CALTECH/MIT
VOTING TECHNOLOGY PROJECT

A multi-disciplinary, collaborative project of
the California Institute of Technology – Pasadena, California 91125 and
the Massachusetts Institute of Technology – Cambridge, Massachusetts 02139

TITLE Electoral Context and Voter Confidence: How The Context of an Election Spaes Voter Confidence in the Process

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Key words:

VTP WORKING PAPER #79
April 2009

Electoral Context and Voter Confidence: How The Context of an Election Shapes Voter Confidence in the Process

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We thank the Caltech/MIT Voting Technology Project for the financial support.

Abstract

A number of recent studies examine how confident voters are that their ballots are counted as intended in U.S. federal elections from 2000 to 2004. One consistent finding of these studies is that, relative to Democrats, Republican voters tend to be more confident that their ballots are counted correctly. However, it is also the case that, in terms of the outcomes of the 2000 and 2004 elections at the national level, Republicans were victorious. Research also suggests that, in the 2004 election, voters who cast a paper ballot are more confident relative to those who vote using an electronic device. Although these results fit nicely into the 2000 and 2004 elections, we argue that future research of voter confidence should interpret voter confidence within the context of the election. The particular context of the 2006 election, gives rise to two testable hypotheses. First, we hypothesize a winner's effect exists where following the election voters who cast their ballot for the winning candidate are more confident that their vote was counted accurately. The second hypothesize we test is that voter access to a voter verified paper audit trail (VVPAT) device leads to higher rates of confidence among electronic voters. Using a panel dataset containing self-reported confidence levels before and after the 2006 election, we find empirical evidence that voter confidence is influenced by the context of the election. First, we find a positive and significant winner's effect; following the 2006 election voter confidence is higher for individuals who voted for the winning candidate. Second, we find that voters who cast ballots on an electronic voting machine with a VVPAT device exhibit higher rates of confidence when compared to electronic voters who do not have access to VVPAT devices. Finally, when measuring the change in confidence rates before and after the election, we find no significant difference in the change in the confidence rates between electronic voters with access to a VVPAT device and voters who cast a paper ballot.

Introduction

There has been a common assumption permeating conversations in recent election cycles about the conduct of elections in the United States --- that voters lack confidence in the process. The confidence of voters in the election process is seen as an important indicator of the quality of election administration, as well as a critical normative issue that may influence the basic legitimacy of the democratic process in the United States. But while this is a common assumption, the few studies that have been done so far on this topic have typically found that in recent election cycles most Americans and American voters are confident in the process (Alvarez and Hall 2004, 2008; Hasen 2005; Atkeson and Saunders 2007; Bullock, Hood and Clark 2005; Hall, Monson, and Patterson 2007, 2008; Alvarez, Hall, and Llewellyn 2008a, b).). But these studies have all found that there are important factors that help us understand how confidence varies across voters; such as partisanship, race and ethnicity, and how a voter interacts with election officials and pollworkers,.

Typically past studies of voter confidence generally agree on two findings. First, voters who self-identify as Republicans are more confident that their vote was counted accurately relative to voters who self-identify as independents or Democrats (Alvarez and Hall 2008; Alvarez, Hall, and Llewellyn 2008a, 2008b; Atkeson and Saunders 2007; Bullock, Hood and Clark 2005; Hall, Monson, and Patterson 2007; Magelby, Monson, and Patterson 2007). Second, voters who cast an electronic ballot are less confident relative to voters who cast a paper ballot (Atkeson and Saunders 2007; Alvarez, Hall, and Llewellyn 2008a). In the context of the 2004 election, these findings are appropriate given concern raised by minority and civil rights groups regarding the counting of Democratic precincts in Ohio and media coverage of problems

associated with non-verifiable voting technologies in parts of California and Ohio during the 2004 primaries and general election (e.g., Alvarez and Hall 2008).

In this paper we study the 2006 mid-term election, because it provides two new contexts in which to evaluate voter confidence. For the first time since academics began studying voter confidence, the 2006 election is the first election where Democrats achieve widespread national success by capturing control of the U.S. House and Senate. Second, following the 2004 election many election officials installed voter verified paper audit trail (VVPAT) devices on electronic voting machines to enhance the ability to conduct post-election audits.[i] Thus, the 2004 election allows us to differentiate between electronic voting without a VVPAT device and electronic voting with a VVPAT device. We hypothesize that voter confidence is dynamic and that the context of an election or voting method affects voter perceptions of confidence. Thus, we argue voter confidence can only be fully understood in light of the issues surrounding the election, such as recent changes in election administration, election specific controversies, media stories, and the election outcome.

In the context of political efficacy and general perceptions of the political system, previous research finds that voters who cast their ballot for the winning candidate tend to have higher levels of efficacy relative to voters who supported the losing candidate (Ginsberg and Weissberg 1978; Clarke and Acock 1989; Craig, Niemi, and Silver 1990; Anderson and Tverdova 2001; Anderson and LoTempio 2002; Banducci and Karp 2003).[ii] We hypothesize that a similar relationship exists for how confident voters are in the election process, where voters who identify with winning candidates are more confident relative to voters who identify with losing candidates. At the party level, support for our hypothesis comes from Alvarez, Hall, and Llewellyn (2008a), who summarize their findings by hypothesizing that partisan differences

in voter confidence may be due to the outcomes of the 2000 and 2004 elections. The first hypothesis that we test is that a winner's effect exists. Where a winner's effect exists if, following an election, voters who voted for the winning candidate are more confident that their ballot was counted correctly relative to voters who voted for the losing candidate.[iii] We test this hypothesis by analyzing post election survey data and panel data from two surveys of voters conducted before and after the 2006 general election. We investigate the existence of a winner's effect by controlling for individual vote choice and election results at the house district and state levels.

Theoretical hypotheses that confidence affects political action date back to the mid-20th century (Stokes 1962). Empirical evidence suggesting a negative relationship between voter perceptions of confidence and turnout have been found by Rosenstone and Hansen (1993) in the context of political efficacy, and in the specific context of voter confidence by Alvarez, et al. (2008a). Due to the nature and context of American elections, the potential for a winner's effect based on voter perceptions of confidence is particularly troubling. High profile, two candidate elections in the United States always contain a winning and losing candidate, where the losing candidate is excluded from government. If election results affect voter confidence, then voters who support the losing candidate may be more likely to question the process used to elect officials, the legitimacy of the elected government, or be less likely to participate in future elections.[iv] For instance, some voters in the United States perceived the Bush Administration as illegitimate following the 2000 and 2004 elections (Craig, Niemi, and Silver 2006). Given America's penchant for plurality voting, if a winner's effect exists, then regardless of the measures taken by election administrators, a group of voters may always exist who question the accuracy of the election process and the legitimacy of certain politicians.

Through specific challenges to the accuracy and reliability of a voting device, voter perceptions of an election's legitimacy may be challenged through voting technology (Saltman 2006). Following the 2004 election, in response to voting rights groups' concerns over the accuracy of the voting process, 18 states passed legislation requiring a verifiable paper audit trail. For precincts using an electronic voting technology, this legislation requires that a VVPAT device be attached to the voting technology. The second hypothesis analyzed is that legislation leading to a greater number of VVPAT devices will produce observable differences in the confidence rates of those electronic voters who have access to VVPAT devices and those who do not. Although a 2006 survey of voters in Franklin County, Ohio did not find that the presence of a VVPAT device significantly altered voter confidence (Magelby et al. 2007), we anticipate that, when analyzing a national sample, the presence of a VVPAT will increase voter confidence because the voter can know that a durable, independent record of their vote exists. Although Atkeson and Saunders (2007) find that voting devices that produce a paper trail lead to greater voter confidence, we differentiate our work by focusing on the effect of independent recording on the confidence of electronic voters.[v]

Furthermore, the second hypothesis addresses a debate within the election administration community over what is the "best" voting technology: paper or electronic voting technologies. Following the 2000 election, government officials largely agreed that certain voting technologies needed replacement. The newly created Election Assistance Commission (EAC) was charged by the Help America Vote Act (HAVA) with the task to "…establish a program to provide funds to States to replace punch card voting systems…" However, when the EAC was created, officials did not unanimously agree on the voting technology that should replace punch cards. The debate over the replacement technology has settled upon two choices: a paper-based ballot such as an

optical scan ballot or an electronic ballot. Proponents of the paper-based technology lauded the fact that paper ballots facilitate recounts and audits but proponents of the electronic ballot touted its superior efficiency, control over the ballot box, and advantages for disabled voters (Alvarez and Hall 2008). To date, the debate over paper versus electronic ballots continues and is evidenced by Georgia being the first state to move to all electronic voting in 2002 and New Mexico's decision to move away from electronic ballots to statewide optical scan balloting in 2006 (Atkeson, Alvarez, and Hall 2007). Although the evidence from Franklin County, Ohio during the 2004 Presidential election suggests the need to consider the administrative impact of electronic voting (Highton 2006), we limit our discussion to the consideration of technological affects on voter confidence in the electoral process.

Confidence in the Election Process

The data analyzed in this article comes from the 2006 Cooperative Congressional Election Study (CCES), a collaborative research effort with 39 universities and over 100 political scientists participating.[vi] The 2006 CCES was a national stratified sample survey of registered and unregistered adults with a sample size of approximately 40,000; registered voters were over-sampled in order to produce similar rates of voting and non-voting participants. In order to attain a nationally representative sample, a random sub-sample was first selected from the 2004 American Community Study (ACS). Each individual selected out of the ACS was then matched to an individual who completed the CCES survey via matching on socio-economic attributes such as gender, age, race, and education. Finally, CCES respondents were weighted using post-stratification weights in order to equilibrate the CCES marginal distribution and ACS marginal distribution along a number of socio-economic variables (education, race, and age etc).

Each CCES survey was comprised of approximately 120 questions where questions common to all participants comprised half of the questionnaire and the other half consisted of questions designed by individual groups and asked of a subset of 1,000 people. The survey had a pre/post election design where questionnaires were completed on-line and fielded by the survey research firm Polimetrix, Inc. Pre-election surveys were conducted in October 2006 and the post-election surveys were completed in November 2006. The results presented here are based on a sub-sample of CCES participants who were asked questions over their level of confidence in the election process. The panel survey contains pre- and post-election opinions for 611 respondents who self-identified as voting in the 2006 mid-term election and self-identified that they voted using a paper, lever, or electronic voting technology.

Since voter confidence over the 2006 election is our dependent variable, the wording of the voter confidence question differed between the pre and post-election surveys. The dependent variable for the pre-election survey is, "How confident are you that your vote in the November 2006 election *will* be counted as you intended?" Respondents were asked to select one of the following options: very confident, somewhat confident, not too confident, and not at all confident. For the post-election survey, the dependent variable is, "How confident are you that your ballot in the November of 2006 election *was* counted as you intended?" and again the response options were very confident, somewhat confident, not too confident, and not at all confident. We recoded the responses from the pre- and post-election surveys into the variables *pre-confidence* and *post-confidence,* where a very confident response takes a value of three, a somewhat confident response takes a value of two, a not too confident response takes a value of one, and a not at all confident response takes a value of zero.

Below, we examine the question of voter confidence using both descriptive and regression analyses. The tables in the next section examine the overall voter confidence level during the pre-and post-election surveys. We anticipate that a winner's effect may exist at the house district, state, and national levels. Specifically, we expect voters who either voted for a winning candidate, or identify with the winning party at the national level, to experience greater gains in confidence following the 2006 election. If the presence of a VVPAT device leads to higher voter confidence among electronic voters, then we expect to observe a difference in the confidence rates between the two groups of electronic voters. Following the descriptive analysis, we discuss the methodology and estimates for a series of multivariate logistic regression models that further investigate the two primary hypotheses.

Descriptive analysis

We present in Table 1 the weighted summary statistics for voter confidence from the pre- and post-election surveys. In the October 2006 survey, prior to the election, 17.1% of respondents were either not at all confident or not too confident that their 2006 ballot would be counted as intended. Following the 2006 election, in the post-election survey, the percent of respondents who were either not at all confident or not too confident fell to 9.2%, a difference of about 8 points relative to the pre-election survey (t=5.4). The 2006 post-election results are comparable to previous nationally representative polls by Alvarez, Hall, and Llewellyn (2008a) and CNN that, respectively, find 11% and 9% of voters were not at all or not too confident that their vote for President following the 2004 election were counted as intended.[vii]

Insert Table 1

By comparing a voter's confidence rate before and after the election, we can determine whether a voter's confidence level was higher, lower, or unchanged following the election. We present in Table 2 marginal statistics for changes in voter confidence between the pre-election and post-election surveys. Relative to their pre-election confidence level, approximately one-third of voters were more confident following the election, while about 10% of voters are less confident following the election. Finally, more than one-half of voters reported no change in their confidence level following the 2006 election. Summarizing the results presented in Tables 1 and 2, the confidence level following the 2006 election is higher relative to the pre-election confidence level.[viii]

Insert Table 2

Consistent with the winner's effect hypothesis, the increase in voter confidence following the 2006 election may reflect increased confidence among voters who cast their ballot for winning candidates. However, another explanation for the higher levels of confidence following the 2006 election is that the factors that influence a voter's assessment of confidence may differ depending upon when a survey is fielded. For instance, prior to the election a voter's socio-economic characteristics, such as party identification or education, may heavily influence voter confidence. Following the election, specific factors regarding the voting process, such as election outcome or the voting technology used, may largely determine voter confidence. We turn now to a descriptive analysis of how the specific context surrounding the voting process may affect voter confidence.

The winner's effect hypothesizes that individuals who vote for winning candidates are more likely to be confident that their vote was counted accurately. Table 3 presents post-election confidence levels for individuals who voted in both a house and gubernatorial race. In general,

the results presented in Table 3 suggest that confidence rates increase as voters report voting for a greater number of winning candidates. For instance, voters who reported voting for neither the winning house nor gubernatorial candidate are 20 points less likely to report being very confident relative to voters who reported voting for both the winning house and gubernatorial candidates (t=4.8). Although we will revisit this in the regression analysis, descriptive results lend preliminary support to the winner's hypothesis at the individual race level.

Insert Table 3

In addition to individual races, we hypothesize that a winner's effect may exist at the state or federal level as a result of partisan identification. Voters not only identify with candidates from their own district but, via their party identification, with candidates from different districts and states. If voters follow races outside of their own district, then voters may be susceptible to inferring local irregularities from national results. An analysis of reported confidence rates by party ID reveals a sharp increase in Democratic voter confidence following the 2006 election. Table 4 presents pre- and post-election voter confidence rates for Republicans and Democrats.

Insert Table 4

At the national level, the winner's effect hypothesis predicts that, prior to the 2006 election, Republicans will be more confident relative to Democrats given Republican electoral successes from 2000 to 2004. However, following the 2006 mid-term election, in which the Democrats retook both the U.S. House and Senate, Democratic voters should experience an increase in confidence relative to Republicans. As expected, prior to the 2006 election Republicans appear significantly more confident relative to Democratic voters. Although Republicans are still more confident following the 2006 election, the confidence gap between

Republicans and Democrats is noticeably smaller. Democratic voter confidence significantly increases following the 2006 election; for instance, the percent of Democrats who are very confident increases by over 20 points (t=6.1). However, post-election Republican voter confidence rates are statistically identical when compared to their pre-election confidence rates (t=1.6).

At the individual voter level, when analyzing changes in confidence between pre-election and post-election confidence rates, Table 5 depicts distinct differences between Democrat and Republican voters. Republicans are equally likely to become more confident following the election as they are to become less confident following the election; that is changes in Republican confidence are approximately normally distributed. Relative to Republican voters, following the election Democratic voters are more than twice as likely to report a higher level of confidence and about half as likely to report a drop in confidence.

Insert Table 5

Hypothesis 2 states that electronic voters who have access to a VVPAT device will have higher confidence rates relative to electronic voters who do not have access to a VVPAT device. Presented in Table 6 are the post-election confidence rates for voters who used one of three voting technologies: electronic voting machines with a VVPAT technology, electronic voting without a VVPAT technology, and paper based voting.

Insert Table 6

The descriptive results for confidence, reported by voting technology, indicate that individuals who vote electronically but have access to a VVPAT are significantly more likely to be somewhat or very confident relative to electronic voters who do not have access to a VVPAT

(t=3.5). Furthermore, no voter who casts a ballot using an electronic voting machine equipped with a VVPAT described herself as "not at all confident". Additionally, VVPAT voters were 12 points more likely to be very confident compared to paper ballot voters and 20 points more confident than electronic voters without a VVPAT. However, we argue that a statistical test of the claim that the VVPAT increases confidence among electronic voters is meaningful only when done in the context of regression analysis that controls for other variables such as age and education of the voter. The basis for this claim is that VVPAT devices may be more common in wealthier voting precincts, which would be positively correlated with education; we account for this type of correlation in the next section.

Multivariate Analysis

We use a multivariate analysis to analyze the two hypotheses: (1) that a winner's effect exists and (2) the presence of a VVPAT device increases confidence among electronic voters. We estimate two regression models to investigate these two hypotheses, controlling for a set of independent variables, and in order to evaluate two separate affects of our hypothesis. The first regression model, Model 1, uses post-election confidence as the dependent variable to analyze: (1) a winner's effect exists and (2) if post election confidence rates are significantly affected by the presence of a VVPAT device. As the dependent variable in the first model involves an ordinal choice, we estimate an ordinal choice logit model. In Model 1, the dependent variable has four categories, with the value of three corresponding to a voter who is very confident and a value of zero corresponding with a voter who is not at all confident; thus higher values of the dependent variable translate into higher levels of confidence.

In Model 2, we estimate a dynamic model of voter confidence that measures changes in individual voter confidence between the pre-and post-election surveys. As discussed in the

descriptive results section, overall voter confidence increases between the pre- and post-election surveys. The dynamic model, Model 2, is used to evaluate whether the winner's effect or voting technology is partially responsible for this increase in confidence. Furthermore, as we will discuss below, Model 1 is incapable of identifying a winner's effect at the national (party) level. However, under some fairly benign assumptions, Model 2 will allow us to estimate whether the winner's effect exists at the national level. In Model 2, we analyze changes in voter confidence between the pre- and post-election surveys and condense the response space from seven possible changes down to three.[ix] The dependent variable in Model 2 takes a value of 1 if the voter expressed a higher degree of confidence in the post-election survey relative to the pre-election survey, a value of -1 if the pre-election confidence level was higher, and 0 if no change between the surveys.

Testing the winner's effect hypothesis is complicated by the possibility that a winner's effect may simultaneously exist over multiple races on the same ballot. What is more, a voter's confidence may be influenced by races in other districts or states. If a winner's effect exists in multiple races or across ballots, this implies fairly sophisticated behavior on the part of voters as they differentiate results from multiple levels of government in their assessment of confidence. In order to evaluate possible levels to the winner's effect, we control for election results at the national, state, and house district levels. Allowing for the possibility that a Republican voter may favor a Democratic governor or *vice versa*, we use three different questions to proxy the winner's effects at the house, state, and national levels.

In Models 1 & 2, the dummy variables *governor win* and *house win* take values of 1 if the respondent reported voting for the winning gubernatorial or house candidate. Additionally, the dummy variables *governor neutral* and *house neutral* take values of 1 if the respondent did not

vote in that particular race.[x] If the values of *governor win* and *governor neutral* both equal zero, then the respondent reported voting for the losing gubernatorial candidate in 2006. Similarly, if the values of *house win* and *house neutral* both equal zero, then the respondent voted for the losing house candidate in 2006. The governor and house variables are intended to capture the winner's effect at the state and house levels. If a winner's effect exists at the candidate level, then we anticipate that in Model 1 the estimated signs and coefficients for the variables *governor win* and *house win* will be positive and significant.

The baseline categories for the winner's effect variables are those voters who voted for a losing candidate at the house and state levels following the 2006 election. At the national level the Democrats retook both Houses of Congress from the Republicans in the 2006 election and we anticipate that, following the 2006 election, Democrats will most likely view themselves as winners and Republicans will view themselves as losers. Using the 2006 election results and voter party identification, it is natural to want to use party identification to capture the winner's effect at the national level. However, it is conceivable that using partisan identification to proxy a national winner's effect in Model 1 is problematic because of inherent differences in confidence, unrelated to election results, along partisan lines. We recognize that in Model 1 the estimated coefficients for party identification may capture differences that arise due to differences in preferences and beliefs (Page and Jones 1972; Franklin 1992). However, assuming differences in partisan preferences and beliefs are fixed in the short-run, the coefficient for *Democrat* in the dynamic model of voter confidence, Model 2, will estimate the difference in the likelihood of winners (Democrats) becoming more confident at the national level following the election.[xi] In other words, if the estimated effects of the party ID coefficients are significant

in a dynamic model of voter confidence, then we attribute this finding to the national election results and not some unobserved, ancillary variable.

In order to test the effect of VVPAT devices on electronic voter confidence it was necessary to determine the respondent's voting technology and, for electronic voter's, whether a VVPAT device was present. We obtained information regarding the voting technologies used by respondents through a closed form survey question that asked respondents the type of machine used to cast their ballot. Respondents were given five voting technology categories from which to choose: electronic, punch card, paper, lever, and other. Because we were unable to classify individuals who either did not know the voting technology they used or responded "other" technology, we eliminated these individuals from the analysis.[xii] Furthermore, only 16 respondents claimed they voted using punch-card technology and with too few observations to develop a reliable estimate of the effect of punch card voting on confidence, we omitted these respondents from the analysis. Respondents who indicated voting via an electronic technology were asked a follow up question that asked if their electronic machine had a printout to view your vote. We coded the dichotomous variable *VVPAT* with a value of 1 if respondents reported voting electronically on a machine that had a printout on which to view their vote and 0 otherwise.

Included on the right-hand side of Models 1 and 2 are typical socio-economic variables such as age, minority status, gender, and education. In the following sections, we estimate the regressions discussed above and discuss the findings in the context of the 2006 election.

Confidence After The 2006 Election

The estimated coefficients for Model 1 are found in Table 7 and the corresponding first differences for the estimated coefficients are found in Table 8. When we examine voter confidence following the 2006 election, socio-economic variables only partially predict voter confidence. While the estimated coefficient for party identification is statistically significant, we find the other socio-economic variables education, age, minority status, and gender do not have a significant effect on voter confidence. However, we find that the variables specific to the context of the voting process are significant in predicting voter confidence: the election results and voting technology do significantly affect voter confidence.

Insert Tables 7 & 8

Recall that the winner's effect hypothesis states that, following the election, individuals who vote for the winning candidate will be more confident relative to individuals who vote for the losing candidate. The results reported in Table 7 and 8 present strong evidence that support the winner's effect hypothesis. The estimated coefficients for *governor win* and *house win* are both positive and statistically significant. Specifically, individuals who voted for the winning house (gubernatorial) candidate are 8 points more likely to be very confident relative to individuals who voted for the losing house (gubernatorial) candidate.[xiii] Thus, relative to those voters who cast a ballot for a losing candidate, individuals who voted for the winning gubernatorial or house candidate are significantly more confident.

We turn now to the second hypothesis regarding the effect VVPAT devices have upon the confidence of electronic voters. Consistent with previous research the estimated coefficient for electronic voting in the post-election model is both negative and significant; electronic voters are less confident relative to voters who use paper ballots. However, when we examine the

effect of a VVPAT device on confidence, we find that electronic voters who have the opportunity to review a printed copy of their ballot are significantly more likely to be very confident relative to electronic voters who did not have access to a VVPAT device. Thus, the presence of VVPAT devices significantly increases voter confidence among electronic voters. Furthermore, following the election, electronic voters who cast their ballot on a voting machine with a VVPAT are a statistically significant 12 points more likely than paper based voters to be very confident.[xiv] Our results indicate that, from the perspective of voter confidence, the debate over the desirability of electronic versus paper ballots must be placed in the context of whether or not the voting device is equipped with a VVPAT device.

Additionally, Table 8 shows that consistent with previous findings, the confidence gap between Republicans and Democrats remains following the 2006 election. While at the national level Democrats were the clear winners in the 2006 election, following the election Republicans confidence levels remain higher relative to Democrats. Recalling that Republicans are the median voter for the first differences at the bottom of Tables 8, we see that the estimated likelihood of a very confident response among Republican voters is 71% following the 2006 election. Democrats are 20 points less likely to be very confident relative to Republicans. As noted above, due to the possibility of inherent differences between Democrats and Republicans, we are unable to estimate a national winner's effect using party ID and the static post-election survey data. However, in the next section we present a model that estimates a dynamic model of voter confidence, which allows us to estimate if a relationship may exist between party ID and a national winner's effect.

Changes in Pre- and Post-Election Confidence

The previous results estimate voter confidence at a particular point in time. However, our hypotheses consider how changes in the context of an election, specifically the event and outcomes of an election, affect voter confidence. We investigate the two primary hypotheses more fully in Model 2, where the dependent variable is whether the voter's confidence increases after the election, remains unchanged, or declines (using the values 1, 0, and -1 respectively). The estimated coefficients and estimated first differences are found in Tables 9 and 10.

Insert Tables 9 and 10

Recall that we anticipate Democrats will perceive themselves as the victors at the national level. Thus, if a winner's effect exists at the national level, then we expect that, following the election, Democratic confidence rates will be more likely to rise relative to Republicans. Consistent with the winner's effect hypothesis, the estimated coefficient in Model 2 for Democrat is positive and significant. That is, relative to Republican voters, Democrats have a higher probability of increasing their level of confidence following the 2006 election. Specifically, Democratic voters are a statistically significant 19 points more likely than are Republican voters to express a higher level of confidence following the 2006 mid-term election.[xv] The results in Model 2 are consistent with a winner's effect at the national level and provide strong evidence that the winner's effect may be responsible for the reduction in the confidence gap between Republicans and Democrats following the 2006 election.

Turning our attention to the house and governor races, we find weak support that voting for the winning house or gubernatorial candidate will significantly affect a voter's pre-election confidence level. Although the associated *p*-value of .06 for the estimated coefficient on *governor win* is on the cusp of significance, the estimated coefficient for *house win* is hardly

different than zero and takes the wrong sign. Therefore, we conclude that the outcomes of a voter's house and governor races do not appear to alter significantly the voter's confidence. Combining this last result with the above post-election results appears to raise an interesting puzzle: a winner's effect exists at the house and gubernatorial levels but the winner's effect does not significantly alter an individual's pre-election confidence rate. This result may be due to a voter's ability to predict, with a fair degree of accuracy, the outcomes of races over which the voter is familiar, such as house and gubernatorial races in their own district and state. However, these same voters may lack the information necessary to predict outcomes at the national level.[xvi] Although local election results may be factored into pre-election levels of confidence, uncertainty regarding national election results may lead to voters to alter their pre-election confidence levels.

Continuing to investigate contextual explanations for the increase in voter confidence following the 2006 election, we turn our attention to the second hypothesis, which looks at the effect of VVPAT devices on voter confidence. Here, we find that, following the election, individuals using an electronic voting technology without a VVPAT device are 5 points more likely to see a decrease in their confidence relative to paper voters.[xvii] However, VVPAT voters are a statistically significant 11 points more likely to become more confident following the election relative to regular electronic voters.[xviii] Finally, the estimates in Table 10 suggest that voters who vote via paper ballots and electronic ballots with a VVPAT are equally likely to experience an increase in confidence following the election. We conclude that the effect of voting technology on the probability that a voter changes their assessment of confidence is important, as it may provide an avenue that election administrators can take to improve voter confidence. Contrary to advocates who propose either an entirely paper-based or an electronic

voting technology, the evidence presented above highlights the need for voting machines to produce what voters see as independent, verifiable results.

Conclusions

By leveraging the 2006 electoral environment, we test whether the context of an election, the election outcome, and technology used to cast a ballot affect the confidence voters have that their ballots will be counted accurately. Using 2006 post-election survey data, we test the hypothesis that voters who cast their vote for the winning house and gubernatorial candidates possess higher rates of confidence following the election. Furthermore, we investigate the existence of a winner's effect at the national level by analyzing 2006 panel data comprised of pre- and post-election survey data. Finally, we analyze administrative changes that required many states to attach voter verifiable paper audit trail (VVPAT) devices to electronic voting machines resulted in higher levels of voter confidence. The large-scale adoption of VVPAT devices allows us to test the confidence rates of two sub-groups of electronic voters at the national level.

The first hypothesis we test is that voters who vote for winning candidates are more confident that their ballot was counted correctly. Specifically, we test whether voting for the winning candidate leads to higher levels of confidence relative to voters who voted for the losing candidate. We test this hypothesis at the individual candidate level using self-reported voting results and house and gubernatorial election results. The empirical results support the conclusion that, following the election, voters who vote for the winning candidate in a house or governor race express significantly higher levels of confidence relative to voters who vote for the losing candidates. Additionally, a dynamic model of voter confidence that measures changes in a voter's confidence as measured before and after the election suggests that a winner's effect exists

at the national level. Although Republicans are more confident than Democrats before the election, we find evidence that the confidence gap between Republicans and Democrats shrinks following the 2006 election. We attribute this finding to the existence of a winner's effect at the national level where Democrats identify themselves as the winner's, and Republicans the losers, of the 2006 election.

The second hypothesis we test is that the context of electronic voting, the presence or absence of a VVPAT device, significantly affects voter confidence. Consistent with previous findings, our results show that following the 2006 election in the absence of a control for VVPAT devices electronic voters are significantly less confident relative to paper voters. However, we find that in a national sample of electronic voters the addition of a VVPAT device significantly increases the confidence rate of electronic voters. Furthermore, estimates of the change in a voter's confidence rate, as measured by the difference in a voter's confidence before and after the election, are statistically equivalent between voters who cast an electronic ballot in the presence of a VVPAT device and voters who cast a paper ballot. We conclude that in discussing the effect of electronic voting upon voter confidence, it is necessary to frame the debate in the context of whether or not a VVPAT device is present.

This empirical evidence lends strong support to the conclusion that, in order to understand voter confidence, it is first necessary to understand the context of an election. The possibility that the factors that predict voter confidence, and to some extent contribute to voter confidence, may vary depending upon the context of the election and timing of the survey is an important question. Only through additional research of voter confidence can academics begin to understand fully the subtle nuances that comprise a voter's perception of confidence in the American electoral process.

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Table 1: Pre-and post-election confidence

Confidence	Pre-election	Post-election
Not at all confident	5.3% (41)	3.0% (24)
Not too confident	11.8% (91)	6.2% (49)
Somewhat confident	45.1% (350)	37.7% (296)
Very confident	37.8% (293)	53.1% (417)
Totals	100% (775)	100% (786)

Table 2: Dynamic measure of voter confidence

Confidence	
Less confident following the election	9.7% (60)
No change in confidence	59.2% (362)
More confident following the election	31.0% (189)
Totals	100% (611)

Table 3: Voter Confidence: House and Gubernatorial Election Results by Individual Voter

Confidence	Both candidates lost	One candidate won and the other lost	Both candidates won
Not at all confident	11.9% (13)	2.9% (6)	0.0% (0)
Not too confident	7.0% (8)	6.9% (14)	5.0% (10)
Somewhat confident	40.6% (45)	35.1% (73)	33.9% (67)
Very confident	40.5% (45)	55.2% (114)	61.1% (120)

Table 4: Confidence by Partisan Identification

Confidence	Pre-election	Post-election
Democrats		
Not at all confident	7.0% (19)	2.2% (6)
Not too confident	16.6% (44)	8.7% (22)
Somewhat confident	54.7% (147)	42.7% (111)
Very confident	21.7% (58)	46.4% (120)
Republican		
Not at all confident	0.3% (1)	0.7% (2)
Not too confident	4.3% (10)	4.2% (10)
Somewhat confident	35.6% (84)	28.5% (69)
Very confident	59.8% (140)	66.6% (162)

Table 5: Dynamic Measure of Voter Confidence by Partisan Identification

Democratic Voter Confidence	Democrats	Republicans
Less confident following the election	7.2% (16)	13.8% (26)
No change in confidence	49.5% (107)	70.2% (134)
More confident following the election	43.3% (94)	16.1% (31)
Totals	100% (217)	100% (191)

Table 6: Confidence by Voting Technology

Confidence	Post-election
Electronic with VVPAT	
Not at all confident	0.0% (0)
Not too confident	3.4% (3)
Somewhat confident	29.9% (30)
Very confident	66.7% (67)
Electronic without VVPAT	
Not at all confident	5.6% (13)
Not too confident	8.5% (20)
Somewhat confident	39.9% (95)
Very confident	46.0% (109)
Paper	
Not at all confident	2.5% (10)
Not too confident	6.3% (25)
Somewhat confident	36.5% (145)
Very confident	54.7% (217)

Table 7: Estimated Coefficients for the Post-Election Model of Voter Confidence

	Coefficient	Stand. Error	Z	Significance
Democrat	-.89	.20	-4.6	.00
Independent	-.99	.19	-5.2	.00
House win	.37	.17	2.2	.03
House neutral	.29	.26	1.1	.27
governor win	.43	.18	2.5	.01
Governor neutral	.19	.20	1.0	.33
Post lever	.67	.33	2.0	.05
Post DRE	-.47	.17	-2.8	.01
VVPAT	1.21	.26	4.6	.00
Female	-.05	.15	-.3	.76
Log education	.22	.14	1.5	.14
Age 18-29	-.27	.33	-.8	.42
Age 30-39	-.15	.27	-.6	.57
Age 40-49	-.40	.25	-1.6	.12
Age 50-64	-.14	.22	-.7	.51
Minority	-.30	.23	-1.3	.19
Cut 1	-3.86	.36		
Cut 2	-2.62	.32		
Cut 3	-.44	.30		
Number of Obs	722			
LR	84.2			
Prob > chi2	.00			
Log likelihood	-670			
Pseudo R2	.06			

Table 8: Estimated First Differences for the Post-election Model of Voter Confidence

	Not confident		Not too confident		Somewhat confident		Very Confident	
Median voter[a]	.01		.03		.25		.71	
Democrat	.02	+	.04	+	.14	+	-.20	+
Independent	.02	+	.05	+	.16	+	-.23	+
House win	-.01	+	-.01	+	-.06	+	.08	+
House neutral	-.00		-.01		-.04		.05	
governor win	-.01	+	-.01	+	-.06	+	-.08	+
Governor neutral	-.00		-.01		-.03		.04	
Post lever	-.01	+	-.01	+	-.09	+	.11	+
Post DRE	.01	+	.02	+	.08	+	-.11	+
VVPAT[b]	.00	+	-.01	+	-.11	+	.12	+
Female	.00		.00		.01		-.01	
Log education[c]	-.00		-.00		-.02		.02	
Age 18-29	.00		.01		.05		-.06	
Age 30-39	.00		.01		.02		-.03	
Age 40-49	.01		.01		.07		-.09	
Age 50-64	.00		.01		.02		-.03	
Minority	.01		.01		.05		-.07	

+ - Estimate significantly different from zero using a 95% confidence interval.
a- The hypothetical median voter possesses the following characteristics: white, age 65+, republican, completed some college, female, used a paper ballot, and does not live in a district controlled by either party.
b- Estimates include the effect of being an electronic voter.
c- Estimates the effect of increasing a respondents education status from high school degree to completing some college.

Table 9: Estimated Coefficients for the Dynamic Model of Voter Confidence

	Coefficient	Stand. Error	Z	Significance
Democrat	1.04	.22	4.8	.00
Independent	.68	.22	3.2	.00
House win	-.01	.19	-.1	.96
House neutral	.52	.29	1.8	.08
governor win	.38	.20	1.9	.06
Governor neutral	.40	.22	1.8	.07
Post lever	.26	.33	.8	.42
Post DRE	-.45	.20	-2.3	.02
VVPAT	.67	.26	2.5	.01
Female	.30	.17	1.7	.08
Log education	-.30	.16	-1.9	.06
Age 18-29	.27	.38	.7	.47
Age 30-39	.10	.30	.3	.75
Age 40-49	.18	.29	.7	.52
Age 50-64	.11	.25	.5	.65
Minority	-.03	.26	.1	.91
Cut 1	-1.52	.35		
Cut 2	1.71	.35		
Number of Obs	578			
LR	51.4			
Prob > chi2	00			
Log likelihood	-496			
Pseudo R2	.05			

Table 10: Estimated First Differences for the Dynamic Model of Voter Confidence

	Less confident		No change		More confident	
Median voter[a]	.17		.66		.17	
Democrat	-.10	+	-.09		.19	+
Independent	-.08	+	-.04		.12	+
House win	-.00		.00		-.00	
House neutral	-.06		-.03		.09	
governor win	-.05		-.01		.06	
Governor neutral	-.05		-.01		.06	
Post lever	-.03		-.01		.04	
Post DRE	.07	+	-.02		-.05	+
VVPAT[b]	-.03		-.01		.04	
Female	-.05		.01		.04	
Log education[c]	.03		.00		-.03	
Age 18-29	-.03		-.01		.04	
Age 30-39	-.01		-.00		.01	
Age 40-49	-.02		-.00		.02	
Age 50-64	-.02		.00		.02	
Minority	.01		-.01		.00	

+ - Estimate significantly different from zero using a 95% confidence interval.
a- The hypothetical median voter possesses the following characteristics: white, age 65+, republican, completed some college, female, used a paper ballot, and does not live in a district controlled by either party.
b- Estimates include the effect of being an electronic voter.
c- Estimates the effect of increasing a respondents education status from high school degree to completing some college.

End Notes

[i] See Alvarez and Hall 2008 and Herrnson et al. 2008a, 2008b for a discussion of this issue.
[ii] Prior to the 2000 election the political efficacy literature investigated broad questions such as the erosion of political efficacy during the last half of the 20th century (Dalton 2004) and the comparison of trust in government across regimes and countries (Inglehart 1997). More specific inquires into questions surrounding political efficacy focus upon voter trust in particular democratic institutions such as elected officials and Congress (Fenno 1978; Hetherington 1998). However, the literature on trust in government takes the confidence that citizens and voters have in the electoral process for granted. The distinction between the trust in government literature and studies investigating the confidence voters and citizens have in the electoral process is important as *a priori* there is no reason to suspect that one group is a subset of the other.

[iii] Our hypothesis that a winner's effect exists is compatible with voter behavior where *ex post* voters may rationalize their vote choice and turnout decision by updating their beliefs over the accuracy of the electoral system.
[iv] See Nadeau and Blais (1993) for a similar argument, as well as a summary of the normative democratic theory questions raised by possible winner's effects.
[v] For a comprehensive analysis of the features of various voting technologies and the operations of VVPAT systems, see Herrnson et al, 2008.
[vi] A complete discussion of the survey methodology can be found at the Cooperative Congressional Election Study at http://web.mit.edu/polisci/portl/cces/index.html . See Gartner (2008) for another example of use of the CCES data.
[vii] The CNN 2004 exit poll numbers can be viewed at the following website: http://www.cnn.com/ELECTION/2004/pages/results/states/US/P/00/epolls.0.html.
[viii] The total number of respondents included in Table 1 is higher relative to Table 2 some respondents who participated in the pre-election survey either declined to participate in the post-election survey or were unable to be contacted.
[ix] There exist seven possible changes as respondents may increase or decrease their confidence by any integer in the set [-3,3]. The loss in efficiency from transforming the scale to [-1,1] is minimal as few observations exist at either ±2 or ±3. Finally, the results do not substantively change when running the regressions on the un-collapsed dependent variable.
[x] All individuals living in a state that did not hold a gubernatorial election in 2006 are coded as being governor neutral.
[xi] We anticipate the estimated coefficient for Independents to be positive as according to a Washington-ABC News poll Independents supported Democrat House candidates by a 2-1 margin (Balz and Cohen 2006).
[xii] As all post-election surveys were completed within a week of the election. We believe it is reasonable that voters recall the specific technology used to cast their ballot. This requirement excluded 3 respondents from the analysis.
[xiii] Statistically significant at the 95% confidence level.
[xiv] Statistically significant at the 95% confidence level.
[xv] Statistically significant at the 95% confidence level.
[xvi] For instance, at the national level empirical evidence suggests voters consistently predict the outcomes of presidential elections, and that correct predictions are correlated with information (Lewis-Beck and Tien 1999).
[xvii] Statistically significant at the 95% confidence level.
[xviii] Statistically significant at the 95% confidence level.