.298			-0.087	0.551
d(SNOW2)			0.083	0.077			0.443	0.234			0.017	0.106			0.271	0.441
d(TMIN)			0.054	0.045			0.049	0.070			0.105	0.081			-0.046	0.107
d(TMIN2)			-0.162	0.048			-0.074	0.075			-0.162	0.000			-0.241	0.115
Age	0.013	0.011	0.048	0.008	-0.031	0.018	0.046	0.012	0.011	0.019	0.026	0.013	0.038	0.018	0.054	0.016
Agesq	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Male	-0.058	0.055	0.095	0.045	-0.172	0.091	0.051	0.075	-0.059	0.095	0.115	0.074	0.046	0.099	0.170	0.094
White	-0.135	0.083	0.208	0.058	-0.272	0.113	0.204	0.085	-0.221	0.138	0.135	0.096	0.139	0.200	0.493	0.151
Religious	-0.188	0.065	0.365	0.048	-0.221	0.095	0.346	0.079	-0.302	0.116	0.359	0.082	-0.173	0.100	0.413	0.098
Own home	-0.034	0.075	0.329	0.050	-0.300	0.113	0.329	0.082	0.034	0.141	0.386	0.082	0.077	0.124	0.276	0.105
Married	-0.042	0.061	0.164	0.048	0.057	0.097	0.140	0.078	-0.145	0.104	0.112	0.079	-0.138	0.113	0.297	0.102
Central	0.084	0.081	0.182	0.065	-0.119	0.131	0.225	0.105	0.097	0.141	0.157	0.110	0.288	0.166	0.084	0.145
Suburb	0.028	0.071	0.138	0.058	-0.185	0.124	0.083	0.099	0.018	0.121	0.112	0.095	0.321	0.131	0.232	0.119
Highsch	-0.022	0.156	0.568	0.095	-0.538	0.233	0.296	0.134	0.427	0.313	0.904	0.180	0.266	0.324	0.865	0.230
Somecoll	-0.012	0.180	0.973	0.103	-0.680	0.245	0.594	0.150	0.387	0.369	1.350	0.192	0.351	0.332	1.343	0.243
Collmore	0.084	0.192	1.288	0.107	-0.458	0.260	1.199	0.168	0.504	0.395	1.635	0.195	0.110	0.333	1.418	0.244
Dem3	1.297	0.124	0.983	0.089	0.228	0.116	0.689	0.075								
Dem2	0.799	0.108	0.299	0.081												
Dem1	0.711	0.115	0.330	0.088					0.678	0.129	0.330	0.090				
Rep1	-0.606	0.125	0.287	0.091					-0.673	0.134	0.292	0.094				
Rep2	-0.577	0.124	0.451	0.088												
Rep3	-1.231	0.151	1.022	0.100									-0.591	0.105	0.643	0.099
D incumbent	0.255	0.085			0.216	0.141			0.251	0.149			0.330	0.154		
R incumbent	-0.076	0.105			-0.104	0.182			0.056	0.182			-0.174	0.201		
D favored	0.131	0.102			0.019	0.189			0.192	0.179			0.113	0.173		
R favored	0.000	0.121			0.221	0.199			-0.261	0.214			-0.045	0.239		
Incumbent			0.075	0.061			0.052	0.104			-0.008	0.101			0.182	0.128
Favored			-0.173	0.074			-0.016	0.129			-0.244	0.119			-0.303	0.159
Constant	0.246	0.769	-2.468	0.533	3.137	1.144	-2.189	0.917	0.700	1.351	-1.791	0.877	-1.865	1.201	-3.394	1.139
rho	0.344	0.230			-0.646	0.298			-0.074	0.384			0.784	0.176		
llh	-3572.3				-1289.3				-1326.4					-874.6		
# obs	4676				1743				1598					1335		

Table 5: Marginal Effects on Turnout: $Pr(d_1 = 1)$

	Democrat			Independent			Republican		
	20-pctile	Median	80-pctile	20-pctile	Median	80-pctile	20-pctile	Median	80-pctile
D tone	-0.216	0.070	0.327	0.144	0.274	0.386	-0.058	0.065	0.351
R tone	-0.464	-0.005	0.642	0.150	0.241	0.295	-0.241	-0.019	0.214
ln(D spend)	0.020	0.042	0.054	-0.026	-0.022	-0.013	-0.001	-0.001	0.000
ln(R spend)	-0.085	-0.065	-0.032	-0.012	-0.010	-0.006	0.000	0.000	0.000
Male	-0.065	-0.051	-0.025	0.022	0.037	0.044	0.009	0.033	0.061
White	-0.104	-0.080	-0.039	0.026	0.044	0.052	0.027	0.095	0.175
Religious	-0.084	-0.065	-0.031	0.070	0.117	0.139	0.023	0.079	0.147
Dem3	0.033	0.067	0.087				0.036	0.123	0.229
Dem2									
Dem1				0.064	0.108	0.128			
Rep1				0.057	0.095	0.113			
Rep2									
Rep3							0.036	0.123	0.229

Table 6: Marginal Effects on Conditional: $Pr(d_2 = 1|d_1 = 1)$

	Democrat			Independent			Republican		
	20-pctile	Median	80-pctile	20-pctile	Median	80-pctile	20-pctile	Median	80-pctile
D tone	-0.197	-0.010	0.139	-0.908	-0.154	0.367	-0.156	0.047	0.313
R tone	-0.080	0.055	0.189	-0.173	0.007	0.378	-0.119	0.009	0.208
ln(D spend)	-0.021	-0.017	-0.010	0.007	0.018	0.031	0.002	0.014	0.028
ln(R spend)	0.010	0.017	0.027	-0.054	-0.029	-0.018	-0.026	-0.013	-0.003
Male	0.011	0.020	0.025	-0.035	-0.022	-0.003	0.009	0.019	0.042
White	0.023	0.045	0.063	-0.115	-0.069	-0.032	0.027	0.054	0.122
Religious	0.019	0.053	0.090	-0.167	-0.100	-0.039	-0.044	0.010	0.087
Dem3	-0.016	0.048	0.132						
Dem2									
Dem1				0.122	0.208	0.383			
Rep1				-0.352	-0.208	-0.106			
Rep2									
Rep3							-0.144	-0.018	0.121

Table 7: Marginal Effects on Counterfactual: $Pr(d_2 = 1|d_1 = 0)$

	Democrat			Independent			Republican		
	20-pctile	Median	80-pctile	20-pctile	Median	80-pctile	20-pctile	Median	80-pctile
D tone	0.118	0.219	0.453	-1.102	-0.344	0.285	-1.902	-0.674	-0.086
R tone	-0.481	0.209	1.895	-0.242	0.042	0.436	-1.681	0.183	1.441
ln(D spend)	0.022	0.036	0.075	0.007	0.022	0.051	0.034	0.063	0.143
ln(R spend)	-0.167	-0.083	-0.049	-0.080	-0.032	-0.018	-0.131	-0.057	-0.029
Male	-0.095	-0.046	-0.027	-0.061	-0.020	0.000	-0.229	-0.110	-0.020
White	-0.052	-0.024	-0.013	-0.194	-0.098	-0.045	-0.658	-0.316	-0.055
Religious	0.033	0.057	0.110	-0.279	-0.120	-0.040	-0.703	-0.477	-0.251
Dem3	0.222	0.376	0.741						
Dem2									
Dem1				0.116	0.220	0.589			
Rep1				-0.563	-0.293	-0.140			
Rep2									
Rep3							-1.416	-1.037	-0.597

Table 8: Marginal Effects: Comparing IV Probit with IV bivariate probit.

	IV Bivariate Probit			IV Probit		
	20-pctile	Median	80-pctile	20-pctile	Median	80-pctile
Democrat						
D tone	-0.197	-0.010	0.139	-0.092	0.361	0.811
R tone	-0.080	0.055	0.189	-0.625	-0.180	0.325
ln(D spend)	-0.021	-0.017	-0.010	0.010	0.024	0.033
ln(R spend)	0.010	0.017	0.027	-0.012	-0.008	-0.003
Independent						
D tone	-0.908	-0.154	0.367	-0.135	0.345	0.753
R tone	-0.173	0.007	0.378	0.021	0.190	0.358
ln(D spend)	0.007	0.018	0.031	-0.089	-0.081	-0.058
ln(R spend)	-0.054	-0.029	-0.018	0.048	0.067	0.074
Republican						
D tone	-0.156	0.047	0.313	-0.283	0.151	0.978
R tone	-0.119	0.009	0.208	-0.101	-0.067	-0.035
ln(D spend)	0.002	0.014	0.028	-0.006	-0.004	-0.003
ln(R spend)	-0.026	-0.013	-0.003	0.000	0.000	0.000