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VOTER CONFIDENCE IN CONTEXT AND THE EFFECT OF WINNING

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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 national outcomes of the 2000 and 2004 elections, Republicans were victorious. Additionally, research 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 hypothesize that future research of voter confidence should interpret voter confidence within the context of the election. This hypothesis, and the particular context of the 2006 election, gives rise to two testable hypotheses. First, we hypothesize that the effect of partisanship on voter confidence is conditional on which party wins the election. Thus, we anticipate that, relative to Republicans, Democrats will experience greater gains in confidence following the 2006 election. Since the 2004 election, greater adoption of voter verified paper audit trail (VVPAT) devices allows us to analyze the context of the technological debate regarding voting technology. The second hypothesize we test is that voter access to a 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; 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 following the 2006 election when compared to electronic voters who do not have access to VVPAT devices. Finally, in 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.

Since the 2000 and 2004 elections, the media and voting rights groups have raised concerns regarding the accuracy and reliability of the American ballot counting process. In response to these concerns, a number of commissions were created to evaluate election administration and to recommend reforms and Congress subsequently passed the Help American Vote Act in 2002. At approximately the same time as media, voting rights groups, and Congress expressed concern that voters were not confident in the election process, academics began to study the issue of public confidence in the electoral process in the United States (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).

Studies of voter confidence following the 2004 election generally agree on two findings. First, voters who identify as Republicans are more confident that their vote was counted accurately relative to voters who 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 either an electronic ballot and/or could not verify their ballot were 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 results 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.

The 2006 mid-term election represents an important event in the study of voter confidence as the 2006 election presents two new contexts in which to evaluate voter confidence. Since researchers have been studying voter confidence, the 2006 election represents the first time the Democrats achieved 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.[1] We hypothesize that voter confidence is dynamic and that the context of an election affects voter perceptions of confidence. Thus, 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). We hypothesize that a similar relationship exists for how confident voters are in the election process, where voters who identify with the winning party are more confident relative to voters who identify with the losing party. Support for our hypothesis comes from Alvarez, Hall, and Llewellyn (2008a) who summarize their results with a similar conclusion 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 would exist if, following an election, voters who identify with the winning party (or candidate) are more confident that their ballot was

[1] See Alvarez and Hall 2008 and Herrnson et al. 2008a, 2008b for a discussion of this issue.

counted correctly than voters who identify with the losing party.[2] We test this hypothesis by analyzing panel data from two surveys of voters conducted before and after the 2006 general election. We investigate the existence of a winner's effect at the national and state levels, controlling for the local political environment and also examine the individual-level factors that determine a voter's confidence in the electoral process before and after the intervention of an American national election.

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 Alvarez et al. (2008a). However, 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.[3] If losing voters are less confident, then voters who identify with the losing party may question the process used to elect officials, the legitimacy of the elected government, or be less likely to participate in future elections.[4] For instance, some voters' in the United Stated perceived the Bush Administration as illegitimate following the 2000 and 2004 elections (Craig, Niemi, and Silver 2006). Given America's two party system, if a winner's effect exists, then regardless of the measures taken by election

[2] 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.
[3] By contrast, a voter in a multi-party parliamentary system can have their candidate or party "lose" on Election day but still have their party represented in the coalition government formed after the election.
[4] 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.

administrators, a minority of voters may always exist, at both the local and national level, who think that the ballot counting process is biased against their personal political ideology.

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 does not find that the presence of a VVPAT device significantly alters 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 verifiable results lead to greater voter confidence, we differentiate our work by focusing on the effect of verifiable results on the confidence of electronic voters.[5]

Furthermore, the second hypothesis addresses a debate within the election administration community over which 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

[5] For a comprehensive analysis of the features of various voting technologies and the operations of VVPAT systems, see Herrnson et al, 2008.

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 affect 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

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 20th century 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. For instance, in the specific context of electronic voting it may be the case that voters have a low level of confidence in the security of an electronic ballot box but high levels of trust in their elected officials. The data collected and analyzed in this article focuses upon voter confidence in the electoral process where all references to voter confidence and confidence are in the context of voters being confidence that their 2006 ballot was counted accurately.

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.[6] 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 marginals and ACS marginals 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

[6] 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.

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 570 respondents who self-identify as voting in the 2006 mid-term election and self-identify 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 multivariate analyses. The tables in the next section examine the overall voter confidence level during the pre-and post-election surveys. We expect that, if a winner's effect exists at the national level, then Democrats should experience an increase 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; even without controlling for socio-economic variables. 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. Prior to the 2006 election, 16.4% of respondents are either not at all confident or not too confident that their 2006 ballot will be counted as intended. Following the 2006 election, the percent of respondents who are either not at all confident or not too confident falls to 9.7%, a difference of 6 points relative to the pre-election survey (t=4.6). The percent of respondents who claim to be very confident following the 2006 election is approximately 15 points higher relative to the pre-election respondents (t=-6.5). 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 was counted as intended.[7]

Insert Table 1

Consistent with the winner's effect hypothesis, the increase in voter confidence following the 2006 election may be a reflection of increased confidence among winning (in this case, Democratic) voters. However, another possible explanation for the higher levels of confidence prior to 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

[7] 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.

voter confidence. Following the election, specific factors regarding the voting process, such as the voting technology used or the election outcome, may largely determine voter confidence.

Although a descriptive analysis of confidence by party identification does not address the potential multilevel nature of a winner's effect, which we discuss below, or that Democrats may be more likely to anticipate problems prior to the 2006 election, this analysis does reveal the sharp increase in Democratic voter confidence following the 2006 election. Table 2 presents summary confidence statistics for Republicans and Democrats, weighted to reflect the U.S population, for the pre- and post-election voter confidence rates.

Insert Table 2

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 success from 1998 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, before 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 sizably 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 the pre-election confidence rates.

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 3 are the post-election confidence rates for three voting technologies:

electronic voting machines with a VVPAT technology, electronic voting without a VVPAT technology, and paper based voting.

Insert Table 3

The descriptive results 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 both electronic voters who do not have access to a VVPAT (t=3.5). Furthermore, no voters who cast ballots using an electronic voting machine equipped with a VVPAT were not at all confident that their votes were counted accurately. Additionally, VVPAT voters were 11 percentage points more likely to be very confident compared to paper ballot voters and 21 percent 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. For instance, VVPAT devices may be more common in wealthier voting precincts, which would be positively correlated with education.

Multivariate Analysis

We use a multivariate analysis to analyze the two hypotheses: (1) that a winner's effect exists at the local, state, and/or national level and (2) the presence of a VVPAT device increases confidence among electronic voters. We estimate a series of regression models to investigate these two hypotheses, controlling for a set of independent variables. The dependent variable in Model 1 is pre-election voter confidence and in Model 2 the dependent variable is post-election voter confidence. In Model 3 we estimate a dynamic model that measures changes in voter confidence between the pre-and post-election surveys. As the dependent variable in each model

involves an ordinal choice, we estimate ordinal choice logit models. In Models 1 and 2 the dependent variable has four categories, with the value of three corresponding to a voter who is very confident and a value of zero a voter who is not at all confident. In Model 3 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.[8] The dependent variable in Model 3 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. The multivariate analysis focuses on the central questions: (1) does a winner's effect exist and (2) does the presence of a VVPAT device make electronic voters more confident?

Testing the winner's effect hypothesis is complicated by the possibility that a winner's effect may simultaneously exist in a multitude of local, state, and national races on the same ballot. If a winner's effect exists at multiple levels, this implies fairly sophisticated behavior on the part of voters as they differentiate between 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 local, state, and national level. All three model specifications, control for the possible multilevel nature of the winner's effect by identifying a winner's effect at the national, state, and local 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 effects at the local, state, and national levels.

[8] There exist seven possible changes as respondents may increase or decrease their confidence by any integer in the set [-3,3]. For instance, if a voter went from very confident during the pre-election survey to not too confident during the post-election survey, then the dependent variable on a seven point scale would be -2. However, 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.

Given the number and variety of local government elections, we do not directly test whether an individual views herself as a winner in each local contest. Instead, we develop a proxy for a local winner's effect through the question, "Do you feel one party controls the governmental system in your U.S. House district?"[9] Respondents were given the options: (1) yes, Republicans, (2) yes, Democrats, (3) No, (4) Yes, other party, (5) don't know. The variable *local control agree* is a dummy variables that take a value of 1 if the respondent is of the opinion that one party controls their voting district and the respondent identifies with that party. The dummy variable *no local control* takes a value of 1 if the respondent believes no party controls the governmental system in their House district. If both local party variables are equal to zero, then the respondent does not identify with the party he or she feels controls the governmental system in their district.

In the pre-election model, the dummy variable *governor agree* takes a value of 1 if the respondent and the current governor identify with the same political party. In models 2 and 3, the variable *governor win* is a dummy variable and takes a value of 1 if the respondent reports voting for the winning governor. The dummy variable *no governor race* takes a value of 1 if no gubernatorial race occurred in the respondent's state during the 2006 election. If the values of *governor win* and *no governor race* both equal zero, then the respondent voted for the losing gubernatorial candidate during the 2006. The variables *governor win*, and *no governor race* are intended to capture the winner's effect at the state level.

The baseline categories for the local and state winner's effect variables are those who identify with a losing candidate at the local and state levels following the 2006 election. At the national level the Democrats retook both Houses of Congress from the Republicans in the 2006

[9] For additional research on how local government decisions and design may affect voter confidence see Atkeson and Saunders (2007).

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, we construct a similar measure of winners and losers at the national level where we use Republican identification as our baseline party identification. We anticipate the coefficient for the party identification variable *Democrat* in the post election survey will estimate the difference in the likelihood of confidence between winners and losers at the national level.[10] Some may argue that using partisan identification as a proxy for winner's effect at the national level is problematic because inherent differences in confidence, unrelated to election results, may exist along partisan lines. Our model assumes that, if inherent differences in voter confidence exist along partisan lines, then these differences are fixed in the short-term. If the estimated effects of the party ID coefficients change between the pre and post election surveys, then we attribute this change 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 or not. 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 used or responded "other" technology, we eliminated these individuals from the analysis.[11] Furthermore, only 14

[10] 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).
[11] As all post-election surveys were completed within a week of the election we think it is reasonable to ask voters to recall the specific technology used to cast their ballot. This requirement excluded 3 respondents from the analysis.

respondents replied to voting via a 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 the respondent reported voting electronically on a machine that had a printout to view their vote and 0 otherwise.

Included on the right-hand side of Models 1, 2, and 3 are typical socio-economic variables such as age, minority status, gender, and education. We also include a variable that measures the frequency with which the respondent watches the local news.[12] Given nationally covered media reports following the 2000 and 2004 elections that highlighted problems at polling locations in Florida and Ohio, it is possible that voters who watch the national news may be more likely to be influenced by media reports both before and after the election regarding the integrity of the voting process. We control for the possible influence of the media on voter confidence through a variable which measures a respondent's frequency of watching the national news. In the following sections, we estimate the regressions discussed above and discuss the findings in the context of the 2006 election.

Confidence Before the 2006 Election

The estimated coefficients for Model 1 are found in Table 4 and the corresponding first differences for the estimated coefficients are found in Table 5.[13] Analyzing the table of first

[12] Not all respondents were asked the frequency with which they watched the national news. Thus, we imputed 114 observations through propensity scores that included variables such as age, education, number of children, and political interest on the right-hand side.

[13] As Model 1 measures confidence prior to the 2006 election, voters had not cast their vote for governor and thus we do not include the variables *governor win* and *governor lose* in this model. However, when we include the variables *governor win* and *governor lose* in Model 1 the estimates for the coefficients on these variables are not significant.

differences, prior to the 2006 election, the likelihood that a Republican voter possessing the "median" characteristics is very confident that their vote will be counted as intended is 48%. Hypothetically changing the voter's party identification from Republican to Democrat lowers the likelihood of a very confident response by 28 percentage points. Similarly, changing party identification from Republican to Independent decreases the likelihood of a very confident response by 21 percentage points.

Insert Tables 4 & 5

The pre-election difference in confidence rates along partisan lines is to be expected. Prior to the 2006 election, the Republican Party enjoyed widespread success at the national level in the 2000, 2002, and 2004 elections. We hypothesize that past electoral success may translate into higher rates of pre-electoral confidence among Republicans relative to Independents and Democrats. We find support for this hypothesis as Republicans are approximately 21 and 28 points more likely than Independents and Democrats to be very confident prior to the 2006 election.

According to the winner's effect hypothesis, respondents who live in a U.S. House district controlled by one of the major parties will be either more or less confident, depending upon the respondent's party identification. Somewhat surprisingly, prior to the election we do not notice a significant difference in confidence between those who identify with the controlling party and those who do not identify with the controlling party. However, we do find that an individual who lives in district which the voter believes is not controlled by any one party is significantly more confident than individuals living in a controlled district. This result may suggest that, at the local level, pre-electoral confidence may be increased not via identification with the controlling party but through a belief in the existence of a politically balanced or non-partisan local government.

Hypothesis 2 states that voters who cast their ballots via an electronic machine equipped with a VVPAT device are more confident relative to voters who cast a ballot using an electronic technology without a VVPAT device. It is important to note that pre-election confidence rates are statistically identical among the various voting technologies. Thus, we do not find evidence that would suggest a selection bias exists where voters who are more likely to be confident receive a certain voting technology. Thus, any post-election differences in confidence rates of voters due to the voting technology can be attributed to the act of voting.

Despite not being directly tied to either primary hypothesis, we note for future comparison that, consistent with prior research, socio-economic variables such as gender and education are statistically significant in the pre-election model. Prior to the election men and individuals who have competed higher levels of education are significantly more likely to be confident. We suspect that immediately following the election socio-economic variables such as gender and education may have reduced value in predicting voter confidence relative to variables that are directly attributable to the act of voting, such as voting technology.

Confidence After The 2006 Election

The estimated coefficients for Model 2 are found in Table 6 and the corresponding first differences for the estimated coefficients are found in Table 7. When we examine voter confidence following the 2006 election, we find that socio-economic variables such as education and gender are no longer statistically significant. Instead, variables specific to the voting process are now significant, including the variables related to use of an electronic voting technology and to the presence of a VVPAT device. This change in the significant variables between the pre- and post-election models indicates that the factors that best predict voter confidence change as a result of participating in the voting process.

Insert Tables 6 & 7

Returning to the investigation of the winner's effect, Table 7 shows the confidence gap between Republicans and Democrats decreased following the 2006 election. Recalling that Republicans are the median voter for the first differences at the bottom of Tables 5 and 7, we see that the estimated likelihood of a very confident response among Republican voters has significantly increased from 48% before the election to 59% following the 2006 election.[14] The likelihood of a very confident Democrat increases from about 20% before the election to about 47% following the election. Following the election Democrats' 27-point gain in the likelihood of a very confident response is more than twice the 11-point gain by Republicans; thus, the confidence gap between Republicans and Democrats shrinks by 16 points following the 2006 election. These results are consistent with the winner's effect hypothesis that predicts the pre-election confidence gap between Democrats and Republicans will shrink following the election as Democrats took control of both Houses of Congress.

Additionally, one might wonder why there is no evidence of a loser's effect among Republicans. One possible explanation is that the losses by Republicans were not considered surprising; there was a high level of media speculation that such losses would occur. Moreover, some conservative commentators even suggested that these losses would be good for Republicans in the long-term.[15] Another possible explanation is that this was the first loss by the Republicans in several elections and the Republicans still retained the Presidency and more than

[14] Result is significant at the 95% confidence level.

[15] Howard Kurtz (2006), the Washington Post media writer, analyzed the media coverage, including the punditry from conservative commentators supporting a change in control of Congress, just prior to the 2006 election. He states "news organizations have framed the midterm elections as a season in which the Republicans are probably, most likely, almost certainly heading for big-time defeat."

40 seats in the senate. Thus, the losses may not have been great enough to noticeably affect Republican confidence.

The results reported in Table 6 and 7 suggest the existence of a local winner's effect following the 2006 election. After the election the coefficient for *local control agree* is now significant and positive, as is the coefficient for *no local control*. Therefore, following the 2006 election voters who are likely to vote for the dominant local party are significantly more likely to be confident relative to voters who believe another party controls the local governance structure. Similar to the pre-election case, we find that individuals who do not believe one party controls their local governance structure are more confident than those who do not identify with the controlling party. The significance of the *no local control* variable in Models 1 and 2 suggests that, at least for some individuals, a bi-partisan local government will increase voter confidence before and after an election. However, additional investigation is needed to estimate the negative impact of implementing a bi-partisan government on voters who identify with the local, controlling party. Finally, we point out that the *t*-statistic associated with the variable that measures the winner's effect at the state level is 1.95, which is on the very cusp of the traditional measure of significance 1.96.

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 in the presence of a VVPAT are a statistically significant 14 points more likely than paper based voters to be very confident.[16] 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.

Changes in Pre- and Post-Election Confidence

The previous models present estimates of 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 winner's effect more fully in Model 3, where the dependent variable is whether the voter's confidence increases after the election, remains unchanged, or declines (using the values of 1, 0, and -1 respectively). The estimated coefficients and estimated first differences are found in Tables 8 & 9.

Insert Tables 8 & 9

Consistent with the winner's effect hypothesis, the estimated coefficient in Model 3 for Democrat is significant and positive. Democrats, who can be thought of as winners at the national level for the 2006 election, have a higher probability of being more confident following the 2006 mid-term election relative to Republican voters. Specifically, Democratic voters are a statistically significant 20 points more likely than Republican voters to express a higher level of confidence following the 2006 mid-term election.[17] Additionally, Independents are 14 points more likely to express higher confidence relative to Republicans, which is likely explained by

[16] Statistically significant at the 95% confidence level.
[17] Statistically significant at the 95% confidence level.

the fact that Independents tended to vote Democratic in 2006.[18] These results are consistent with the winner's effect hypothesis and provide strong evidence that the confidence gap between Republicans and Democrats shrinks following the 2006 election.

Turning our attention to the state and local levels, we find weak support that identification with the winning party at either the state or local level may result in a higher probability of increasing voter confidence. Although voting for the winning governor or identifying with the party that controls one's district is on the cusp of significance with *p*-values around .07, these *p*-values are just outside the typical cut-off value of .05. Given these findings and small sample size, we think additional research is needed in order to understand more fully the effect of state and local election outcomes on voter confidence.[19]

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. First, 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.[20] However, VVPAT voters are a statistically significant 9 points more likely to become more confident following the election relative to regular electronic voters.[21] Finally, the estimated first differences on the coefficients for paper and electronic voting with a VVPAT suggest that there is no difference

[18] In our sample independent voters reported favoring Democratic House and Senate candidates by margins of 10 and 20 percentage points. Our results may understate the estimated coefficient for *Independent* as a Washington Post-ABC News poll conducted just prior to the election 59% of Independents supported Democratic House candidates relative to only 31% of Independents supporting Republican House candidates see (Balz and Cohen 2006).

[19] For instance, our sample size prohibits prevents us from analyzing the affect of closely contested state and local races on voter confidence. However, we hypothesize that a model which estimates the effect of closely contested state and local races may result in statistically significant state and local elections effects.

[20] Statistically significant at the 95% confidence level.

[21] Statistically significant at the 95% confidence level.

between the two technologies in the likelihood of a voter becoming more confident. 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 another avenue 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 verifiable results.

Conclusions

We hypothesize that the context of an election, the election outcome and changes in the administration of elections (such as voting technology), affects voter confidence that their vote will be counted accurately. The 2006 election provides an opportunity to test this hypothesis because for the first time since scholars began to study voter confidence the Democrats encountered electoral success at the national level. Furthermore, the 2006 election witnessed election administration changes that required many states to attach voter verifiable paper audit trail (VVPAT) devices to electronic voting machines. Adoption of VVPAT devices allows us to test the confidence rates of two sub-groups of electronic voters at the national level. Utilizing a panel dataset that captures voter confidence before and after the election, we evaluate the effect the context of an election has upon voter confidence.

The first hypothesis we test is that the effect of partisan affiliation on a voter's perceived confidence is mediated by the outcome of the election. Specifically, we test whether identification with the winning party and candidates leads to higher levels of confidence relative to voters who identify with the losing party and candidates. Empirical results support the conclusion that at the national level identification with the winning party/candidate increases voter confidence following the election. Democrats are significantly more likely relative to

Republicans to increase their level of confidence following the 2006 election. Although Republicans are more confident than Independents and Democrats before the election, we find evidence that the confidence gap between Republicans and Democrats shrinks following the 2006 election.

The second hypothesis tested is that the context of electronic voting, the presence or absence of a VVPAT device, significantly affects voter confidence. Consistent with previous results, 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. Thus, the empirical evidence suggests that the effect on voter confidence of an electronic voting device equipped with a VVPAT and a paper ballot are indistinguishable. 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.

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	5.2% (30)	3.3% (19)
Not too confident	11.2% (64)	6.4% (36)
Somewhat confident	44.3% (252)	35.6% (203)
Very confident	39.3% (224)	54.7% (312)
Totals	100% (570)	100% (570)

Table 2: Confidence by Partisan Identification

Confidence	Pre-election	Post-election
Democrats		
Not at all confident	6.0% (11)	1.5% (3)
Not too confident	15.8% (30)	8.4% (16)
Somewhat confident	54.9% (103)	41.3% (77)
Very confident	23.2% (44)	48.8% (92)
Republican		
Not at all confident	0.0% (0)	0.0% (0)
Not too confident	4.2% (8)	4.7% (9)
Somewhat confident	33.3% (63)	29.1% (55)
Very confident	62.5% (118)	66.2% (125)

Table 3: Confidence by Voting Technology

Confidence	Post-election
Electronic with VVPAT	
Not at all confident	0.0% (0)
Not too confident	3.4% (4)
Somewhat confident	29.9% (31)
Very confident	66.6% (70)
Electronic without VVPAT	
Not at all confident	5.9% (14)
Not too confident	9.1% (22)
Somewhat confident	39.5% (96)
Very confident	45.5% (111)
Paper	
Not at all confident	2.8% (9)
Not too confident	5.9% (19)
Somewhat confident	36.3% (118)
Very confident	55.0% (179)

Table 4: Estimated Coefficients for the Pre-Election Model of Voter Confidence

	Coefficient	Stand. Error	Z	Significance
Democrat	-1.30	0.23	-5.61	0.00
Independent	-0.93	0.27	-3.50	0.00
Governor agree	0.52	0.21	2.49	0.01
Local control agree	0.20	0.27	0.71	0.48
No local control	0.74	0.19	3.82	0.00
Frequency watch national news	0.17	0.20	0.84	0.40
Post lever	0.26	0.33	0.78	0.43
Post DRE	-0.10	0.19	-0.50	0.62
VVPAT	0.43	0.26	1.64	0.10
Women	-.43	0.17	-2.55	0.01
Log education	.52	0.23	2.26	0.02
Age 18-29	-.54	0.38	-1.43	0.15
Age 30-39	-.29	0.31	-0.95	0.34
Age 40-49	-.55	0.29	-1.88	0.06
Age 50-64	-.25	0.25	-1.01	0.32
Minority	-.34	0.26	-1.31	0.19
Cut 1	-3.31	0.48		
Cut 2	-2.01	0.46		
Cut 3	0.29	0.45		
Number of Obs	569			
LR	116			
Prob > chi2	0.00			
Log likelihood	-581			
Pseudo R2	0.09			

Table 5: Estimated First Differences for the Pre-election Model of Voter Confidence

	Not confident		Not too confident		Somewhat confident		Very Confident	
Median voter[a]	0.03		0.07		0.42		0.48	
Democrat	0.07	+	0.11	+	0.09		-0.28	+
Independent	0.04	+	0.07	+	0.10	+	-0.21	+
Governor agree	-0.01	+	-0.03	+	-0.09	+	0.13	+
Local control agree	-0.01		-0.01		-0.03		0.04	
No local control	-0.02	+	-0.03	+	-0.13	+	0.18	+
Frequency watch national news	-0.01		-0.01		-0.02		0.04	
Lever voter	-0.01		-0.01		-0.04		0.06	
Electronic voter	0.00		0.01		0.01		-0.02	
VVPAT present[b]	-0.00		-0.02		-0.07		0.10	
Male	-0.01		-0.02		-0.07		0.11	
Log of education[c]	-0.01	+	-0.02	+	-0.06	+	0.09	+
Age 18-29	0.02		0.04		0.06		-0.13	
Age 30-39	0.01		0.02		0.04		-0.07	
Age 40-49	0.02		0.04		0.07		-0.13	
Age 50-64	0.01		0.02		0.04		-0.06	
Minority	0.01		0.02		0.04		-0.08	

+ - 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 6: Estimated Coefficients for the Post-Election Model of Voter Confidence

	Coefficient	Stand. Error	Z	Significance
Democrat	-0.49	0.24	-2.05	0.04
Independent	-0.61	0.25	-2.47	0.01
Governor agree	0.40	0.20	1.95	0.05
Governor neutral	0.33	0.23	1.47	0.14
Local control agree	0.85	0.30	2.81	0.01
No local control	0.80	0.20	3.92	0.00
Frequency watch national news	-0.09	0.21	-0.44	0.66
Post lever	0.53	0.26	1.51	0.13
Post DRE	-0.58	0.20	-2.91	0.00
VVPAT	1.23	0.29	4.22	0.00
Female	-0.11	0.18	-0.63	0.53
Log education	0.23	0.24	0.97	0.33
Age 18-29	-0.63	0.41	-1.55	0.12
Age 30-39	-0.57	0.33	-1.73	0.08
Age 40-49	-0.71	0.31	-2.30	0.02
Age 50-64	-0.27	0.27	-0.99	0.32
Minority	-0.41	0.26	-1.59	0.11
Cut 1	-3.80	0.52		
Cut 2	-2.59	0.48		
Cut 3	-0.30	0.46		
Number of Obs	569			
LR	85.15			
Prob > chi2	0.00			
Log likelihood	-506.56			
Pseudo R2	0.08			

Table 7: Estimated First Differences for the Post-election Model of Voter Confidence

	Not confident		Not too confident		Somewhat confident		Very Confident	
Median voter[a]	0.02		0.05		0.34		0.59	
Democrat	0.01	+	0.03	+	0.08	+	-0.12	+
Independent	0.02	+	0.03	+	0.10	+	-0.15	+
Governor win	-0.01		-0.01		-0.07		0.09	
Governor neutral	-0.01		-0.01		-0.06		0.08	
Local control agree	-0.01	+	-0.02	+	-0.14	+	0.17	+
No local control	-0.01	+	-0.02	+	-0.13	+	0.17	+
Frequency watch national news	0.00		0.01		0.02		0.03	
Lever voter	-0.01		-0.02		-0.09		0.11	
Electronic voter	0.02	+	0.03	+	0.09	+	-0.14	+
VVPAT[b]	-0.03	+	-0.05	+	-0.20	+	0.28	+
Male	-0.00		-0.01		-0.02		0.03	
Log of education[c]	-0.00		-0.01		-0.03		0.04	
Age 18-29	0.02		0.03		0.09		-0.14	
Age 30-39	0.02		0.03		0.09		-0.14	
Age 40-49	0.02		0.04		0.11		-0.17	
Age 50-64	0.01		0.01		0.04		-0.06	
Minority	0.01		0.02		0.06		-0.09	

+ - 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 8: Estimated Coefficients for the Dynamic Model of Voter Confidence

	Coefficient	Stand. Error	Z	Significance
Democrat	1.14	0.23	4.89	0.00
Independent	0.85	0.24	3.56	0.00
Governor win	0.37	0.20	1.82	0.07
Governor neutral	0.41	0.23	1.83	0.07
Local control agree	0.48	0.28	1.73	0.08
No local control	0.01	0.20	0.07	0.95
Frequency watch national news	-0.28	0.20	-1.36	0.17
Post lever	0.21	0.33	0.64	0.52
Post DRE	-0.45	0.20	-2.22	0.03
VVPAT	0.69	0.27	2.58	0.01
Women	0.27	0.18	1.52	0.13
Log education	-0.40	0.24	-1.68	0.09
Age 18-29	0.22	0.39	0.56	0.58
Age 30-39	-0.05	0.31	-0.15	0.88
Age 40-49	0.11	0.29	0.36	0.72
Age 50-64	0.07	0.25	0.28	0.78
Minority	-0.07	0.27	-0.26	0.80
Cut 1	-1.86	0.46		
Cut 2	1.35	0.45		
Number of Obs	569			
LR	51.43			
Prob > chi2	0.00			
Log likelihood	-490			
Pseudo R2	0.05			

Table 9: Estimated First Differences for the Dynamic Model of Voter Confidence

	Less confident		No change		More confident	
Median voter[a]	0.19		0.65		0.16	
Democrat	-0.12	+	-0.09		0.20	+
Independent	-0.10	+	-0.05		0.14	+
Governor win	-0.05		-0.01		0.06	
Governor neutral	-0.05		-0.01		0.06	
Local control agree	-0.06		-0.01		0.07	
No local control	-0.00		0.00		0.00	
Frequency watch national news	0.04		-0.00		-0.04	
Lever voter	-0.03		-0.01		0.04	
Electronic voter	0.08	+	-0.03		-0.05	+
VVPAT[b]	-0.11	+	0.02		0.09	+
Male	0.04		-0.01		-0.03	
Log of education[c]	0.04		-0.00		-0.04	
Age 18-29	-0.03		-0.01		0.04	
Age 30-39	0.01		-0.00		-0.01	
Age 40-49	-0.01		0.00		0.01	
Age 50-64	-0.01		0.00		0.01	
Minority	0.02		-0.01		-0.01	

+ - 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.