Toppan Best-set Premedia Limited	
Journal Code: PSQ	Proofreader: Mony
Article No: PSQ4021	Delivery date: 10 Sep 2012
Page Extent: 24	

Polls and Elections

Understanding Persuasion and Activation in Presidential Campaigns: The Random Walk and Mean Reversion Models

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Political campaigns are commonly understood as random walks, during which, at any point in time, the level of support for any party or candidate is equally likely to go up or down. Each shift in the polls is then interpreted as the result of some combination of news and campaign strategies. A completely different story of campaigns is the mean reversion model in which the elections are determined by fundamental factors of the economy and partisanship; the role of the campaign is to give voters a chance to reach their predetermined positions. Using a new approach to analyze individual level poll data from recent presidential elections, we find that the fundamentals predict vote intention increasingly well as campaigns progress, which is consistent with the mean-reversion model, at least at the time scale of months. We discuss the relevance of this finding to the literature on persuasion and activation effects.

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Introduction

For many years political scientists have argued that campaigns have minimal effects on election outcomes. When campaign-related information flows activate latent predispositions, given balanced resources, election results are largely predetermined.[1] This perspective appears to be reinforced by the finding that election outcomes can be accurately forecast well before a campaign has run its course (Campbell 2000; Fair 1978; Lewis-Beck and Rice 1992; Rosenstone 1983). However, a consensus has emerged over the past decade among political scientists that campaigns have substantive persuasion effects (Franz and Ridout 2010; Hillygus and Jackman 2003; Huber and Arceneaux 2007; Shaw 1999a, 1999b; Vavreck 2009).

Though there has been a great deal of work on campaigns' persuasion effects over the past decade, there has been relatively little on campaigns' activation effects (see Andersen, Tilley, and Heath [2005] for an important exception, and Huber and Arceneaux [2007] for a recent analysis of a campaign's reinforcement effect). A few of the more recent studies of campaign effects do distinguish between types of activities and their associated persuasion effects. For example, Holbrook (1996) attempts to parse the effects of presidential conventions and debates, and Shaw (1999a) distinguishes between the persuasion effect of presidential candidate TV advertising and presidential candidate visits by state. But much of the recent work on campaigns' persuasion effects often does not attempt to distinguish between persuasion effects and activation effects. For example, Franz and Ridout (2007, 467n.1) write "We do not distinguish here between the different processes by which advertising might influence candidate preferences; that is, we do not distinguish between attitude change brought by conversion, the activation of predisposition or the reinforcement of prior preferences." In a similar manner, Hillygus and Jackman (2003) also categorize any movement toward a candidate as a manifestation of a persuasion effect.

Here we consider only presidential general election campaigns, which are characterized by long lead times, high media exposure, only two major candidates (in most states in most years), and generally clear partisan and ideological separation between the candidates. These conditions combine to increase the predictability of votes and the stability of opinions, and to minimize feedback effects arising from polling and other sources of information that can affect expectations. We would expect multicandidate elections, primaries, low-salience elections, and nonpartisan contests to show much less stability and predictability.

In a long campaign, such as a presidential election, the performance of these persuasion and activation models should depend on the time scale being considered, and it is these changes as a campaign progresses that we discuss.

1. For example, Lazarsfeld, Berelson, and Gaudet (1944) found that 8 percent changed their vote. Early studies estimated campaigns' conversion effects to be in the 5 percent to 8 percent range (Finkel 1993). These estimates may overestimate persuasion effects—in that some of this conversion could have happened in the absence of any special campaigning—or be underestimates, to the extent that strong effects from two competing campaigns can cancel.

This article contributes to the existing literature conceptually and empirically. We offer clean definitions of campaigns' persuasion and activation effects, which clearly distinguish between the two types of campaign effects. These definitions permit us to estimate the extent of campaigns' activation effects. To do so, we deploy a relatively straightforward but new methodology to estimate how the effects of the "fundamentals" change over the course of the campaign. Our empirical analysis estimates the magnitude of the variance in vote choice that can be ascribed to campaigns' activation effects. Finally, based upon existing theory, we argue that activation effects should vary by partisanship and political context, and we deploy our methodology to parse the relative activation effects of the 2000, 2004, and 2008 campaigns by region and partisanship. In the end, we find that the 2000, 2004, and 2008 campaigns have substantive activation effects.

In addition to our contribution to the political science literature, this article addresses a persistent confusion in the news media, where even the most sophisticated journalistic analysts tend to assume a random walk model as a matter of course (perhaps via a mistaken analogy to the efficient markets hypothesis in finance). By explicitly separating the random walk and mean reversion models, we are able to situate journalistic and political science models on common ground.

Campaign Effects: Persuasion and Activation

Studies of persuasion and activation effects tend to use one of four methodologies: (1) individual level panel studies to determine changes in vote intention over the course of a campaign, (2) experimental studies to isolate the causal effect of specific stimuli, (3) individual level cross-sectional studies that take advantage of measures of respondents' ad exposure, (4) aggregate level studies based upon rolling cross-sectional data. A small number of recent studies that fall into the latter two categories also integrate natural experiments into their analyses.

The earliest work on campaign effects used multiwave (panel) survey data in a particular locale to assess changes in vote attention at the individual level (Berelson, Lazarsfeld, and McPhee 1954; Katz and Lazarsfeld 1955; Lazarsfeld, Berelson, and Gaudet 1944) to conclude that political "campaigns are important primarily because they *activate* latent predispositions" italics in the original] Lazarsfeld, Berelson, and Gaudet 1944, 74). More recent analyses based upon individual level panel data do not attempt to distinguish the direction of change and hence do not distinguish between persuasion effects and activation effects. For example, Hillygus and Jackman (2003) categorize any change in vote attention as a manifestation of persuasion, even if such change was toward the party that the voter identified with (or leaned towards) in the initial wave of the study.[2]

Experimental and aggregate level studies often attempt to assess the magnitude of effect of television advertising on respondents' candidate preferences. Experimental

2. Andersen, Tilley, and Heath (2005) are a rare exception, since they specifically set out to assess the extent that campaigns activate latent dispositions. Using two British election panel studies (the first from 1992 to 1997 and the second from 1997 to 2001), they attempt to parse the extent of campaign activation effects.

studies often find a statistically significant and substantive effect of television advertising on respondents' candidate preferences (Kahn and Geer 1994; Valentino, Hutchings, and Williams 2004). However, as has been commonly noted, experimental studies often suffer from a variety of shortcomings, such as poor external validity, problematic samples, and unrealistic settings and time frames.

A number of studies have matched data on candidate television advertising with individual cross-sectional or panel survey data to assess the extent to which individual level exposure to such advertising affects the probability of supporting a candidate (Franz and Ridout 2007; Goldstein and Freedman 2000). However, Huber and Arceneaux (2007) note several potential confounding factors and, taking advantage of natural experiments to more finely gauge the effects of candidate television ads aired on vote choice, find larger persuasion effects than almost all previous nonexperimental studies. To their credit, Huber and Arceneaux (2007) also parse the data in search of reinforcement effects but find that candidate television advertising has almost no statistically significant reinforcement effects.[3]

Gelman and King (1993), Romer et al. (2006), Romer et al. (2004), and Kenski, Hardy, and Jamieson (2010) each use multiple polls or rolling cross-sectional polls over the course of a campaign to examine campaign effects. Gelman and King (1993) argue voters become more informed as the campaign progresses, resulting in their final vote choice on election day closely matching their "enlightened preferences" (433). The decrease in variance in the polls over the course of the campaign and the increasing ability of the fundamental factors to predict vote choice over the course of the campaign suggest that campaigns function to activate voters' latent predispositions. The inherent limitation of Gelman and King (1993) is that the change in the relative weight given by respondents to the various fundamentals over the course of the campaign could be due to campaigns successfully persuading voters to focus on those specific fundamental factors, thus persuading voters via priming. Indeed, it is commonly suggested that campaigns are about determining the factors upon which the voters make their vote choice (Simon 2002). Thus, the changes in weights given to the various "fundamentals" identified by Gelman and King (1993) could be due to campaign effects other than activation.

The methodology deployed in the present article ensures that any changes in weight given to the fundamentals over the course of a particular campaign cannot be due to persuasion or other campaign effects specific to the particular campaign.

Journalists' and Political Scientists' Perspectives on Persuasion and Activation

As noted above, scholars have long argued over the effect of campaigns on vote choice in presidential elections (see Bennett and Iyengar 2008; Hillygus 2010; Iyengar and Simon (2000) for systematic reviews of the literature). Despite extensive research in

3. Huber and Arceneaux (2007) consider changes in opinion toward a candidate's position associated with campaign television advertising as a manifestation of campaign television advertising "reinforcement" effect; in contrast, activation effect focuses on (intended) vote choice rather than issue opinion.

the area, no one has offered a complete explanation of the meaning of the question "Do campaigns matter?" To this end, we consider aggregate preferences as a time series leading up to an election, following the example of Wlezien and Erikson (2002). This time series may be stationary, so that preferences have a mean reversion quality where final votes are predicted by predispositions. Or preferences may be better characterized as the result of a random walk where campaigns change or create preferences apart from how people would be predisposed to vote.

The popularity of the random walk model for polls may be partially explained via analogy to the widespread idea that stock prices reflect all available information, as popularized in the book, *A Random Walk Down Wall Street* (Malkiel 1996). Once the idea has sunk in that short-term changes in the stock market are inherently unpredictable, it is natural to think the same of polls. For example, political analyst Nate Silver (2010) wrote

> In races with lots of polling, instead, the most robust assumption is usually that polling is essentially a random walk, i.e., that the polls are about equally likely to move toward one or another candidate, regardless of which way they have moved in the past.

But polls are not stock markets: for many races, a forecast from the fundamentals gives a pretty good idea about where the polls are going to end up. For example, in the 1988 presidential election campaign, even when Michael Dukakis was up 10 points in the polls, informed experts were pretty sure that George Bush was going to win. Congressional races can have predictable trends too. Bafumi, Erikson, and Wlezien (2010) find predictable changes in the generic opinion polls in the year leading up to an election, with different patterns in presidential years and off years. Individual polls are noisy, though, and predictability will generally only be detectable with a long enough series.

In the mean reversion model, voters have predispositions that can determine their vote even before they know what that vote will be. These predispositions are the so-called fundamentals that determine election outcomes. Here we shall estimate coefficients for sex, race (black or nonblack), age, education, income, region of residence (South vs. non-South) and religiosity.[4] We include ideology and party identification as fundamentals as well.[5] In other words, we include as fundamentals all the standard socioeconomic status

4. Religiosity has become a standard predictor to include in vote choice models and was of particular interest in the 2004 election. There has been deluge of work on the subject of religion and American politics over the past few years as reflected by such books as Campbell (2007), Dunn (2009), Green (2010), Putnam and Campbell (2010), Smidt and Guth (2009), Wolfe and Katznelson (2010), as well as a flood of journal articles.

5. Debate exists on whether party identification and ideology should be considered fundamental in this sense. For example, Andersen (2003) argues that party identification is not a fundamental variable but a short cut for other fundamentals such as issue positions. However, Campbell et al. (1960) persuasively argues that partisanship in the 1950s had little to do with a person's ideology or issue positions, but rather should be considered within the context of reference group theory in which self-identify is based on affective orientations toward groups usually developed in the preadult socialization process, and consequently partisanship could best be analogized to religious affiliation (Miller and Shanks 1996, 120-21). This view has been questioned at both the individual and the aggregate level (Fiorina 1977, 1981; MacKuen, Erikson, and Stimson 1989). However, research has shown that partisanship is far more stable at the individual level and the aggregate level than such revisionist conceptualizations of partisanship would suggest (Alwin and

variables usually included as control variables in models of vote choice. They were normalized to account for the differing codes in the surveys employed.[6]

Using similar inputs, Gelman and King (1993) show evidence that fundamentals are activated by information flows as campaigns progress and elections draw near. For the 1988 presidential campaign, they show increasing coefficients of race and ideology but decreasing coefficients for sex and region in determining the vote. Gelman and King (1993) argue that the predispositions that grow in importance are those that are out of equilibrium early in the election season. Andersen (2003) similarly finds that media coverage during election years helps voters select parties that better represent their ideological ideal points.

Using the 2000, 2004, and 2008 National Annenberg Election Surveys, we fit a series of logistic regressions predicting vote choice based on the fundamentals in the months leading to the election. The time interval represented by each snapshot is nearly two weeks for the surveys early in the election and decreases to days in the period just before the election, when the survey was conducted more frequently. The differing time

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Krosnick 1991; Green, Palmquist, and Shickler 2002). And there remains little question that partisanship functions as a "perceptual screen" (Bartels 2002; Campbell et al. –1960; and the works of Goren and colleagues over the past decade and the works of Carsey and Layman for over the past decade). Such research persuades us that partisanship should be considered a fundamental factor.

We are more inclined to accept the view of Andersen, Tilley, and Heath (2005) that ideology is a shortcut for issue positions rather than a fundamental factor in and of itself. Nonetheless, we include ideology since it is more feasible than including all of its parts (a series of issue variables). But in contrast to Andersen, Tilley, and Heath, we are wary of treating issue positions as fundamentals akin to race, sex, residence, religiosity, or even partisanship. Hence, we ran all our models twice: once with and once without ideology as a fundamental variable. Dropping ideology from the fundamentals predicting vote intention does not substantively change any of the results or conclusions of this analysis.

6. We did not include variables tapping respondents' approval of the incumbent President and the respondents' economic evaluation(s). Incumbent approval and the state of the economy are strong predictors of election outcomes in aggregate level election forecasting models. However, there are a number of reasons not to include them in our individual level analyses. First, it is not unreasonable to treat incumbent approval and the state of the economy as contextual factors rather than individual level fundamentals. Also, at the individual level, incumbent approval functions as a summary evaluation which incorporates the effects of the fundamentals. In other words, it is an intervening variable much like a feeling thermometer, both of which can be seen as a function of the fundamentals that we put on the right-hand side of our models. Consequently, and unsurprisingly, in a model specifying direct effects only, incumbent approval swamps the influence of the fundamentals, obfuscating their effects. We tend to think there is a stronger argument for including respondents' economic evaluations since much work has shown that economic evaluations often influence vote choice (Duch and Stevenson 2008; Gomez and Wilson 2001; Kinder 1983; Nadeau and Lewis-Beck 2001; Rudolph 2003). Unfortunately, the 2000 and 2004 National Annenberg Election studies did not ask most respondents the standard economic evaluation questions used in the American National Election studies (i.e., the prospective and retrospective sociotropic and pocketbook questions based on change over a one year time period). The only economic evaluation questions they asked all respondents were "How would you rate economic conditions in this country today? Would you say they are excellent, good, only fair or poor?" and "How would you rate your own personal economic situation today? Is it excellent, good, only fair or poor?" These questions have relatively low correlations with the four traditional economic evaluation questions asked in NES. We know this because the 2000 Annenberg asked the traditional economic evaluation questions of a couple of thousand respondents. Thus, we were able to examine the correlation of these respondents' answers to the four traditional economic questions to their responses to the question Annenberg asked of all respondents, "How would you rate your own personal economic situation today? Is it excellent, good, only fair or poor?" The 2008 Annenberg did not include the "economic conditions in this country today" questions used previously, but instead asked all respondents the traditional sociotropic and pocketbook retrospective economic evaluation questions. However, to be consistent with the two prior analyses, we did not include either of these two variables in our analyses of the 2008 campaign.

intervals for each snapshot ensured that we could maintain a relatively constant n per snapshot. For each snapshot, we fit a model of the form,

$$\Pr(y_{it} = 1) = \text{logit}^{-1}(\beta_i X_{it}), \quad (1)$$

where individuals are subscripted i within cross-section t; y_{it} equals 1 or 0 for supporters of Bush and Gore, respectively; X_{it} represents a matrix of covariates (the fundamentals); and βt represents a vector of coefficients for that cross-section. Using respondents interviewed after March 30 and before Election Day, our total sample sizes for 2000, 2004, and 2008 are 26,931, 35,698, and 23,841, respectively. The number of respondents per snapshot ranges from 476 to 711. Maintaining a mean of approximately 600 respondents per snapshot resulted in our dividing the 2000, 2004, and 2008 campaigns into 45, 59, and 40 snapshots, respectively.

Figure 1 shows improvement in model fit as the election approaches. The three graphs in the top row in Figure 1 plot the decrease in change in deviance from the null model per data point for each of the fitted logistic regression equations during each campaign.[7] Deviance is a general measure of misfit for generalized linear models (McCullagh and Nelder 1989). To yield an average measure, analogous to mean squared error, we divide the difference between the deviance of the full model and the deviance of the null model by the total sample size of each cross-section studied, since both the deviance of the null model and the sample size of each cross-section varies from cross-section to cross-section. These three graphs show the decrease in the change in deviance per respondent during the three campaigns.

The fundamentals are stronger predictors of vote choice as the election nears in all three campaigns. The lowess trend line of the top left graph indicates that the change in deviance per observation dropped from about −0.65 at the beginning of the 2000 campaign to almost −0.74 just before the 2000 election. The lowess trend line of the top middle graph indicates the change in deviance per respondent for each of our cross-sections of the 2004 Annenberg survey. Again, the fundamentals are stronger predictors of vote choice as the election nears, with change in deviance per observation dropping from just under −0.75 at the beginning of the 2004 campaign to approximately −0.88 just before the election. Finally, the lowess trend line of the top right graph shows that the change in deviance per observation dropped from approximately −0.60 at the beginning of the 2008 campaign to almost −0.80 just before the 2008 election.

The graphs in the bottom row of Figure 1 repeat the comparisons using a different measure of fit—McKelvey and Zavoina's pseudo-R-squared—for each of the fitted logis-

7. Deviance is −2 times the log likelihood. Decrease in deviance from the null model per observation is $((-2\sum_{i=1}^{n} p(y_i|x_i, \beta)) - (-2\sum_{i=1}^{n} p(y_i|1, \beta_0)))/n$; that is, the average value of the difference between the log likelihood of the full fitted model and the log likelihood of the constant only model, averaging over the n data points.

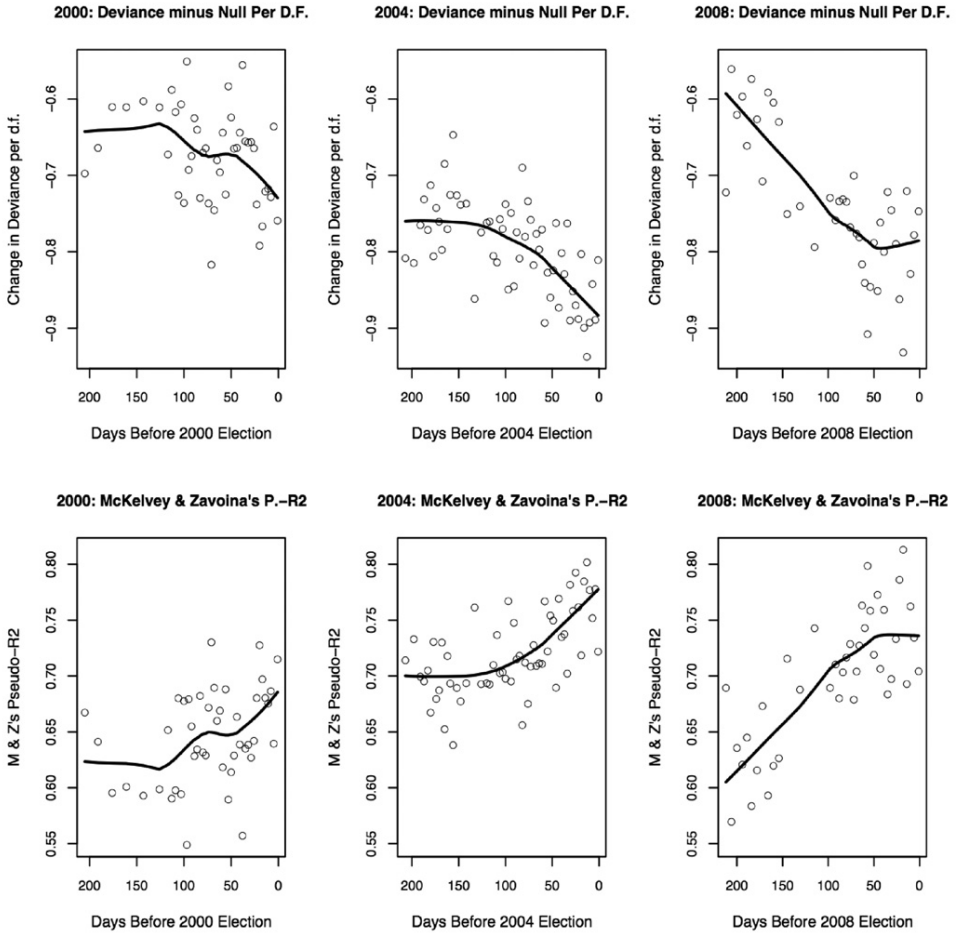


FIGURE 1. The deviance per observation summarizes the error in the logistic regression model predicting vote choice, as fit to each cross-section of the 2000, 2004, and 2008 Annenberg surveys. As shown by the lowess lines in the top row of graphs, the model fit improves (that is, the deviance decreases) as the election draws near, indicating the increasing predictive power of the fundamental variables. The increase in the trend lines in the graphs in the bottom row indicate the increase in the pseudo-*R*2 improves over the course of the three campaigns.
D.F. = degrees of freedom.

tic regression equations over the course of the 2000, 2004, and 2008 campaigns.[8] The bottom left graph shows the lowess trend line for the 2000 campaign, the bottom middle

8. McKelvey and Zavoina's pseudo-R-squared is $\frac{\widehat{Var}(\hat{y}^*)}{\widehat{Var}(\hat{y}^*)+\pi/3}$. We report this quantity for reasons discussed by Long (1997, 105). The extent of the increase in the pseudo-R-squared is similar using alternatives such as McFadden's or Efron's.

graph shows the lowess trend line for the 2004 campaign, and the bottom right graph shows the lowess trend line for the 2008 campaign. During the 2000 campaign, McKelvey and Zavoina's pseudo-*R*-squared increases from approximately 0.62 to almost 0.69. In the 2004 campaign, it increases from approximately 0.70 to about 0.77. Finally, in 2008, it increases from approximately 0.60 at the beginning of the campaign to about 0.73 by Election Day. In the three campaigns, the fundamentals account for approximately 0.08, 0.07, and 0.13% more of the variance in vote choice by the end than at the beginning.

The pseudo-*R*-squared is greater and change in deviance per observation is lower at the end (and, for that matter, the beginning) of the 2004 campaign, in which the incumbent president was running, compared to 2000 and 2008. The public saw the parties and the candidates as even more distinct in 2004—and probably 2008—than they did in 2000. In the 2000 campaign, Bush promoted compassionate conservatism and often mentioned that he wanted to be the education president, while Gore spent a fair amount of time trying to distance himself from Clinton. In contrast, in 2004, Bush's actions in office such as the invasion of Iraq and upper-income tax cuts left far less doubt about his ideological position.

Campaign ads increase in frequency as the date of an election approaches (Franz and Ridout 2007) and, in recent years, both major parties have been comparably well funded in their campaigns.[9] It is reasonable to suppose that information flows from the two campaigns per election were roughly on a par at the aggregate national level. With mean reversion, we expect voters' predispositions to be activated as each election approaches, crystallizing on Election Day when information is at its highest. These predispositions then loosen as Election Day passes and crystallize again as the next election looms. This leads us to our first hypothesis.

> $\mathbf{H}_1$: Controlling for campaign specific factors, the influence of the fundamentals on vote choice increases over the course of the campaigns.

However, political context matters (Hillygus and Jackman 2003). Far more information is known about one of the candidates in a campaign in which an incumbent is running. This leads us to Hypotheses 2a and 2b.

> $\mathbf{H}_{2a}$: Controlling for campaign specific factors, the fundamentals will do a better job of predicting vote intention at the beginning of a campaign in which an incumbent is running than at the beginning of a campaign in which there is no incumbent; and
>
> $\mathbf{H}_{2b}$: Controlling for campaign specific factors and assuming a ceiling effect and Hypothesis 2a, the increase in the influence of the fundamentals on vote intention over the course of a campaign will be less in campaigns in which there is an incumbent running.

9. In 2008, Obama did not adhere to the Federal Election Commission specified spending limits in order to qualify for matching funds, and he raised and spent far more than McCain. The trend in the coefficient of the fundamental follows a somewhat different trajectory in the 2008 election than the trend for the coefficient of the fundamentals in the previous two elections. We will discuss how this difference in spending may have contributed to this difference in trends.

Again, assuming that campaign-generated information is the primary mechanism by which latent predispositions become activated, we would anticipate that activation effects will be greater for those with strong predispositions about politics (so political information will be meaningful) and more interested in politics (since more interested people are more likely to receive information generated by the campaign). By definition, independents' latent dispositions tend to be weaker than those of partisans. Furthermore, independents tend, on average, to be less interested in politics and less informed about politics than partisans. Consequently, we parse the electorate by partisanship, since partisanship (and partisan intensity) is related to political information (Delli Carpini and Keeter 1996; Prior 2005). This leads us to our third hypothesis.

> **H$_3$**: Controlling for campaign specific factors, the influence of the fundamentals on vote choice over the course of the campaign will increase more for partisans than for independents.

Model

Under mean reversion, the process by which predispositions are activated in a particular election j should be the same as in the following election $j+1$, at least to first approximation, disregarding the differing candidacies and campaign strategies in those years (which would promote disequilibriating campaign effects). We can test whether this is true. Suppose the coefficients of the fundamentals from a 1996 vote choice equation are shown to do an increasingly better job of explaining the relationship between 2000 fundamentals and the 2000 vote choice as Election Day approaches. Likewise, suppose that the coefficients of the fundamentals from a 2000 vote choice equation are shown to explain the relationship between 2004 fundamentals and the 2004 vote better as Election Day approaches and, finally, that the coefficients of the fundamentals from a 2004 vote choice equation are shown to explain the relationship between 2008 fundamentals and the 2008 vote better as Election Day approaches. This would show evidence of activation unencumbered from year-specific campaign effects. Using the coefficients from the vote choice equation for election j to account for vote intention over the course of campaign $j+1$ ensures that any changes in the explanatory power of the fundamentals over the course of campaign $j+1$ cannot be due to effects specific to campaign $j+1$ because the coefficients used to estimate vote intention at the various points during campaign $j+1$ do not change and are based upon the preceding election—an election with different candidates, different convention and debate dynamics, and so forth. In other words, such an approach controls for campaign specific events. To examine the extent to which vote choice is predetermined by the fundamentals, free from random walk campaign effects, we fit logistic regressions using the National Election Survey (NES) from year j, which was conducted shortly before the November election, to predict the vote preference from the fundamentals. Formally

$$\Pr(y_i^j = 1) = \text{logit}^{-1}(X_i^j \beta^j), \tag{2}$$

where individuals are subscripted i; y_i^j equals 1 or 0 for the Republican presidential candidate or the Democratic presidential candidate supporters, respectively; X_i^j represents a matrix of covariates (the fundamentals); and β^j represents a vector of coefficients for the j presidential election. To apply this model to the $j+1$ election, we take the estimated vector β^j and multiply it by the corresponding variables from each snapshot t of the Annenberg surveys (X_{it}^{J+1}) to yield a linear predictor (Z_{it}).[10]

$$Z_{it} = X^{j+1}\beta_t^j \tag{3}$$

We use this as a predictor in a new logistic regression for the $j+1$ Annenberg vote choice item for the cross-sections conducted from early April to just before the election:

$$\Pr(y_{it}^{J+1} = 1) = \text{logit}^{-1}(a_{0t} + a_{1t}Z_{it}), \tag{4}$$

where y_{it}^{J+1} equals 1 for supporters of the Republican candidate. We fit this regression to each of our snapshots from the Annenberg surveys. We expect a_{1t}, the coefficient of the prediction based on j, the preceding election, to increase toward 1 as Election Day $j+1$ nears. For the purpose of this analysis, j takes the values of 1996, 2000, and 2004, and $j+1$ takes the values of 2000, 2004, and 2008, respectively.[11]

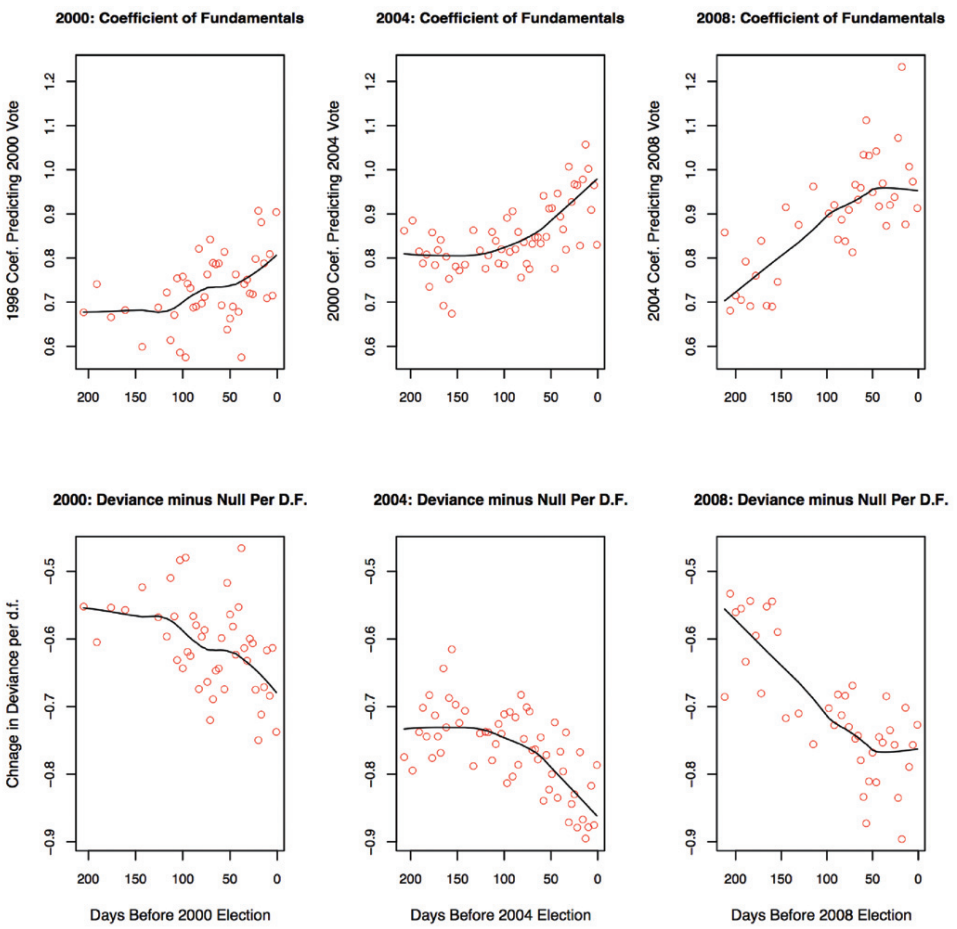
Results

The graphs in the top row of graphs in Figure 2 depict the trend in the coefficient of fundamentals over the course of the 2000, 2004, and 2008 campaigns, respectively. As noted above, changes in a_{1t} cannot be due to campaign-specific effects since they are based upon the coefficients from equation (2), which is derived from the influence of the fundamentals at the end of the campaign of the preceding election. So increases in a_{1t} can only be due to the increasing influence of the fundamentals controlling for campaign specific factors.

The top left graph of Figure 2 shows the trend over the course of the 2000 campaign. The weights assigned to the fundamentals by registered voters in 1996 applied more strongly to vote choice in 2000 as the election drew near. A lowess smoother shows this trend for the Annenberg data. The average value of the key coefficient (a_{1t}) goes from approximately 0.67 at the beginning of the 2000 to almost 0.79 by the end of the campaign. This increase of (at least) 0.12 in the coefficient of fundamentals represents an increase of over 15% in the magnitude of the coefficient. The fact that the coefficient does not attain a value of 1 by the end of the campaign could be accounted for either by

10. In calculating Z_{it} we do not include the constant estimated in equation (2) since, by definition, the constant does not reflect the influence of any of the fundamental factors.

11. The inclusion of the constant a_{0t} in equation (4) permits the vote intention model to reflect the influence of campaign specific factors other than the fundamentals incorporated in Z_{it}.



Colour online, B&W in print

FIGURE 2. A prediction is generated using the coefficients from a 1996, 2000, and 2004 vote choice equation based upon NES data and covariates from 2000, 2004, and 2008 Annenberg studies conducted up to 200 days out from the election. This prediction is then used as a covariate predicting 2000, 2004, and 2008 vote choices, respectively. The trend in the coefficient of the fundamentals yielded is plotted in the top row above. The trend in the change in deviance per degree of freedom is plotted in the bottom row.
D.F. = degrees of freedom.

fundamental factors not included in our model or by campaign-specific factors such as the nation's economic state, the nation's war status, the characteristics of the particular candidates, or campaign specific factors and events that move beyond the activation of predispositions.

The top center graph of Figure 2 shows the trend over the course of the 2004 campaign. The weights assigned to the fundamentals by registered voters in 2000 applied more strongly to vote choice in 2004 as the election drew near. A lowess smoother

shows this trend for the Annenberg data. The average value of the key coefficient (a_{1t}) goes from approximately 0.81 at the beginning of the 2004 campaign to almost 0.98 by the end of the campaign. This increase of approximately 0.17 in the coefficient of fundamentals represents an increase of over 20% in the magnitude of the coefficient. The coefficients for the predictor throughout the 2004 campaign—a year with an incumbent running for reelection—are greater than in 2000.

The top right graph of Figure 2 shows the trend over the course of the 2008 campaign. The weights assigned to the fundamentals by registered voters in 2004 applied more strongly to vote choice in 2008 as the election drew near. A lowess smoother shows this trend for the Annenberg data. The average value of the key coefficient (a_{1t}) goes from approximately 0.70 at the beginning of the 2008 campaign to almost 0.95 by the end of the campaign. This increase of approximately 0.25 in the coefficient of fundamentals represents an increase of approximately 35% in the magnitude of the coefficient. The magnitude of the coefficient at the beginning of the 2008 campaign is similar to that at the beginning of the 2000 campaign. We suspect that the greater weight given the fundamentals in vote preference by the end of the 2008 campaign compared to the weight given the fundamentals by the end 2000 campaign is due to how the fundamentals were related to the particulars of the 2008 campaign (most notably, Obama's race and the economic recession)—particularly among independents. We will discuss this more when we parse the effect of the fundamentals over the course of the 2008 campaign by partisan identification.

The growth in the coefficient of the fundamentals over the course of the 2000, 2004, and 2008 campaigns is consistent with Hypothesis 1. That the value of the coefficient at the beginning of the campaigns in 2000 and 2008 is less than the value of the coefficient at the beginning of the campaign in 2004 in which an incumbent was running is consistent with Hypothesis 2a. However, the results are more mixed regarding Hypothesis 2b. As expected, the relative increase in magnitude of the coefficient of the fundamentals is greater in 2008 when there was no incumbent than in 2004 when an incumbent was running. The relative change in the magnitude of the coefficient of the fundamentals in the campaign featuring an incumbent in 2004 does not appear to have been less than the relative growth in the magnitude of the coefficient over the course of the 2000 campaign when there was no incumbent (as there was in 2004). This would not have been the case if the coefficient of the fundamentals approached the value of 1 by the end of the 2000 campaign as it did by the end of the 2004 and 2008 campaigns. This suggests that activation of the fundamentals was less during the 2000 campaign than might have been expected. An explanation for this lower-than-anticipated activation effect due to the 2000 campaign falls outside the scope of this article and is worth further investigation.

The importance of the growth in the coefficient of the fundamentals is only manifest explicitly to the extent that the growth in the coefficient is associated with the model doing a better job accounting for vote preference. The bottom row of graphs in Figure 2 charts the trend line for the change in deviance per degree of freedom over the course of the campaigns. Again, the lower the deviance, the better the fit of the model to the data.

The bottom left graph in Figure 2 plots the change in deviance per degree of freedom for each of the fitted logistic regression equations over the course of the 2000 campaign. The fundamentals are stronger predictors of vote choice as the election nears, with the lowess line indicating that the change in deviance per observation dropped from approximately −0.55 at the beginning of the 2000 campaign to about −0.67 just before the 2000 election. This decrease of (at least) 0.12 in the change in deviance per degree of freedom represents a decrease of over 20% in the magnitude of the change in deviance per degree of freedom.

The bottom center graph in Figure 2 plots the change in deviance per degree of freedom for each of the fitted logistic regression equations over the course of the 2004 campaign. Again, the fundamentals are stronger predictors of vote choice as the election nears, with the lowess line indicating that the change in deviance per observation dropped from approximately −0.74 at the beginning of the 2000 campaign to about −0.85 just before the 2004 election. This decrease of (at least) 0.11 in the value of the change in deviance per degree of freedom represents a decrease of almost 15% in the magnitude of the change in deviance per degree of freedom.

The bottom right graph in Figure 2 plots the change in deviance per degree of freedom for each of the fitted logistic regression equations over the course of the 2008 campaign. The fundamentals are stronger predictors of vote choice as the election nears, with the lowess line indicating that deviance per observation dropped from approximately −0.55 at the beginning of the 2000 campaign to about −0.85 just before the 2008 election. This decrease of (at least) 0.30 in the value of the change in deviance per degree of freedom represents a decrease of over 50% in the magnitude of the change in deviance per degree of freedom.

Though the relative magnitude of the drop in the value of the change deviance per observation varies substantively from campaign to campaign (from roughly 15% to 50%), the drop in the value of the change in deviance per degree of freedom is least in 2004, again consistent with incumbency.

Since change in deviance per degree of freedom is not the most intuitive goodness of fit measure, the top row of graphs in Figure 3 plots McKelvey and Zavoina's pseudo-*R*-squared for each of the fitted logistic regression equations over the course of the 2000, 2004, and 2008 campaigns. In the 2000 campaign the McKelvey and Zavoina's pseudo-*R*-squared increases from approximately 0.60 to 0.68. In the 2004 campaign, the McKelvey and Zavoina's pseudo-*R*-squared increases from approximately 0.69 to 0.77. In the 2008, campaign the McKelvey and Zavoina's pseudo-*R*-squared increases from approximately 0.55 to 0.70. In the 2000, 2004, and 2008 campaigns, the fundamentals account for approximately 0.08, 0.08 and 0.15 percentage points more of the variance in vote choice by the end of the campaigns than at their beginnings. That the increase in the variance in vote choice explained by the 2008 campaign is greater than the increase in the variance in vote choice accounted for by the analyses of the two prior campaigns partly reflects the fact that the model accounts for less of the variance in vote choice at the beginning of the 2008 campaign than at the beginning of the other two campaigns. The uncertainty about which candidate (Clinton or Obama) would be the Democratic Party's nominee as late as April might in part account for this. The relatively low variance in vote

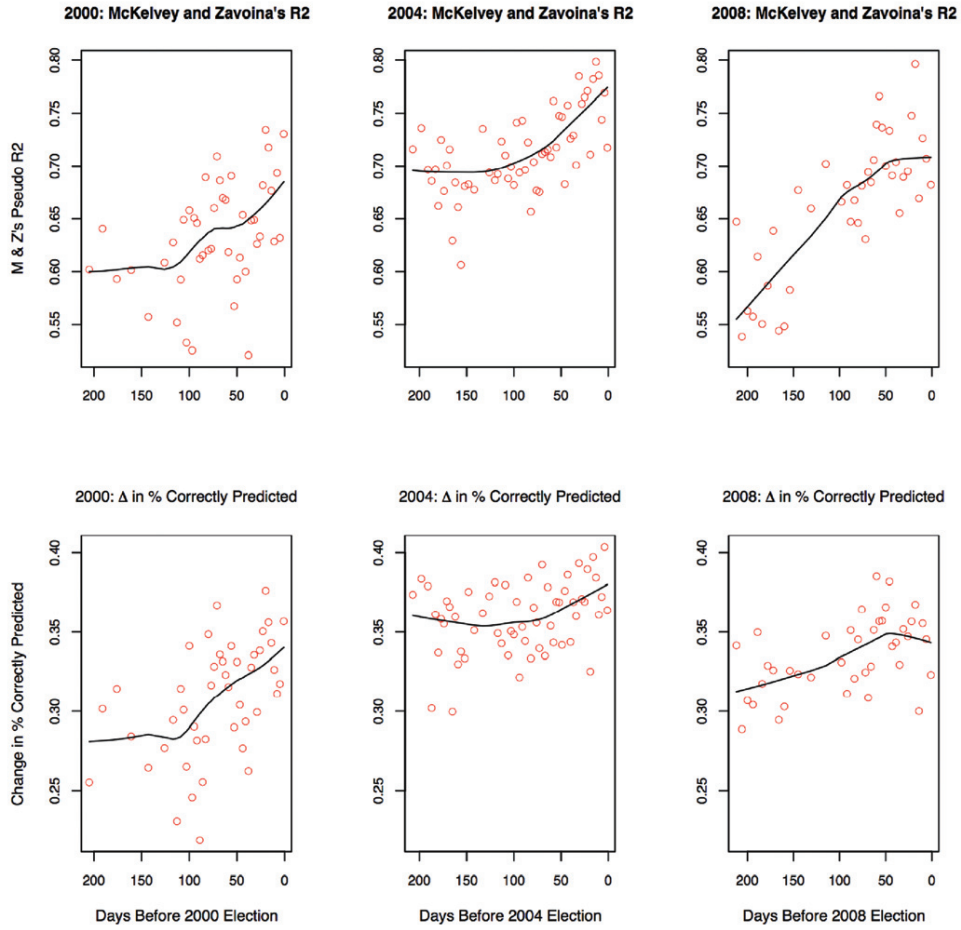


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FIGURE 3. A prediction is generated using the coefficients from a 1996, 2000, and 2004 vote choice equation based upon NES data and covariates from 2000, 2004, and 2008 Annenberg studies conducted up to 200 days out from the election. This prediction is then used as a covariate predicting 2000, 2004, and 2008 vote choices, respectively. The trend in the pseudo-$R2$s yielded is plotted in the top row above. The trend in the change in the percent of cases predicted correctly by the model is plotted in the bottom row.

choice explained by the model early in the 2008 campaign might also have been reinforced by the uncertainty and anxiety generated by the recession of 2008.

In order to assess the relative magnitude of this activation effect with previous research on the magnitude of persuasion effects, we need to put the two on similar metrics. Sometimes persuasion effects are put in terms of the effect on the percentage of vote received by one of the candidates given, for example, a specified increase in advertising (often expressed in an increase buy in gross point ratings). However, it is not uncommon for analyses to calculate maximum effects (Vavreck 2009) or the effect of a

two standard deviation change in the buy (Franz and Ridout 2010). To address the relative substantive magnitude of the activation effects, we report change in percent correctly predicted. This goodness of fit measure has three advantages. It is relatively intuitive; it is commonly used in reporting results of multivariate analyzes of a binary dependent variable; and, since it can be put in terms of change in percent of vote, it can be compared to other works that use a similar metric to gauge relative substantive impact of such factors as campaign visits or television ads aired.

Change in percent of cases correctly predicted by the full model is simply the difference between the percent of cases predicted correctly by the full model minus the percent of cases predicted by null model (i.e., an intercept only model). So, for example, if the full model of vote choice predicts 78% of the cases correctly and the null model of vote choice predicts 51% of vote choice correctly, the change in percent of vote choice correctly predicted is 27%. The bottom row of graphs in Figure 3 plots the trend in change in percent correctly predicted by the full model for the three campaigns. In the 2000 campaign, the change in the percent of cases correctly predicted by the full model increases from approximately 0.28 to 0.33 (bottom right graph of Figure 3). In the 2004 campaign, the change in the percent of cases correctly predicted by the full model increases from approximately 0.35 to 0.37 (bottom center graph of Figure 3). And in the 2008 campaign, the change in the percent of cases correctly predicted by the full model increases from approximately 0.31 to 0.34 (bottom right graph of Figure 3).

The range of 2% to 5% in the lowess trend lines for change in percent correctly predicted for the three campaigns is not huge. But it should be remembered that the model remains constant throughout the campaign so such an increase in the specified change in percent of cases correctly predicted is solely due to people's vote preferences increasing in consistency (relative to the model) over the course of the campaign. Furthermore, this range for the substantive effect of implication is often of the same magnitude for the range of persuasion effects ascribed to campaigns (Franz and Ridout 2010).

Ideally, we would perform the above analysis on the last dozen presidential elections rather than just the last three. But sufficiently large *n* campaign datasets only became publicly available starting in 2000 with the Annenberg survey. An alternative strategy to create replications is to repeat the above analyses for each region of the country for each election. The NES does not provide a sufficiently large number of cases to permit us to develop reliable coefficients for each region, but Annenberg does. There were enough respondents interviewed by Annenberg in the last three weeks of the 2000 and 2004 elections to permit us to break down the model by region. We then used these estimated coefficients with covariates from the 2004 and 2008 Annenberg studies to generate a prediction which can be used as the covariate in Equation (4). We can only do this analysis by region for the 2004 and 2008 campaigns since we do not have such a dataset for 1996 that would permit us to estimate coefficients that we could use with the covariates of respondents to the 2000 Annenberg study. Nonetheless, replicating the above analysis by region for the 2004 and 2008 campaigns does provide another eight analyses.

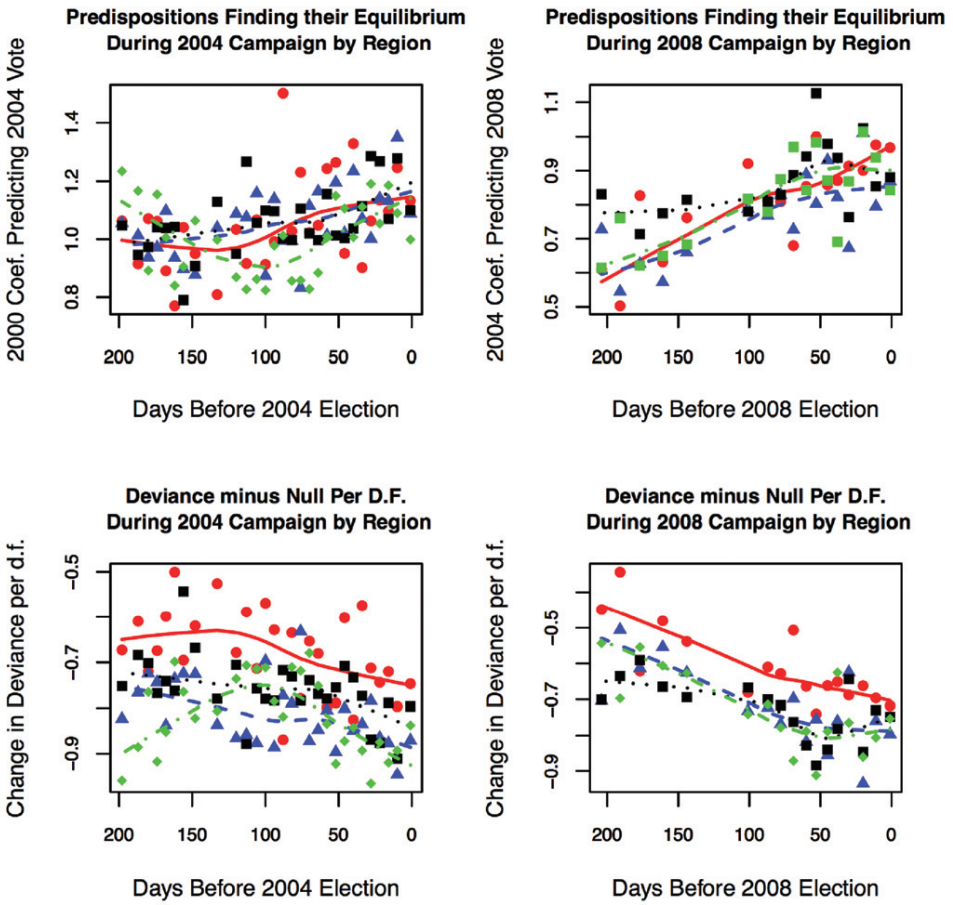

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FIGURE 4. A prediction by region is generated using the coefficients from the 2000 and the 2004 vote choice equation based upon the two Annenberg studies and covariates from the 2004 and the 2008 Annenberg studies conducted up to 200 days out from the election. These predictions are then used as a covariate predicting 2004 and 2008 vote choice by region. The top two graphs illustrate the trend in the coefficient of the fundamentals for the North (circle, solid-line), Midwest (triangle, dash-line), South (square, dot-line), and West (diamond, dot-dash-line) over the course of the 2004 and 2008 campaigns, respectively. The bottom two graphs illustrate the trend in the change in deviance per observation by region over the course of the 2004 and 2008 campaigns, respectively. D.F. = degrees of freedom.

Figure 4 presents results parallel to those analyses presented in Figure 2 but broken down by region.[12] The graphs in the top row of Figure 4 illustrate the trend in the

12. Region is based upon Census Bureau designation. North: Connecticut, Maine, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, Vermont. Midwest: Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Missouri, Nebraska, North Dakota, Ohio, South Dakota, Wisconsin. South: Alabama, Arkansas, Delaware, District of Columbia, Florida, Georgia, Kentucky, Louisiana, Mary-

coefficient of fundamentals by region over the course of the 2004 and 2008 campaigns. Likewise, the graphs in the bottom row of Figure 4 show the trends in the reduction in deviance per degree of freedom by region over during the 2004 and 2008 campaigns.

As expected, in general, the fundamentals are stronger predictors of vote intention as the campaign nears the 2004 and 2008 elections for all the regions since all the trend lines decrease. The one anomaly is that the lowess trend line for the reduction in deviance per degree of freedom for the West (dot-dash line) in the 2004 campaign trends up for the first half of the campaign. But for the last three months of the 2004 campaign, the lowess trend line for the West decreases. And the trend lines for the reduction in deviance per degree of freedom for all the other regions trend down monotonically over the course of the 2004 campaign. And all regional trend lines decrease monotonically over the course of the 2008 election. Consistent with our aggregate level findings (Figure 2, row 2) and Hypothesis 2b, in which we anticipate greater effects in campaigns in which there is no incumbent compared to campaigns in which there is an incumbent candidate, the reduction in the trend lines for the reduction in deviance per degree of freedom over the course of the campaign, on average across the four regions, is greater in 2008 than in 2004.

Activation Effects by Partisanship

Last, we test the mean reversion model, the process by which predispositions are activated in election j should be the same as the process in the following election $j+1$, at least to first approximation, disregarding the differing candidacies and campaign strategies in those years (those which would promote disequilibriating campaign effects) but disaggregating voters by partisanship.[13]

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land, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, Virginia, West Virginia. West: Alaska, Arizona, California, Colorado, Hawaii, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, Wyoming.

13. Formally

$$Pr(y^{j}_{i,pid}=1)=logit^{-1}(X^{j}_{i,pid}\beta^{j}_{pid}), \tag{5}$$

where individuals are subscripted i; $y^{j}_{i,pid}$ equals 1 or 0 for Republican or Democratic supporters, respectively; $X^{j}_{i,pid}$ represents a matrix of covariates (the fundamentals); and β_j represents a vector of coefficients for presidential election j. To apply this model to the election $j+1$, we take the estimated vector $\beta_{pid}{}^{j}$ and multiply it by $X^{j+1}{}_{it,pid}$, the corresponding variables from each snapshot t of the Annenberg surveys for election $j+1$, to yield a linear predictor ($Z_{it,pid}$).

$$Z_{it,pid}=X^{j+1}_{i,pid}\beta^{j}_{t,pid} \tag{6}$$

We use this as a predictor in a new logistic regression for the Annenberg vote choice item in election $j+1$ for the cross-sections conducted from early April to just before the election:

$$Pr(y^{j+1}_{it,pid}=1)=logit^{-1}(a_{0t}+a_{1t}Z_{it,pid}), \tag{7}$$

where $y_{it,pid}{}^{j+1}$ equals 1 for Republican supporters. We fit this regression to each of our snapshots from the Annenberg surveys. We expect a_{1t}, the coefficient of the prediction based on j, to increase toward 1 as the day of election $j+1$ nears.

Our approach requires a sufficient number of respondents per party identification to have been interviewed at the end of campaign *j* (such that they could be considered to have been activated by the campaign to the extent these respondents could have been activated). We can do this using the 2000 and 2004 Annenberg data. Specifically, the coefficients generated by equation (5)] are based upon an analysis of respondents from the last 18 days of the 2000 and 2004 campaigns, respectively. For example, during these last 18 days of the 2000 campaign, 1,132 Annenberg respondents identified themselves as Republican, 1269 as Democrats, and 1069 as independents. Thus, the coefficients estimated by partisanship were never based on fewer than 1,000 respondents. The same is true for estimates based on respondents interviewed by Annenberg during the last 18 days of the 2004 campaign.

Equation (7) requires us to divide respondents to the 2004 and 2008 Annenberg studies for each snapshot and by partisanship. Our sample sizes for these analyses by partisanship are thus much smaller than the analyses in the previous sections of the article (approximately one-third of the total *n* used for the analyses reported in the first three figures of this analysis). Consequently, we could not maintain the same mean *n* per snapshot nor have as many snapshots. In this situation, there is a trade-off between the number of snapshots we can have over the course of the campaign (and the more snapshots, the greater our ability to discern changes in the influence of the fundamentals over the course of the campaign) and the number of respondents per snapshot (with more respondents per snapshot reducing the number of possible snapshots but decreasing the standard error around each estimate). In the end, each snapshot has a mean *n* of approximately 445 in 2004 (whereas the mean *n* is 600 for the analyses in the previous sections). For Republicans in 2004, for example, the number of respondents per snapshot ranges from 352 to 828. The numbers are similar for Democrats and independents. This permits us to divide the 2004 campaign into 29 snapshots. By definition, the reduced number of snapshots and the reduced *n* per snapshot makes it less likely for the analysis to discern any trends per subgroup. Also, given the different number of snapshots, the different period of time covered by these snapshots, and the smaller *n* per snapshot, a visual aggregation of the trends of the three subgroups should not be expected to yield clearly the trends (or lack of trends) displayed in Figure 2 (though the aggregate trend is often adumbrated by an inspection of the partisan level trends). We divided the 2008 campaign into 17 snapshots in order to maintain an average n of almost 450 respondents per snapshot (by partisanship).

We show the extent of the improvement in model fit of equation (4) by partisanship as the election approaches. The top row of graphs in Figure 5 depicts the trend in the coefficient of fundamentals by partisanship over the course of the 2004 and 2008 campaigns, respectively. The bottom row of graphs in Figure 5 depicts the trend in the change in deviance per degree of freedom by partisanship over the course of the 2004 and 2008 campaigns, respectively.

The top left graph of Figure 5 plots the coefficient of fundamentals for each of the fitted logistic regression equations over the course of the 2004 campaign by partisanship. Once we disaggregate by partisanship, we see that the trend of the coefficient of the fundamentals increases a bit for Republicans and Democrats over the course of the

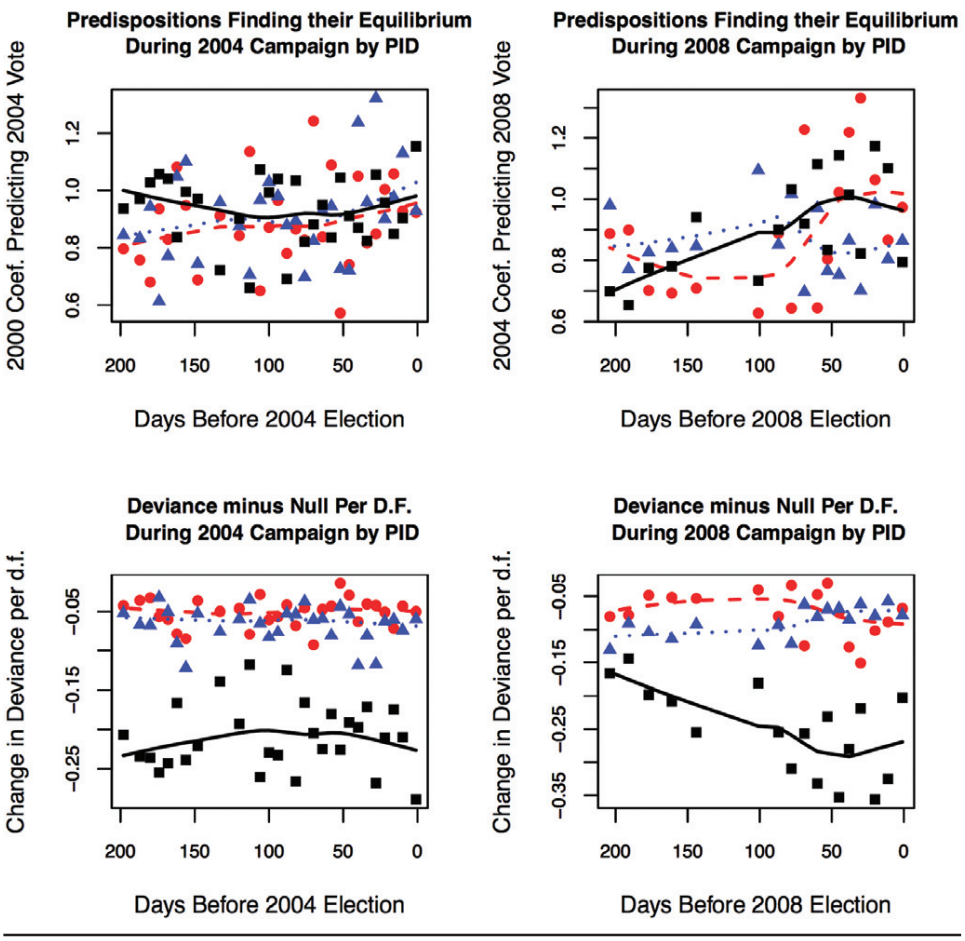

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FIGURE 5. A prediction by partisanship is generated using the coefficients from the 2000 and the 2004 vote choice equation based upon the two Annenberg studies and covariates from the 2004 and the 2008 Annenberg studies conducted up to 200 days out from the election. These predictions are then used as a covariate predicting 2004 and 2008 vote choice by partisanship. The top two graphs illustrate the trend in the coefficient of the fundamentals for Democrats (triangle, dot-line), Republicans (circle, dash-line) and independents (square, solid-line) over the course of the 2004 and 2008 campaigns, respectively. The bottom two graphs illustrate the trend in the change in deviance per observation by partisanship over the course of the 2004 and 2008 campaigns, respectively.
D.F. = degrees of freedom; PID = party identification.

election but that the coefficient of the fundamentals remains flat for independents over the course of the 2004 campaign. The top right graph of Figure 5 plots the coefficient of fundamentals for each of the fitted logistic regression equations over the course of the 2008 campaign by partisanship. Once we disaggregate by partisanship, we see the coefficient of the fundamentals trending up over the course of the campaign for all three groups indicating that activation is occurring to some degree for all three. The increase

in the coefficient of the fundamentals for independents over the course of 2008 campaign is in contrast to the relatively unchanging value of the coefficient of the fundamentals for independents over the course of the 2004 campaign.

However, as noted when discussing the results presented in Figure 2, the relative importance of the growth in the coefficient of the fundamentals is only manifest explicitly to the extent that the growth in the coefficient is associated with the model doing a better job ac- counting for vote preference. The bottom left graph of Figure 5 plots the change in deviance per degree of freedom for each of the fitted logistic regression equations over the course of the 2004 campaign by partisanship. The bottom right graph of Figure 5 plots the change in deviance per degree of freedom for each of the fitted logistic regression equations over the course of the 2008 campaign by partisanship. Again, the lower the change in deviance per degree of freedom, the better the fit of the model to the data.

The first striking feature of these two graphs is that all the trends in change in deviance per degree of freedom by partisanship are flat except for independents in 2008. In other words, once you control for partisanship, the other factors that go into the coefficient of the fundamentals do not contribute to that part of the activation effect that contributed to the coefficient of the fundamentals increasingly doing a better job accounting for vote choice over the course of these campaigns for all respondents as reflected in Figure 2. This suggests that partisanship is the key factor driving the increasing power of the coefficient of the fundamentals to account for vote choice over the course of these campaigns.

The second striking feature is the one exception already noted: the drop in the change in deviance over the course of the 2008 campaign among independents. The increase in the coefficient of the fundamentals for independents over the course of the 2008 campaign is noticeably greater than the increase in the coefficient of the funda- mentals for any of the groups in the 2004 campaign and greater than the increase in the coefficient of the fundamentals for Democrats or Republicans over the course of the 2008 campaign. This suggests that some factor or set of factors came into alignment over the course of the 2008 campaign with the fundamental preferences of independents. The two most obvious culprits are the race of the Democratic nominee and the state of the economy. As the salience of the state of the economy and Obama's race increased over the course of the 2008 campaigns (two issues that were not much of a factor in the 2004 campaign), the ideology and race of independents became increasingly better predictors of their vote preference. Though this may have been true to some extent for partisans as well, the implication is that the influence of the increasing salience of these issues was not sufficient to contribute substantively to the fit of the model beyond that already accounted for by party loyalties.

Conclusion

Political candidates invest time, energy, and money in their campaigns, which can activate predispositions that achieve predictable votes and also shift voters from their anticipated positions. In campaigns that are won based on local issues, where resources are severely unbalanced between the candidates and information flows are minimal, we

expect both sorts of campaign effects to occur. Presidential campaigns, though, tend to be nationalized, highly competitive, and with high information. We posit that campaigns may activate predispositions for partisans so that votes are mean reverting or that they may engender out-of-equilibrium or random walk vote outcomes when shocked by biasing campaign information. Our findings from the 2000, 2004, and 2008 campaigns are consistent with Gelman and King (1993) and Andersen, Tilley, and Heath (2005) in finding a growing importance for the fundamentals as an election draws near and information flows activate predispositions for partisans but do not do so consistently for independents. We come to this conclusion through an innovative analysis of vote-prediction models, comparing between and within campaigns. The fact that aggregate election outcomes and individual vote choice both move toward predictable outcomes provides strong support for the findings of mean reversion campaign effects for partisans but not necessarily for independents. Our data analysis resolves some questions in the political science literature and also can, we hope, be persuasive to political analysts and journalists who have tended to assume a random walk model by default.

One source of confusion is that a mean reversion process can look like a random walk when looking at an immediate time horizon. Over short time scales, the expectation of a stationary autoregression is a linear function of time, while the standard deviation scales like the square root of time. As time runs forward, the linear term eventually dominates, but for short periods the noise dominates the signal. This is why the polls can look like a random walk during any given week during the campaign, even while looking like a mean reversion over the period of several months.

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