



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

RESIDUAL VOTES AND ABSTENTIONS IN THE 2016 ELECTION

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Keywords: *residual vote rate, 2016 presidential election*

VTP WORKING PAPER #133

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Abstract

We analyze the significant increase in the residual vote rate in the 2016 presidential election. The residual vote rate, which is the percentage of ballots cast in a presidential election that contain no vote for president, rose nationwide from 0.99% to 1.41% between 2012 and 2016. The primary explanation for this rise is an increase in abstentions, which we argue results primarily from disaffected Republicans more than from alienated Democrats. In addition, other factors related to election administration and electoral competition also explain variation in the residual vote rates across states, particularly the use of mail/absentee ballots and the lack of competition at the top of the ticket in non-battleground states. However, we note that the rise in the residual vote rate was not due changes in voting technologies. The analysis relies on a combination of public opinion and election return data to address these issues.

Originally prepared for presentation at the annual meeting of the Southern Political Science Association, New Orleans, Louisiana, January 4–6, 2018. An earlier version of this paper was presented at the USC Political Institutions and Political Economy (PIPE) workshop, February 6, 2018; we thank workshop participants for their comments and feedback. Revised as of April 24, 2019. Comments appreciated.

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When a voter fails to cast a vote for president, what does that signify? Before 2000, the lack of a vote for president was generally assumed to be an abstention — a choice consciously made by the voter. The 2000 election changed things. The Florida recount, with its tales of hanging chads and butterfly ballots, alerted students of elections to the possibility that the lack of a vote for president might instead indicate voter confusion or voting-machine malfunction.

The 2016 election draws attention back to abstention. Among states that report the necessary information to calculate it, the residual vote rate — the percentage of ballots that contained no vote for president — rose to 1.41% in 2016, compared to 0.99 % in 2012 and 1.05% over the three previous presidential elections.¹ As we show in this paper, the 2016 spike in the residual vote rate is most likely due to a spike in intentional abstentions, mostly Republicans unwilling to vote for Donald Trump, rather than the sudden failure of voting machines.

The residual vote rate was originally employed to measure the performance of voting machines and, in particular, to assess the degree to which different machines contributed to “lost votes” (Alvarez et al. 2004; Alvarez, Ansolabehere, and Stewart 2005; Ansolabehere 2000; Brady 2004; Herron and Sekhon 2005; Buchler, Jarvis, and McNulty 2004; Stewart 2006).²

¹ To calculate the residual vote rate, a state needs to report turnout (the number who cast a ballot), beyond the number of votes cast for particular candidates. As far as we can tell, Mississippi, Missouri, Oklahoma, Pennsylvania, and Texas did not report turnout in 2016.

² Its use as a diagnostic measure helped to justify its inclusion in the Elections Performance Index, see <http://electionlab.mit.edu>.

However, the residual vote rate may also be a valuable tool for measuring the degree of abstention at the top of the ballot in presidential elections, and even provide advantages over studying abstaining using survey research. If we assume that year-to-year fluctuations in the residual vote rate (conditional on controlling for confounding factors such as machine performance) are primarily due to abstention, then a properly specified statistical model of the residual vote rate may provide a better estimate of presidential abstentions than asking survey respondents whether they voted.

This is the first effort in the literature to test hypotheses to understand the dynamics of abstention in the 2016 presidential election. Using the canonical theories that have been used to explore voting behavior and voting machine performance, we specify and test hypotheses about the rise in the residual vote in 2016. The evidence we offer points to a significant role for abstention due to alienation from the candidates, particularly among Republicans.

The Residual Vote

The residual vote rate is a measure of voting machine accuracy that was initially championed by the Caltech/MIT Voting Technology Project in 2001, and has been used subsequently in many studies of voting technology and election administration.³ From the beginning, scholars have recognized that variation in the residual vote rate is a function of multiple factors. For instance, abstention could be caused by either voter alienation or indifference. Machine deficiencies could be due to failure, such as hanging chads or stripped gears on a mechanical lever machine, or

³ In addition, see Leib and Dittmer (2002), Kropf and Kimball (2013), Ansolabehere and Reeves (2004), Ansolabehere (2002), Alvarez, Beckett and Stewart (2013), Hanmer, Park, and Traugott (2010), Hanmer and Traugott (2004), Campbell and Byrne (2009), Everett, et al (2008), Sinclair and Alvarez (2004), McDonald (2010), Allers and Kooreman (2009) Bullock and Hood (2005), Damschroder (2013), and Warf (2006). The Help American Vote Act (Sec. 241(b)(17)) directs the U.S. Election Assistance Commission to conduct studies of voting machines to understand the factors that minimize the residual vote rate.

voter confusion, perhaps from misleading ballot designs. Finally, administrative practices like voting-machine maintenance and vote counting could affect residual vote rates (Stewart 2004).

The residual vote rate is closely related to ballot roll-off, although the two measures are distinguishable, both conceptually and in practice. Burnham (1965, p. 9) defined ballot roll-off as “the tendency of the electorate to vote for ‘prestige’ offices but not for lower offices on the same ballot and at the same election.” Conceptually, roll-off studies tend to focus on the issue of “ballot fatigue,” that is, the tendency of voters to show up for the main event and then lose interest in the electoral undercard.

In terms of implementation, roll-off measures the difference between the number of votes cast for the top-of-the-ticket race and votes cast for down-ballot races. One benefit of this measurement approach is that it only requires knowing the total number of votes cast for a particular set of offices, rather than turnout data in the form of the total number of ballots cast (including blank or partially blank ballots), which prior to 2000 many states did not report. However, roll-off measures are contaminated by factors related to machine performance that might affect the entire ballot. And, of course, roll-off is useless in conducting aggregate-level studies that focus on the *top* of the ticket. Despite some continued use of the measure (e.g., Reilly and Richey 2011), the residual vote has largely replaced roll-off, even when the focus of study has been down-ballot races (e.g., Alvarez, Beckett and Stewart, 2013).

Abstention in presidential elections

While electoral abstention fits within the large literature on turnout, as the failure to vote is one form of abstention, we are interested in what happens when a voter has decided to cast a ballot, just not vote for president. Past research has tended to frame the issue of abstention-conditional-on-turnout in terms of the probabilistic spatial model, where two spatial dynamics determine

abstention, *abstention due to alienation* and *abstention due to indifference*. In the former, a voter is more likely to abstain if the candidates are viewed as ideologically distant from the voter. In the latter, the voter is more likely to abstain if the candidates are seen as interchangeable. Public opinion studies have found evidence of both paths to abstention in presidential (Adams, Dow, and Merrill 2006) and U.S. Senate elections (Plane and Gershtenson 2004).

Abstention-due-to-alienation and indifference are important concepts in the comparative literature on protest voting. The presence of blank, null, or spoiled (BNS) ballots has especially been notable in countries with compulsory voting. In many of these countries, rates of BNS ballots, what we call the residual vote rate, are often quite high, and BNS ballots are often interpreted as protest votes or abstentions-due-to-alienation (Schwartzman 1973; Alves 1985; Kinzo 1988; Lamounier 1989; Power and Roberts 1995). However, research has also observed that compulsory voting systems tend to have higher residual vote rates in down-ballot contests, which is also consistent with abstention-due-to-indifference even in these countries. While BNS ballots have been used to study protest voting in nations with compulsory voting, they have also been used to identify “BNS protest voting,” in particular, evidence for voter disapproval of the choices on the ballot (Alvarez, Kiewiet, Nunez, 2018). This literature has infiltrated the literature on American elections only slightly (Weinberg, Linderman, and Kavar 1982; Brown 2011; Damore, Waters and Bowler 2012).

Empirical evidence from 2016.

Popular accounts of the 2016 November election provide reasons to believe that some voters who turned out also abstained in the presidential contest, either due to alienation or indifference, and that these numbers were higher in 2016 than in the typical presidential election.

The case for abstention-due-to-alienation in 2016 starts with the politically disruptive character of the Republican nominee, Donald Trump. Fitting this assessment of Trump into the standard spatial model is not straightforward, because of Candidate Trump's unusual mixture of issue stances. Yet his unusual issue postures may be what makes abstention-due-to-alienation among Republicans a possibility — longtime, mainstream Republicans might have distrusted Trump, due to his initial advocacy of a mix of policies that combined populism, nationalism, xenophobia, and business libertarianism while also downplaying social issues like abortion and LGBTQ rights. This is of course on top of questions about Trump's character, which likely alienated some Republicans despite his issue positions.⁴

Evidence that Republican voters may have been alienated from voting for Trump shows up in two ways in public opinion data. We illustrate this using the 2016 Cooperative Congressional Election Study (CCES). We define abstention as those who said, "I didn't vote in this election" in response to the vote-recall question in the post-election CCES survey ("For whom did you vote for President of the United States?") First, Republicans who supported candidates other than Trump in the primaries or caucuses were more likely to report abstaining in the general election. (See Table 1a.)⁵ Among the 5,937 CCES respondents who reported they supported Trump in the primaries, none reported abstaining in November; Republican abstentions came entirely from non-Trump primary supporters. Second, ideologically moderate Republicans were more likely to abstain in the general election than far right Republicans (Table

⁴ Here we are characterizing Donald Trump the candidate. We recognize that it is possible to characterize Donald Trump the president differently.

⁵ In Table 1 we have included responses from Republican identifiers who reported voting for a Democrat in the primaries for the sake of completeness. Because such a small fraction of Republican identifiers voted for a Democrat in the primaries, we do not analyze those responses here.

1b). Leaving aside the small number of liberal Republicans in the survey, Republican were more prevalent on the middle-of-the-road/moderate-conservative side of the party.

[Table 1]

The Democratic Party also had a disruptive candidate, although the nature of the disruption was different. Bernie Sanders offered a platform that was coherent, if ideologically extreme, in contrast with Trump's mix of policy positions. Sanders also fought against the party establishment. These efforts generated animosity between his supporters and those of the eventual nominee, Hillary Clinton. This animosity might have primed Democrats for their own form of abstention-due-to-alienation in the general election, with Sanders supporters finding it impossible to vote for Clinton.

However, evidence from the CCES provides little support for the hypothesis that Democratic abstention in the general election simply mirrored that of the Republicans. First, Sanders's primary voters reported abstaining at essentially the same rate as Clinton's supporters once November rolled around (Table 2a). Thus, despite lingering animosity between the Clinton and Sanders camps after the nomination was decided, there is little evidence that this animosity carried over into the November balloting. Furthermore, because Sanders clearly positioned himself on the far left of the Democratic Party, an abstention-through-alienation pattern in the general election among Democrats would have to show that *leftist* Democrats abstained in the general election at higher rates than moderates did. In fact, the opposite is true; if anything, *centrist* Democrats disproportionately abstained (Table 2b). Still, this pattern is less pronounced than among Republicans.⁶

[Table 2]

⁶ Figure SM1 in the supplementary materials provides a visual summary of Tables 1b and 2b.

Turning to the issue of abstention due to indifference, this phenomenon should manifest itself in the general election among voters who reported seeing no ideological difference between Trump and Clinton. This is easy to test, by examining the abstention rate as a function of perceived ideological difference on the standard 7-point ideological scale (Table 3). Among those who saw no ideological difference between the candidates, the abstention rate was much higher than if even a slight difference was perceived. In addition, there is an order-of-magnitude difference between those who saw only a minor ideological difference between the candidates (3 points or fewer) and those who saw a major difference (4 points or greater).

[Table 3]

Of course, this is an overly simple test of abstention-due-to-indifference. First, the flow of causality is ambiguous — a respondent might just as easily rationalize abstention by stating she saw no ideological difference between the two candidates as be drawn to abstain because she saw no difference. Second, failure to see big ideological differences between Trump and Clinton may be a proxy for inattention to politics which, itself, is a likely cause of abstention.

We conclude this section by placing the preceding discussion about abstention in the 2016 presidential election in a multivariate statistical context. Here, the dependent variable is the “abstention” indicator and the independent variables are (1) indicators for primary/caucus support, (2) self-reported ideology, and (3) perceived ideological differences between the candidates. To simplify interpretation, we exclude respondents whose party identification does not match their ideology. (That is, we exclude all self-reported liberal Republicans and conservative Democrats.) We also exclude self-identified independents and minor-party identifiers. We estimate the model using a rare-events logit procedure suggested by Firth (1993)

and Heinze and Schemper (2002), and report the results in Table 4.⁷ Three effects consistently stand out: (1) Republicans were more likely to abstain than Democrats, (2) Republican primary supporters of Trump were less likely to abstain than Republican supporters of other candidates, and (3) respondents who saw big ideological differences between Trump and Clinton were less likely to abstain.

[Table 4]

There is one important detail in the analysis summarized in Table 4 that gives us pause: the lack of variability in the dependent variable. Only 0.11% of respondents (52 weighted and 81 unweighted observations, out of 45,242 observations overall in the dataset) self-reported abstaining. Thus, individual-level analysis can give us clues about where we might find higher residual vote rates (i.e. in strong Republican areas and areas that supported Trump's opponents in the primaries), but beyond that, further insight from public opinion data is limited. Not only is this a small number of observations to hang the individual-level analysis on, it is an especially low number of abstainers, given the patterns in the aggregate election returns.⁸

The 2016 Residual Vote Rate in Context

We turn now to the residual vote rate. The residual vote rate for president is defined as

$$100 \times \frac{\text{Over votes for president} + \text{under votes for president}}{\text{Turnout}}.$$

Because few jurisdictions report over-

and under-votes, it is usually necessary to calculate the residual vote rate as

$$100 \times \left(1 - \frac{\text{Total votes for presidential candidates}}{\text{Turnout}} \right).$$

⁷ This technique utilizes a penalized maximum likelihood scoring technique in order to reduce bias in rare-event models. It also helps to overcome the problem of "separation" in limited dependent variables models, which is when an independent variable perfectly predicts an observed outcome on the dependent variable.

⁸ It is unclear whether the under-reporting of abstention on public opinion surveys in the 2016 presidential election is confined to the CCES. For instance, the sequence of questions in the ANES about vote choice does not allow the respondent to report abstaining in the presidential race.

The national residual vote rate time series that runs from 1980 to 2016 (Figure 1) shows a clear break after 2000, which the literature attributes to a combination of new voting machines and other administrative changes that occurred following 2000. In the years up to and including 2000, the residual vote rate hovered around 2%. It was cut in half immediately after 2000, with the rate spiking up to 1.4% in 2016.

[Figure 1]

The average residual vote rate from 2004 to 2012 was 1.07%; the residual vote rate in 2016 was 1.41%. The difference, 0.34 percentage points, is a good starting point for quantifying the *increase* in abstentions in 2016, on top of the pre-existing abstention rate in immediately past elections. Because the baseline abstention rate in prior elections has been estimated to be around 0.5% (Stewart 2014), this would put the 2016 presidential abstention rate at around 0.8% nationwide. This implied abstention rate is significantly greater than the 0.11% of CCES voters who reported abstaining in 2016. We return to the implications of this apparent under-self-reporting of abstention in the conclusion.

Figure 2 presents scatterplots that compare the residual vote rates in 2016 and 2012 at the county and state levels (Figures 2a and 2b, respectively). To aid in legibility, cube roots have been taken of the percentages in the county graph. Overall, there are small-to-moderate correlations across time at both levels of aggregation: $r = .29$ for counties and $r = .68$ for states.⁹ The presence of moderate correlations at the state and county levels between 2012 and 2016 suggests that underlying the residual vote rate in any given jurisdiction are legal, administrative, and cultural practices that are slow to change across adjacent presidential election cycles.

[Figure 2]

⁹ The correlations are calculated weighting by turnout in 2016. The correlations using the cube-root transformations is $r = .53$ for the counties.

Inspection of the graphs in Figure 2 reveals that the residual vote rate went up in 2016 in most counties (1,629 of 2,586) and states (35 of 45). This provides preliminary evidence that the residual vote rate spike in 2016 had a common nationwide cause. However, the increase was greater in some states and counties, which also suggests that variations in short-term political factors that affected some parts of the country more than others also were in play.¹⁰

Partisanship, Ballot Access Laws, and the Residual Vote Rate in 2016

In this section, we turn our attention to the residual vote rate and how its cross-sectional variation in 2016, both at the state and county levels. We focus on determining whether administrative, technological, or behavioral explanations might explain variation in the 2016 residual vote rate.

Maps describing the geographic distribution of the residual vote rate in 2016, at both the county and state levels, are provided in Figure SM3 of the supplementary materials. Five states (Mississippi, Missouri, Oklahoma, Pennsylvania, and Texas) did not reliably report turnout rates statewide, so are shaded gray in both maps. While Alaska reported turnout, its election returns were reported by state senate district, which hinders allocating the residual vote rate into that state's county equivalents.

An examination of the geographic distribution of residual vote rates reveals, first, that the residual vote variation within most states was much less pronounced than variation between states.¹¹ This suggests that any explanations for why the residual vote rate varies must account for legal and administrative factors that are often determined by state legislatures or directives

¹⁰ In the Supplementary Materials we discuss Nevada, which is interesting because in the 1970s it allowed voters to register an abstention in the presidential race, "none of these candidates" (NOTC). Presumably, voters making this choice would have abstained if they had voted in any other states. In Figure SM2 we show the NOTC Nevada time series since 1964. After gradually declining starting in 1976, the residual vote rate in Nevada was 0.17% in 2012 and the NOTC rate was 0.57%. In 2016, the residual vote rate declined further to 0.004%, but the NOTC rate rose to 2.56%, an increase of nearly 2 percentage points.

¹¹ A simple quantitative measure of this point is the R^2 (.54) of a regression that only contains state dummy variables to explain county residual vote rates.

from the state's chief election authority. An examination of the geographic distribution of residual vote rates also reveals that the highest residual vote rates in 2016 tended to be in the western states, with lower residual vote rates in the southeast. While this pattern is somewhat correlated with strength shown in the primaries by Trump, it is also correlated with the use of vote-by-mail, which has previously been shown to be correlated with higher residual vote rates. (We address these issues below.)

Voting technology and the residual vote in 2016

Early research on voting technology and the residual vote found that older technologies, especially punch-card machines, had significantly higher residual vote rates than newer technologies. Once New York replaced its mechanical lever machines for federal elections in 2012, all of the antiquated machines that had been used in 2000 were finally retired from service. Prior research has generally found little difference in residual vote rates when comparing electronic voting machines (DREs) and optically scanned paper ballots. Because virtually all votes are now cast on one of these two technologies, it is unlikely that cross-county variation in the 2016 residual vote rate would be strongly related to voting technology.

In a simple bivariate test, the residual vote rate in 2016 *was* slightly greater in counties that used optical scanners (1.46%) than in counties that used DREs (1.26%).¹² A simple *t*-test rejects the null hypothesis that these percentages are equal (*p* value of $< .0005$). However, this difference in the residual vote rate across the two major types of voting machines may be an artifact of the types of machines used in different states. If we conduct this simple statistical test

¹² There were 1,704 and 733 counties that used optical scanners and DREs, respectively. In addition, the average residual vote rate for the 43 counties that used hand-counted paper was 2.20%; the average residual vote rate for the 80 counties that used a mix of technologies was 1.67%. Averages here, and elsewhere in the paper, are calculated after weighting by turnout.

in the context of a (state-level) fixed-effects regression, DREs have a *higher* average residual vote rate than optical scanners, by 0.14 percentage points.¹³ This is consistent with past work that has found that the estimated effects of voting technologies on the residual vote rate can be sensitive to specification in cross-sectional analysis (Ansolabehere and Stewart 2004). Thus, we should be especially careful in drawing conclusions about the effect of voting machines on the residual vote rate in 2016.

Voter abstention in the 2016 presidential election: the role of party faction, election law, and voter strategy

We focus on four major factors regarding voter abstention, one behavioral, two legal, and one strategic. The first factor, which we classify as behavioral, is (1) the relative distaste partisans felt for the major-party nominees, especially the nominees of their own party. The second and third factors, which we classify as legal, are (2) the ability of voters to write in presidential candidates if they find the nominated candidates unpalatable and (3) the extent of mail-ballot use in a state. The fourth factor, which we classify as strategic, is (4) the partisan balance in a state, which might make voters more or less likely to mark their ballot in an expressive, rather than narrowly instrumental, way.

If some voters abstained because of their distaste for the candidates, then we should see more abstentions where support for those candidates is weakest. More specifically, if some fraction of Republicans — presumably moderate “mainstream” Republicans — found voting for Trump unpalatable, and if those same Republicans could not bring themselves to vote for Clinton (or any of the other candidates), then we would expect abstentions to be higher in counties where

¹³ The *t*-statistic testing the difference in residual vote rates between DREs and optical scanners in the fixed-effects regression is 2.54, $p = .011$.

Trump's support among Republicans was weakest. A similar argument could be made about "Sanders Democrats." We operationalized strength of support for the party nominees by using the county-level vote shares received by Trump and Sanders in the Republican and Democratic primaries, respectively.

Because support for Trump and Sanders in the primaries was likely correlated with overall partisan strength within a county, we control for partisan strength by taking the average of the vote received by Republican candidates in each county from 2000 to 2012.¹⁴ To allow for the possibility that more staunchly partisan areas may be more likely to stand by their party's candidate, we also included the square of the Republican-strength variable.

We conducted the analysis in a multiple regression framework with state-level fixed effects. The fixed effects help to account for unmeasured legal, administrative, and cultural factors that had a common influence on the residual vote rate in 2016 beyond the behavioral factors we explore here. State-level fixed effects also help to account for different mixes of candidates who were on the various primary ballots in the states, and the different time of the year when the primaries were held.¹⁵ This also allows us to include states that did not have primaries, but rather held caucuses. For these states, support for Trump and Sanders is set to zero for each county. These states' observations do not contribute to the analysis about the correlation between the residual vote rate and support for Trump/Sanders, but they do contribute to the analysis about the correlation between the residual vote rate and historical partisan voting patterns.

¹⁴ That is, the "Republican strength" variable was the average vote share of George Bush (2000 and 2004), John McCain (2008) and Mitt Romney (2012).

¹⁵ In other words, with state-level fixed effects, the correlations we observe between the residual vote rate and either support for Trump/Sanders or local historical partisan support are largely *within-state* correlations among each states' counties.

Table 5 reports the results of the analysis. The strongest effect is related to partisan strength. The combination of the two Republican-strength variables indicates a symmetrical curvilinear relationship, with the highest residual vote rates coming in counties with evenly split partisanship.¹⁶ Interestingly, counties that gave Trump his highest vote totals in the primary were no more or less likely to cast blank ballots in the general election. Just as interestingly, counties that gave Sanders their greatest support in the primaries were *less* likely to cast residual votes in November. Thus, we see little support for an association between party factionalism and general election abstention.

[Table 5]

Abstention may not be the only option available to disaffected partisans: they could vote for minor-party candidates or could write in another candidate. In either case, the ability to vote for a minor-party candidate or write in a candidate depends on ballot access laws in the voter's state.

In 2016, 6.04% of voters took advantage of one of these minor-party candidates, well over the 3.75% of the vote that went to minor-party candidates in 2012.¹⁷ (See Figure SM4 in the supplementary materials.) While these percentages are nowhere close to years like 1968, 1992, and 1996, they approached the 8.24% level for the minor-party vote in 1980, when John Anderson received 6.6% of the vote against Ronald Reagan and Jimmy Carter. Gary Johnson received 3.27% of the nationwide popular vote in 2016, while Evan McMullin received another 0.53%, and the right-wing Constitution-Party candidate Darrell Castle received 0.15%. The only significant minor-party presence on the left was the Greens' Jill Stein, at 1.06% of the vote.

¹⁶ Taking first derivatives and setting them to zero, the maximum of the Republican strength effect occurs when average Republican vote share is 54.7%.

¹⁷ These election return statistics are taken from David Leip's Atlas of U.S. Presidential Elections, <https://uselectionatlas.org>.

Even if we apportion all the remaining minor-party candidates to the left, that leaves 4.01% of the nationwide popular vote going to right-wing minor-party candidates and 2.03% going to left-wing minor-party candidates. In short, if abstention was disproportionately a Republican behavior in 2016, so was voting for minor-party candidates.

In addition to alternatives on the ballot, voters can often write in a candidate rather than choose among names presented to them. In 2016, only nine states¹⁸ prohibited write-in candidates.¹⁹ The remaining states allowed write-ins, with 33 having some form of registration in order for the votes to be reported separately, and nine (including D.C.) allowing write-ins without registration.²⁰

Although most states allow write-in votes for president, write-in votes can be hard to count, since they typically require hand tabulation. Because of this extra effort to count, and the unlikelihood that write-in votes will be cast for the winner, they often go uncounted by precinct workers even when the state allows for write-ins (Ansolabehere et al. 2018). Also, even when states favor registered write-in candidates, they often have choices about how to handle unregistered candidates — they can record each unregistered candidate receiving votes by name, group the unregistered candidates into a “scattering” category, or ignore them as if the ballot was unmarked. If the last choice is made, then legally cast votes will be ignored in the counting and appear as residual votes.²¹

¹⁸ Arkansas, Hawaii, Louisiana, Mississippi, Nevada, New Mexico, Oklahoma, South Carolina, and South Dakota.

¹⁹ We developed these categories through triangulating among a number of sources, including *Ballotpedia* and state election Websites.

²⁰ These latter nine states were Alabama, D.C., Iowa, New Hampshire, New Jersey, Oregon, Pennsylvania, Rhode Island, and Vermont.

²¹ In the course of conducting another research project, one of the co-authors had the occasion to talk to a senior election official from a state with a high residual vote rate about the counting of write-ins. He stated that he regarded votes for non-registered write-in candidates as all akin to “voting for Donald Duck,” and not worth the time of poll workers to count, despite the fact that a write-in line appears on the ballot and all votes appearing on the line are legal votes in that state.

Based on the tendency of poll workers to undercount write-in votes, either because some do not want to count them or are instructed not to, it is easy to see how liberal write-in laws could actually result in a high residual-vote rate, *even (or especially) if disaffected voters choose to write in a candidate rather than abstain*. When an increased number of disaffected voters come to the polls (rather than stay at home) and write in a minor-party candidate, the residual vote rate will go up if poll workers do not become much more diligent in counting write-in votes. Of course, a highly publicized write-in campaign could spur election officials to be more aggressive in training their poll workers to count write-in votes, and thus an increase in write-in votes could cause the residual vote rate to decline. Whether an up-tick in write-in votes increases or decreases residual votes is therefore an empirical question.

In the case of 2016, it appears that easy access to the write-in option ended up *increasing* the residual vote rate. When we divide states into the three categories based on write-in laws discussed above, states that disallowed write-ins had average residual vote rates of 0.95%, compared to 1.33% in states that allowed write-ins without pre-registering and 1.44% in states that required pre-filing of write-in candidates. These differences between states, of course, may be due to spurious correlation. Still, at first look, it is not obvious that liberal write-in laws made it more likely that write-in votes would actually be counted.

With our focus on the role of abstention in producing the 2016 spike in the residual vote rate, there is a danger we might ignore other changes in the electoral landscape that may also be increasing the residual vote rate over time. One important factor is the increased use of the mail to deliver and return ballots in recent years. This increase is due to the confluence of a number of factors, the most important being the demise of “for-excuse” absentee ballot laws, the rise of permanent absentee ballot lists, and the increase in the number of states that deliver all their

ballots by mail. Based on responses to the Census Bureau's Current Population Survey Voting and Registration Supplement, we estimate that the percentage of voters using the mails to return ballots doubled from 2000 to 2016, from 10.2% of voters to 21.1%.

Even in the absence of the abstention hypothesis, previous research leads us to expect that the increase in voting by mail would cause the residual vote rate to increase. In particular, Alvarez, Beckett and Stewart (2013) found that the rise of vote-by-mail in California over a two-decade period led to a significant rise in the residual vote rate in that state — a rise that was masked by a reduction in the residual vote rate caused by the retirement of punch-card and mechanical lever machines. Those who cast their ballot by mail or at a drop-off location cannot take advantage of Help America Vote Act (HAVA) mandated technologies that scan the ballot for over- or under-votes. Furthermore, the processing of postal mail introduces the possibility of stray marks being added to mail-in ballots, especially when the ballots are folded. Thus, there is likely to be a direct effect between the use of the mail to vote and the rise of the residual vote rate.²²

Because state law determines whether mail ballots will be widely used, it makes little sense to explore the nationwide cross-sectional relationship between the residual vote rate and the fraction of ballots cast by mail at the county level. Thus, we focus here on exploring the relationship at the state level. In 2016, the correlation between the residual vote rate and the fraction of ballots cast by mail was moderate ($r = .59$). This correlation was much weaker in 2012 ($r = .29$) and non-existent between 2000 and 2008. (Scatterplots illustrating these effects, along with associate linear regressions, appear in Figure SM5 and Table SM1 in the

²² There may also be indirect effects. For example, delivering a ballot to every voter in a state weeks before the election could prompt disaffected voters to be active in finding alternatives to abstaining. In any case, such indirect effects are speculative, and likely to be weak.

supplementary materials.). These results suggest that the increase in the residual vote in 2016 might be due to the coincident rise in voting-by-mail, in addition to was abstention-due-to-alienation.

Finally, going to the polls and abstaining in the presidential race, or voting for a minor-party candidate, is likely to be influenced by the competitive environment of the state in which a voter lives. Despite the unlikelihood that any individual vote will be determinative in a race, many voters act as if their one vote will determine the outcome of an election, especially when it is perceived to be close. In other words, many voters will act strategically when the situation calls for it (Alvarez, Boehmke, and Nagler 2006).

If abstention is one of the available choices among those who come to the polls, and if at least some voters see a trade-off between their vote being expressive and their vote determining the outcome of the election, then we could imagine that abstention would be less in a highly competitive state compared to a non-competitive state.

The simplest way to test this notion in the 2016 election is to examine the correlation between the residual vote rate and the Trump-Clinton electoral margin across the states. The results, provided in Figure SM6 in the supplementary materials, are consistent with the idea that voters take into account the strategic circumstances when they decide whether to abstain. Examining 2016 alone, the correlation between the residual vote rate and the percentage margin-of-victory by the prevailing candidate in a state is moderate ($r = .42$) and the t -score of the best-fit line through the scatter is 1.96, using robust standard errors.²³ Measurements of association improve when we remove D.C., which is a clear outlier.²⁴

²³ More precisely, the best-fit line's equation is $y = 0.99 (0.16) + 0.024 (0.012) x$, with $R^2 = .18$ and $n = 46$. (Standard errors of coefficient are in parentheses.) Observations are weighted by turnout in 2016. Robust standard errors.

²⁴ With DC excluded, the best-fit line's equation is $y = 0.93 (0.16) + 0.028 (0.023) x$, with $R^2 = .23$ and $n = 45$.

In addition, 2016 appears to be the only year in recent history in which there has been a statistically significant association between the residual vote rate and the two-party margin of victory. As explored further in the supplementary materials (Table SM2 and Figure SM7), 2016 is the only year since 2000 in which the residual vote rate has been lower in low margin-of-victory (“battleground”) states than in high margin-of-victory states.²⁵

Considered all together, then, it appears that the tendency to abstain in 2016 was tempered by the competitive environment. In more competitive, battleground states, abstaining or voting for a minor-party candidate could more likely lead to an even-more-disliked electoral outcome.

The Residual Vote Rate in Recent History

The major story in the residual vote rate over the past twenty years has been its dramatic decline after the 2000 presidential election, in the wake of the wave of new voting machines and administrative practices that swept over election administration after the Florida recount fiasco. A new chapter in the residual vote rate was written in 2016, when it increased after 2012, and approached the level of 2000. The question this raises is, had there not been a wave of new voting machines adopted by local jurisdictions after 2000, would the residual vote rate have been even higher in 2016 than what we observed? The answer is “yes,” as the following analysis demonstrates.

Here, we estimate the residual vote rate in a fixed-effects framework [e.g., Ansolabehere and Stewart (2004), Stewart (2006)]. To focus on the effects of changing voting technologies, there are two types of variables: (1) a series of dummy variables to indicate the election year and

²⁵ As with 2016, the substantive results of the analysis do not change for previous years if we exclude D.C. from the analysis.

(2) a series of dummy variables to indicate the type of voting technology used by a county in year t . Rather than explicitly control for other demographic and administrative practices that might lead to inter-county variation in residual vote rates, these factors are accounted for by using county fixed effects. Because we include county-level fixed effects, many of the state-level factors we explored previously are outside the scope of analysis. The focus here is on the role of technology and national factors that are common to all states and counties.

We performed the analysis on a county-level dataset that included observations from every presidential election from 1988 to 2016. Because the number of states reporting turnout has grown over the years, the number of counties reflected in each year's analysis increases as well, from 1,354 in 1988 to 2,597 in 2016.²⁶ The results are reported in Table 6. In the first column, we include only the year dummy variables, showing only year-to-year fluctuations in the residual vote rate before considering changing voting technologies. Here we see a pattern of coefficients that is broadly consistent with the graph in Figure 1.

[Table 6]

Because the omitted year is 2000, the analysis of the year dummies revolves around the pre- and post-HAVA periods. Before Florida and the HAVA-era reforms, there are two positive coefficients, and one of the year coefficients that is statistically no different from zero. This indicates that in the late 1980s and 1990s, the residual vote rate nationwide was sometimes greater than in 2000, controlling for voting technology use. The four year-specific coefficients after 2000 are negative, which reflects the fact that residual vote rates fell after 2000 beyond what we would have predicted from changing voting technologies alone. Finally, the coefficient

²⁶ In the analysis that follows, the substantive results related to the year dummies remain unchanged. If anything, the finding that 2016 had a higher residual vote rate than 2000, controlling for changes in voting technology, is strengthened.

associated with 2016 in the first column of Table 6 is also negative, but it is roughly half the absolute value of the coefficients associated with the period 2004–2012.

The second column adds dummy variables reflecting different voting technologies that were used during this period. This analysis reveals that across this entire period, punch card voting machines and DREs had residual vote rates that were higher than optical scanners. The residual vote rates of hand-counted paper — which is rarely used nowadays — had lower residual vote rates. Because the voting technologies do not appear uniformly across the period covered in the regression — punch cards and mechanical lever machines are no longer used and hand-counted paper is virtually extinct, while the use of DREs has waxed and waned as optical scanners have become steadily more popular — their presence in the regression shifts the size of the year-specific dummy variables. Most notably, the magnitude of the 2016 dummy variable flips signs once we account for changes to voting technologies. The size of the coefficient suggests that if there had not been a wholesale modernization of voting machines in the 2000s, the residual vote rate in 2016 would have exceeded 2000 by about $\frac{1}{4}$ of a percentage point.

Discussion and Conclusions

The residual vote rate for president in 2016 was a half-point higher in 2016 than it was in 2012 or in any of the post-Bush v. Gore presidential elections, for that matter. We have presented evidence that this was due to an increase in under-votes, most likely driven by an increase in abstentions in the presidential race. At the same time, this increase also shows signs of interacting with factors related to election administration, namely, the rise in voting by mail and the counting of write-in votes.

Abstention is a topic that is rarely taken up by academic students of American elections. For that reason, the infrastructure of electoral studies is poorly situated for studying this

phenomenon. Thus, we focus our conclusion on the implications of this study for future research.

First, this paper opens up the issue of protest voting in the U.S. to further study. Even if protest voting has been uncommon historically in the U.S., the current political climate may be ripe for it to become more frequent in the near future. For instance, protest voting was in evidence in the 2017 U.S. Senate special election in Alabama, in which Democrat Douglas Jones narrowly defeated Republican Roy Moore by 21,924 votes out of 1,348,720 cast.²⁷ Moore was seen by many Alabama Republicans as a deeply flawed candidate, either by dint of his long-known theocratic views or his more recently-revealed history of sexual predation. Moore's candidacy presented a dilemma to loyal Republicans who could not bring themselves to crossover and support Jones. In this case, the preferred action was not leaving the ballot blank,²⁸ but rather, casting a write-in vote. In that race, 22,852 write-in votes were cast, enough potentially to have swung the results of the election. The prevalence of write-in votes was the greatest in both the most staunchly Republican counties of the state and in the counties that most supported Moore's opponent in the Republican primary, Luther Strange.²⁹ Thus, the write-in vote in Alabama appears to be a consequential protest vote.

²⁷ These are the unofficial election night results as of December 21, 2017. See Alabama Secretary of State, "Alabama Votes," <http://www2.alabamavotes.gov/electionNight/statewideResultsByContest.aspx?ecode=1000915>.

²⁸ There were only 1,780 residual votes reported in the unofficial election night results, or 0.13% of votes cast. There appears to be no correlation between the residual vote rate and support for Moore or Republican candidates more generally. The only factor explaining a few outlying counties (Baldwin, Geneva, Lamar, Lowndes, Madison, Marengo, Tallapoosa, and Washington) was that these counties also had tax-rate questions on the county ballot, and apparently several hundred voters showed up to vote on these questions while abstaining from the question of U.S. senator.

²⁹ The correlation between the percentage of write-in votes in the special election and the vote for Strange in the primary was .30, while the correlation between the write-in vote and Trump's share of the presidential vote in 2016 was .31. Because support for Strange and support for Trump in the general election are negatively correlated, the fact that both are positively correlated with write-in votes indicates that each is tapping into the two important factors that drove the write-in vote: Republican Party loyalty and opposition to Moore.

A second implication of this paper is that public opinion surveys clearly under-estimate the prevalence of intentional abstentions in top-of-the-ballot races. As we note above, the abstention rate in the 2016 presidential election, according to answers to the CCES vote-choice question, was an order-of-magnitude less than what the analysis of aggregate election returns would suggest. There are many reasons why this might be, ranging from the nature of survey respondents, who may be less likely to abstain at the top of the ticket, to social-desirability bias that favors naming a candidate over admitting abstention.

It would be nice to trust that scholars could find some way to alter the vote-choice question to elicit more “abstention” responses, assuming the problem is social desirability. However, efforts to overcome the well-known problem of over-reporting turnout (Traugott and Katosh, 1979) by altering question wording or adopting other techniques have met with mixed success in tamping-down the over-reporting of turnout in surveys (Abelson, Loftus, and Greenwald, 1992; Presser, 1990; Holbrook and Krosnick, 2010). It is hard to imagine that efforts to increase the revelation of actual abstention through question-wording manipulation would be more successful; however, the field will not know until it is tried.

Until progress is made in eliciting more accurate reports of abstentions in survey instruments, research into issues like protest voting in the U.S. will need to rely heavily on aggregate analysis, as is generally the case with studies of the analysis of blank, null, and spoiled (BNS) protest voting in comparative politics. As is noted by Alvarez, Kiewiet, and Nunez (2018) in their review of protest voting, this is both unavoidable and unfortunate — unavoidable, because of the relative infrequency of the behavior and the problems studying the phenomenon using surveys, and unfortunate, because aggregate data are not well suited to distinguishing between intentional and unintentional BNS ballots.

A third implication of this paper is that residual vote rates can vary, longitudinally and cross-sectionally, for reasons related to election administration that go beyond the performance of voting technologies, which has been why attention has been played to the measure over the past twenty years. One of those reasons is the rise of mail ballots, which are prone to higher residual vote rates than ballots cast in person (Alvarez, Beckett and Stewart, 2013). Another reason is variation in the implementation of liberal write-in-ballot laws, which can, ironically enough, create inflated residual vote rates by encouraging write-in votes that are then left uncounted.

The final implication of this paper goes back to the most common recent use of the residual vote rate, which is to assess the accuracy of voting technologies. Here, we show why caution should be exercised with the use of the residual vote rate to assess the accuracy of voting machines, and especially its use in comparing across jurisdictions, as is done in the Elections Performance Index (EPI). The use of the residual vote rate is justified in the EPI based on academic research demonstrating its success in quantifying the relative performance of voting technologies. In the 2012 EPI, Kansas, the state with the highest residual vote rate, at 2.2%, is penalized in comparison with the other states, most of which had residual vote rates of 1.0% or less. This seems like a fair assessment, given the fact that most states have gotten down to 1.0% or less by adopting new equipment and new practices. For whatever reason, Kansas did not see the gains in machine performance that were evident in other states, and as a consequence its voters experienced more “lost votes” on Election Day than voters in other states. However, given the way that the EPI is constructed, an increase in the residual vote rate due to abstention is currently no different than an increase due to the disintegration of a state’s voting machines. At the very least, efforts such as the EPI should normalize for abstentions, perhaps using the simple dummy-variable methodology presented in Table 6.

To conclude, most students of elections focus on who wins, and on explanations for electoral outcomes. However, other things are also revealed through the patterns of election returns that go beyond the winners and losers. One of those patterns has to do with the residual vote in the presidential race. Understanding the causes of residual votes is important for understanding the nature of American electoral democracy, regardless of their source. When residual votes are caused due to voting machine breakdown and ballot confusion, the will of the voters is undermined. When residual votes are caused by intentional abstentions, there are lessons in the returns about how voters view the choices before them. What the 2016 election shows is that at least for one presidential election, abstention was a choice made by many. The question for the future is whether 2016 was an anomaly, the beginning of a trend, or a sign of an interesting political phenomenon we have been ignoring all along.

Citations

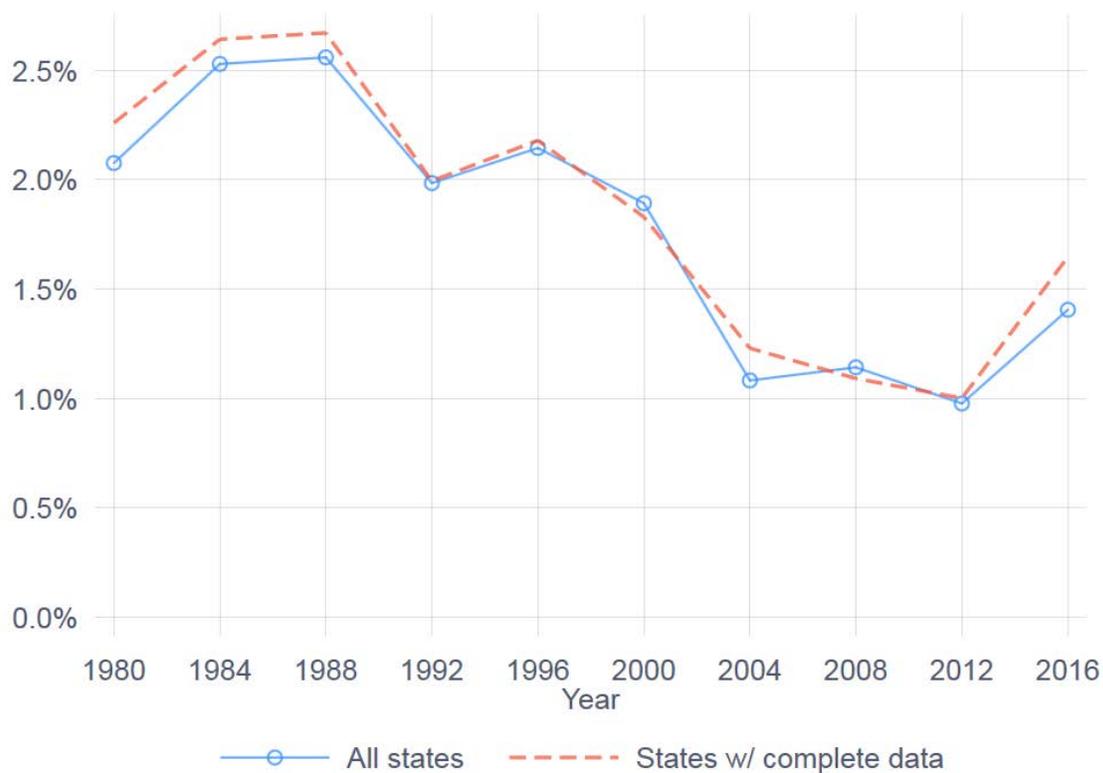
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Figure 1. Residual vote rate nationwide in presidential elections, 1980–2016.

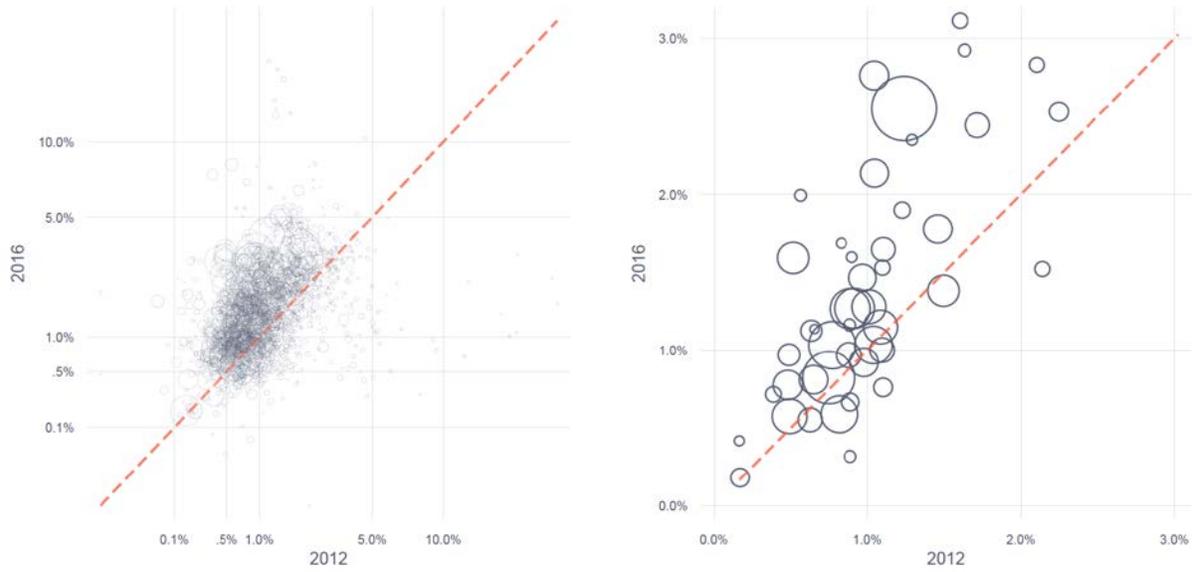


Source: United States Election Project (1980–1984); Election Data Services (1988–2000); the authors (2004–2016).

Note: The solid blue line reports the residual vote rate using all the data available for each year. The dashed red line report the residual vote rate using data from states for which we could calculate the residual vote rate *each year* from 1980 to 2016.

Figure 2. Comparison of residual vote rate, 2016 vs. 2012.

a. Counties (data transformed by taking cube-roots) b. States



Source: Data gathered by the authors

Table 1. Reported abstention in the 2016 general election among Republicans, given primary/caucus support and ideology.

a. Primary/caucus support

Candidate support	Abstention pct.	N
Donald Trump	0.00%	5,675
Ted Cruz	0.19%	2,867
John Kasich	0.29%	1,017
Marco Rubio	0.26%	1,138
Another Republican	0.25%	619
Neither Dem. or Rep.	0.70%	105
Any Democrat	0.07%	592
Total	0.11%	12,013

b. Ideology

Respondent ideology	Abstention pct.	N
Very liberal, Liberal, or Somewhat liberal	0.00%	469
Middle of the road	0.18%	2,630
Somewhat conservative	0.26%	3,323
Conservative	0.10%	6,232
Very conservative	0.06%	3,480
Not sure	0.00%	200
Total	0.14%	16,334

Note: Independent Republican leaners are included as Republicans. All three “liberal” responses are collapsed into one category.

Source: 2016 CCES, Common Content

Table 2. Reported abstention in the 2016 general election among Democrats given primary/caucus support.

a. Primary support

Candidate support	Abstention pct.	N
Hillary Clinton	0.05%	9,213
Bernie Sanders	0.07%	6,024
Another Democrat	0.31%	99
Neither Dem. or Rep.	0.00%	103
Any Republican	0.03%	811
Total	0.05%	16,250

b. Ideology

Respondent ideology	Abstention pct.	N
Very liberal	0.04%	4,066
Liberal	0.01%	6,092
Somewhat liberal	0.12%	3,879
Middle of the road	0.11%	5,245
Somewhat conservative, Conservative, or Very conservative	0.01%	2,229
Not sure	0.00%	484
Total	0.06%	21,995

Note: Independent Democratic leaners are included as Democrats. All three “conservative” responses are collapsed into one category.

Source: 2016 CCES, Common Content

Table 3. Reported abstention in the 2016 general election as a function of perceived ideological distance between Donald Trump and Hillary Clinton.

Absolute difference on 7-point scale	Abstention pct.	N
0	0.35%	1,577
1	0.18%	2,947
2	0.21%	5,169
3	0.15%	8,482
4	0.04%	9,217
5	0.04%	6,159
6	0.06%	2,023
Total	0.11%	35,574

Source: 2016 CCES, Common Content

Table 4. Probability of respondents reporting they abstained in the 2016 presidential election.

	Rare-events logit	Effect
Republican (Democrat excluded category)	5.75*** (1.46)	.0109†
Republican voted for Trump in primary	-3.32* (1.43)	-.0012†
Democrat voted for Sanders in primary	0.42 (0.60)	.0004†
Republican ideology (positive = conservative)	-0.37* (0.18)	-.0014‡
Democratic ideology (positive = conservative)	0.73* (0.31)	.0184‡
Perceived ideological difference b/t Trump & Clinton	-0.41*** (0.11)	-.0049‡
Intercept	-8.11*** (1.14)	
N	28,418	
Lif	-281	

* $p < .05$, ** $p < .01$, *** $p < .001$

†Effect calculated by setting other variables at their means and evaluating the difference in predicted probabilities at $x = 0$ and $x = 1$.

‡Effect calculated by setting other variables at their means and evaluating the difference in predicted probabilities at $x = \min(x)$ and $x = \max(x)$.

Source: 2016 CCES, Common Content

Table 5. Regression predicting residual vote rate as a function of Republican strength in a county and vote for Trump and Sanders in nominating primaries. State fixed effects.

Variables	Coeff. (s.e.)
Trump primary share	-0.0021 (0.0022)
Sanders primary share	-0.0093** (0.0027)
Republican strength	0.039*** (0.006)
Republican strength ²	-0.036*** (0.007)
Constant	0.0088*** (0.0019)
N	1,746
R ²	.54

* $p < .05$, ** $p < .01$, *** $p < .001$

Source: Data gathered by the authors.

Table 6. Residual vote rates, 1988–2016, with machine effects included. County fixed effects.

Variables	Coeff. (s.e.)	Coeff. (s.e.)
<u>Year</u>		
1988	0.0059*** (0.0004)	0.0057*** (0.0004)
1992	-0.0000 (0.0004)	-0.0003 (0.0004)
1996	0.0020*** (0.0004)	0.0018*** (0.0004)
2000	Excluded	Excluded
2004	-0.0083*** (0.0003)	-0.0068*** (0.0004)
2008	-0.0083*** (0.0003)	-0.0062*** (0.0004)
2012	-0.0092*** (0.0003)	-0.0074*** (0.0004)
2016	-0.0046*** (0.0003)	0.0024*** (0.0004)
<u>Voting technology (opscan excluded)</u>		
-Punch card	—	0.0057*** (0.0004)
-Mechanical lever	—	-0.0004 (0.0005)
-Paper	—	-0.0033** (0.0012)
-DRE	—	0.0030*** (0.0003)
-Mixed	—	-0.0011 (0.0006)
Intercept	0.019*** (0.0003)	0.016*** (0.0003)
County fixed effects	Yes	Yes
N	17,312	17,312
R ²	.42	.44

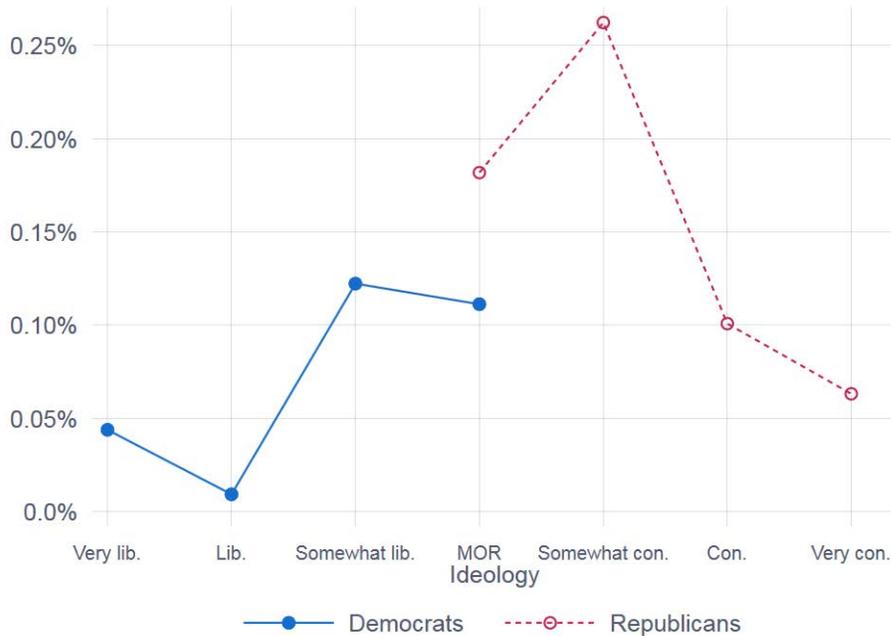
* $p < .05$, ** $p < .01$, *** $p < .001$

Source: Data gathered by the authors

Supplementary Materials for Online Publication

A visual summary of Tables 1b and 2b

Figure SM1. Reported abstention in the 2016 election by Democratic and Republican identifiers, by ideology.



Source: CCES 2016, Common content

A side note about Nevada

Before proceeding with the nationwide analysis of the residual vote rate, we pause to consider the case of Nevada. Nevada is interesting because in the 1970s it began providing a ballot mechanism that allows voters to register an abstention in the presidential race, by offering the choice of “none of these candidates” (NOTC). Presumably, voters making this choice would have abstained if they had voted in any other states.¹ Therefore a comparison of Nevada’s

¹ It is also likely that at least some of the Nevada voters who vote for “none of these candidates” would have failed to turnout in another state that did not offer the choice.

residual vote rate over time alongside its “none of these candidates” rate (we will call this the “NOTC rate”) is instructive.²

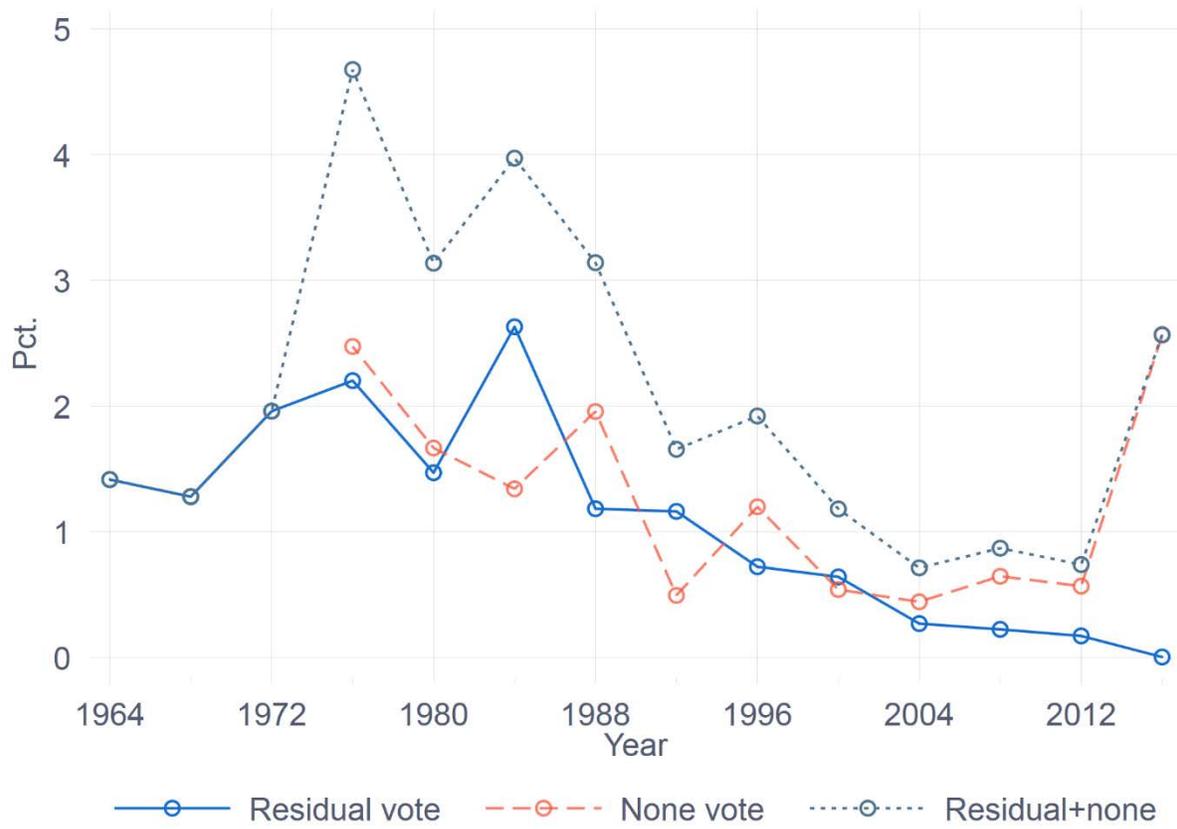
Figure SM2 shows the relevant Nevada time series going back to 1964. The NOTC option was first offered in presidential elections in 1976, so the NOTC rate is shown starting then. Interestingly, the onset of the NOTC option in 1976 did not obviously depress the residual vote rate in that year, which suggests that in years prior to that, most voters who would have abstained in the presidential contest just stayed home instead. From 1976 to 2012, both the residual vote rate and the NOTC rate gradually declined, to the point that in 2012, the residual vote rate in Nevada was 0.17% and the NOTC rate was 0.57%, totaling 0.74%. In 2016, the residual vote rate declined to a miniscule 0.004%, but the NOTC rate spiked to 2.56%, for an increase of nearly 2 percentage points.

[Figure SM2 about here]

It is instructive to speculate about what would have happened if Nevada did not have the NOTC option in the 2016 election. Presumably, some of the voters who chose NOTC for president in 2016 would have stayed home if it had not been offered as a choice. However, others would have shown up, either out of civic duty or interest in down-ballot races, and would have presumably abstained in the presidential contest. Distinguishing between these two actions is a tricky methodological question, and one in principle that has implications for how we think about abstentions in all states.

² For research into Nevada’s NOTC option, see Damore, Waters and Bowler (2012).

Figure SM2. Residual vote and none-of-these-candidates vote in Nevada presidential elections, 1964–2016.

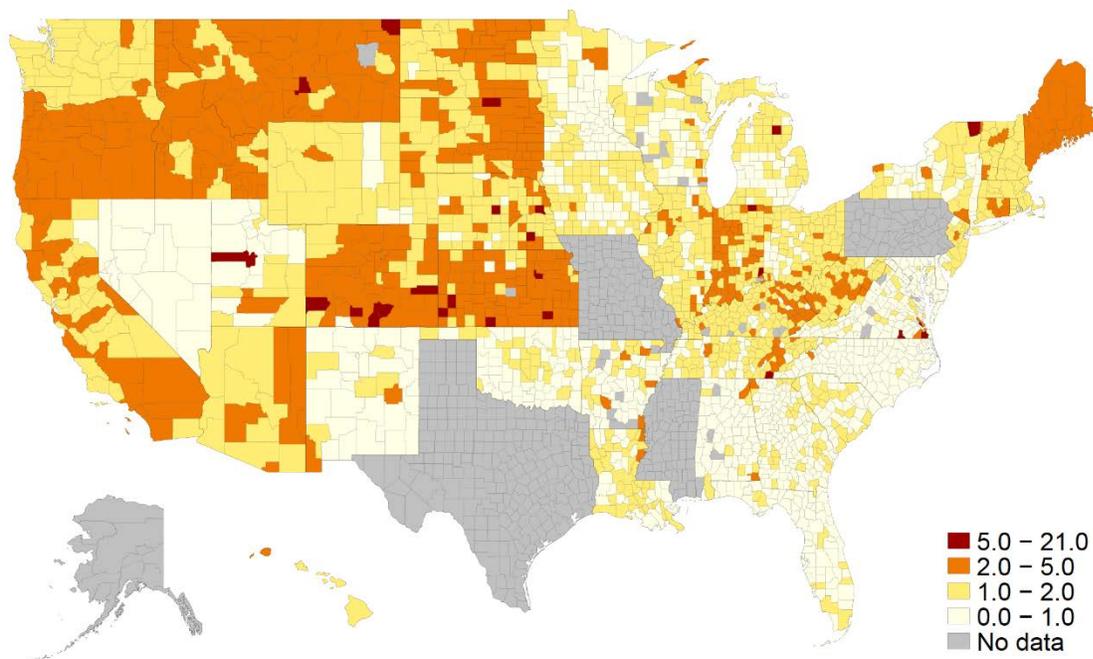


Source: Nevada Secretary of State.

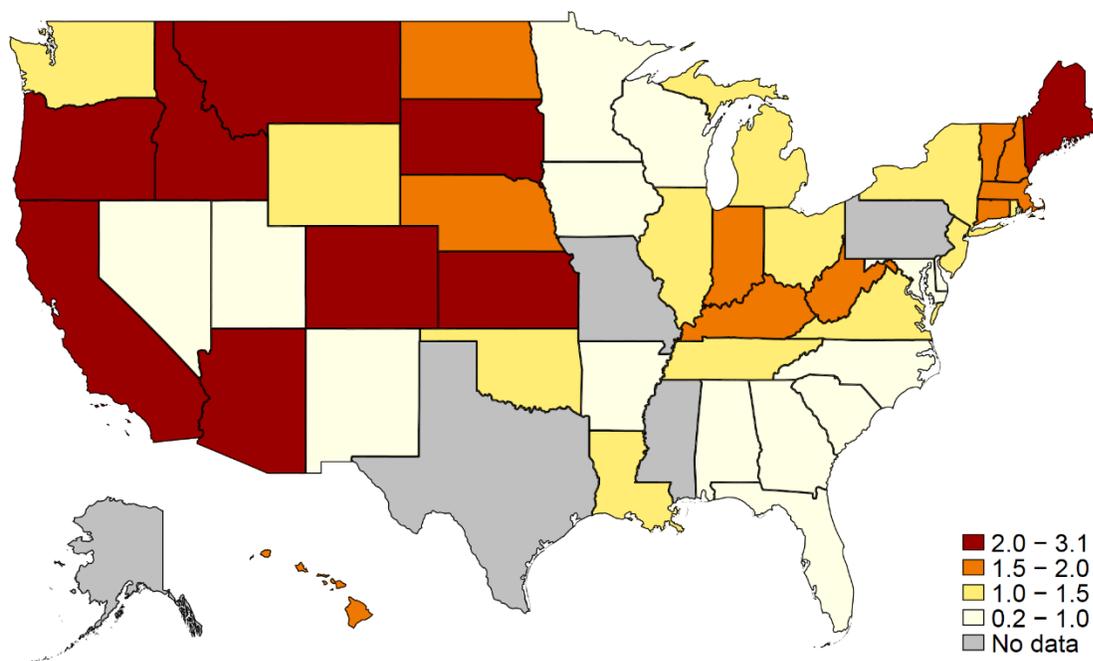
Geographical variation of the residual vote rate in 2016

Figure SM3. Residual vote rate in 2016.

a. By county

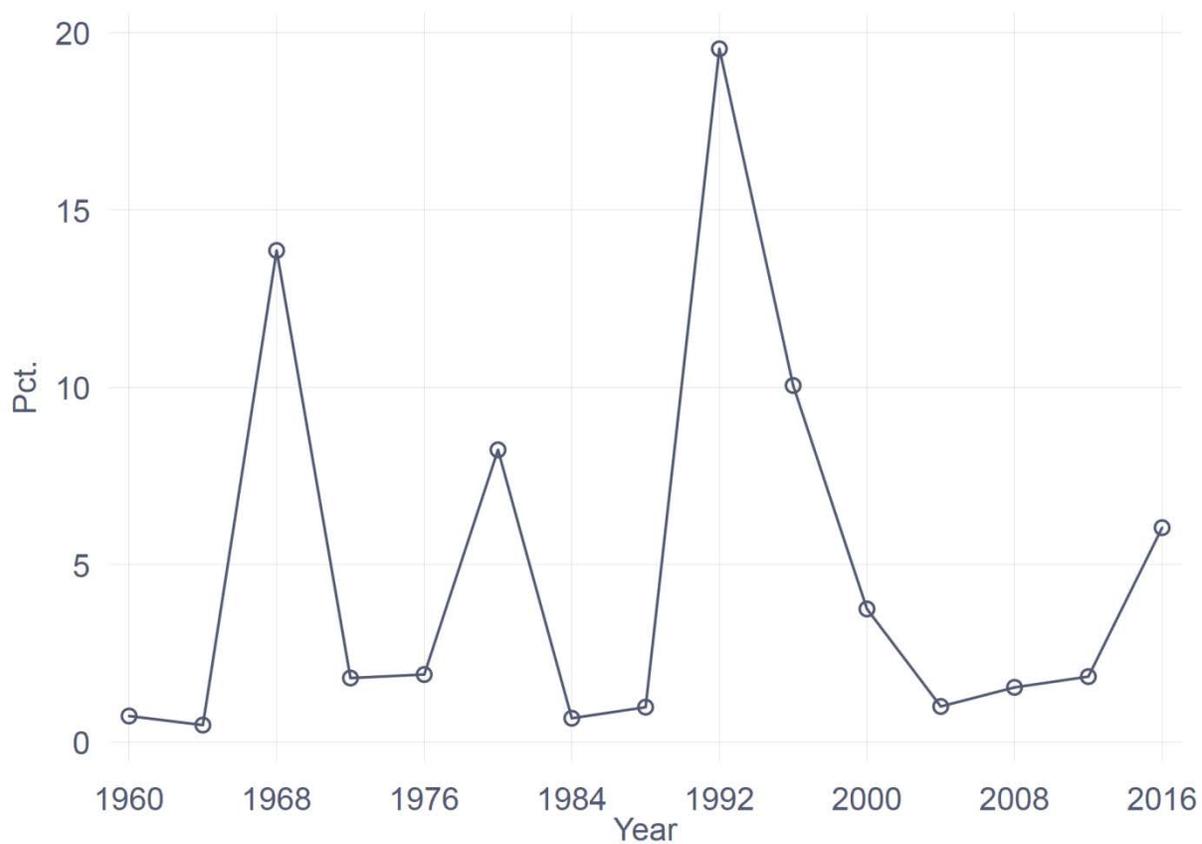


b. By state



Time series of minor-party vote shares

Figure SM4. Percent of the national presidential vote received by non-major-party candidates, 1960–2016.

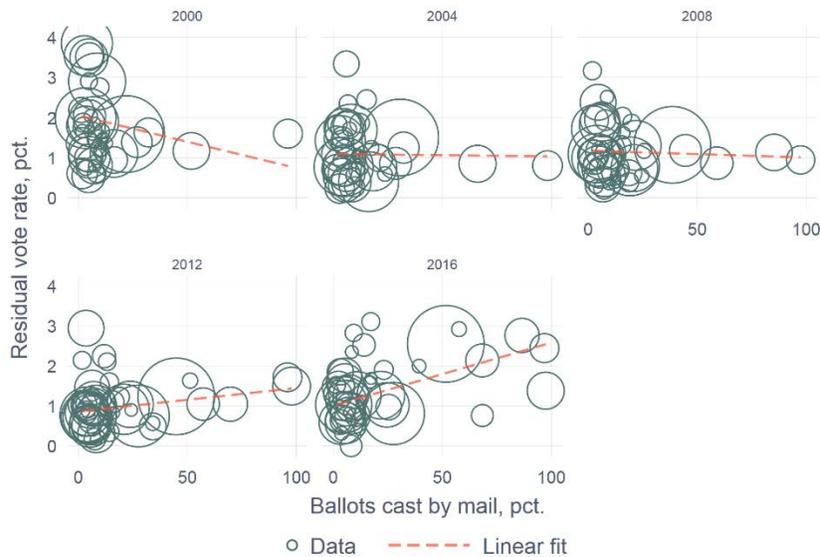


Source: Dave Leip's Presidential Atlas

Relationship between residual vote rate at the state level and the fraction of votes cast by mail.

Note that in the graphs and regressions below, there is a significant right skew to the variable measuring the use of mail ballots. However, transforming this variable --- for instance, by taking logarithms --- does not change the substance of the analysis.

Figure SM5. Relationship between residual vote rate and fraction of votes cast by mail, 2000–2016.



Source: U.S. Census Bureau, Current Population Survey, Voting and Registration Supplement, various years; Election data gathered by authors

Table SM1. Regression of residual vote rate on fraction of ballots cast by mail at the state level, 2000–2016. (Robust standard errors)

	Year				
	2000	2004	2008	2012	2016
Ballots cast by mail	-0.013 (0.008)	-0.001 (0.004)	-0.002 (0.003)	0.0059** (0.0021)	0.016** (0.005)
Intercept	2.05*** (0.25)	1.09*** (0.13)	1.17 (0.11)	0.86*** (0.10)	1.01*** (0.11)
R ²	.05	.00	.01	.09	.35
N	41	42	45	48	46

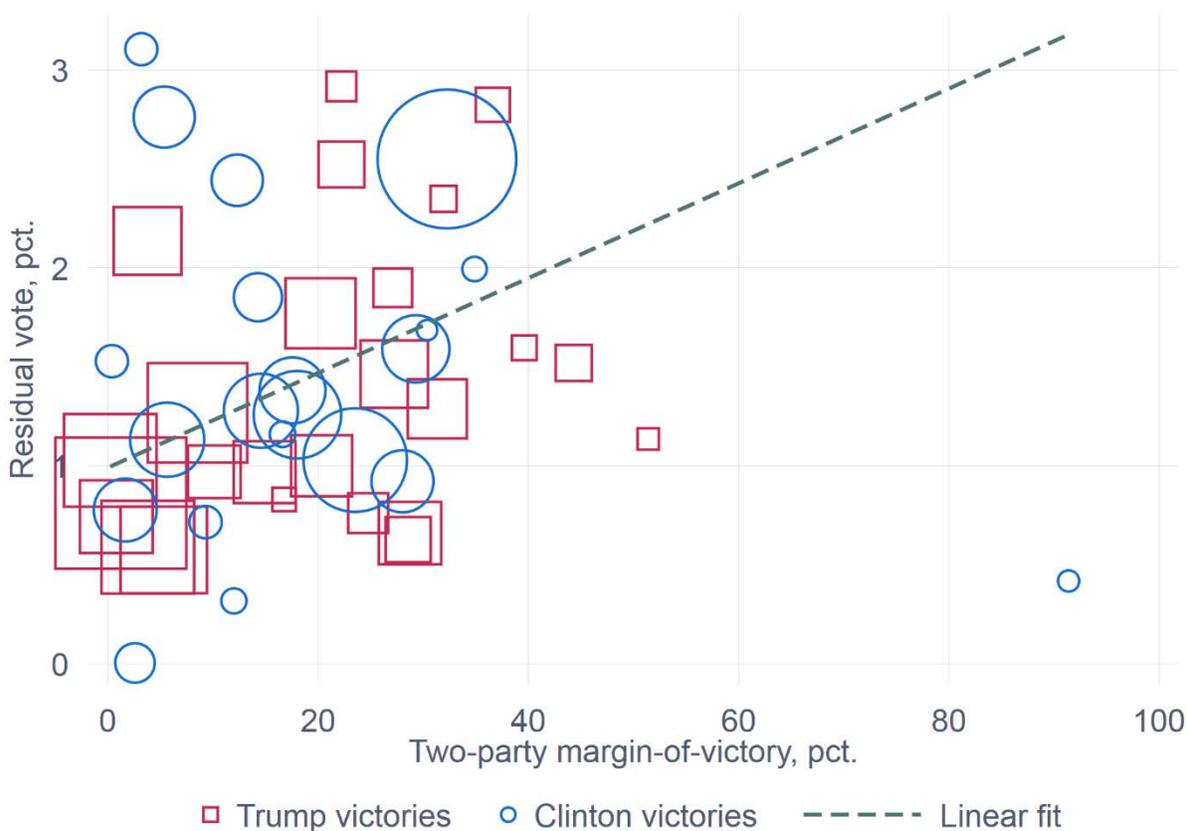
* $p < .05$, ** $p < .01$, *** $p < .001$

Source: U.S. Census Bureau, Current Population Survey, Voting and Registration Supplement, various years; Election data gathered by authors

Relationship between partisan competitiveness of states and the residual vote rate.

Here, we have plotted the residual vote rate of each state in 2016 against the percentage margin-of-victory enjoyed by Trump (red squares) and Clinton (blue circles). (The sizes of the data tokens are proportional to the number of voters.) While there is considerable variation around the best-fit line, the correlation is moderately high ($r = .43$) and the t -score of the line's slope is 1.96, using robust standard errors.³ The District of Columbia is the obvious outlier in the graph, but its small relative turnout means that removing it from the analysis barely changes the results, and if anything, strengthens them.⁴

Figure SM6. Correlation between the residual vote rate and two-party margin-of-victory in each state, 2016.

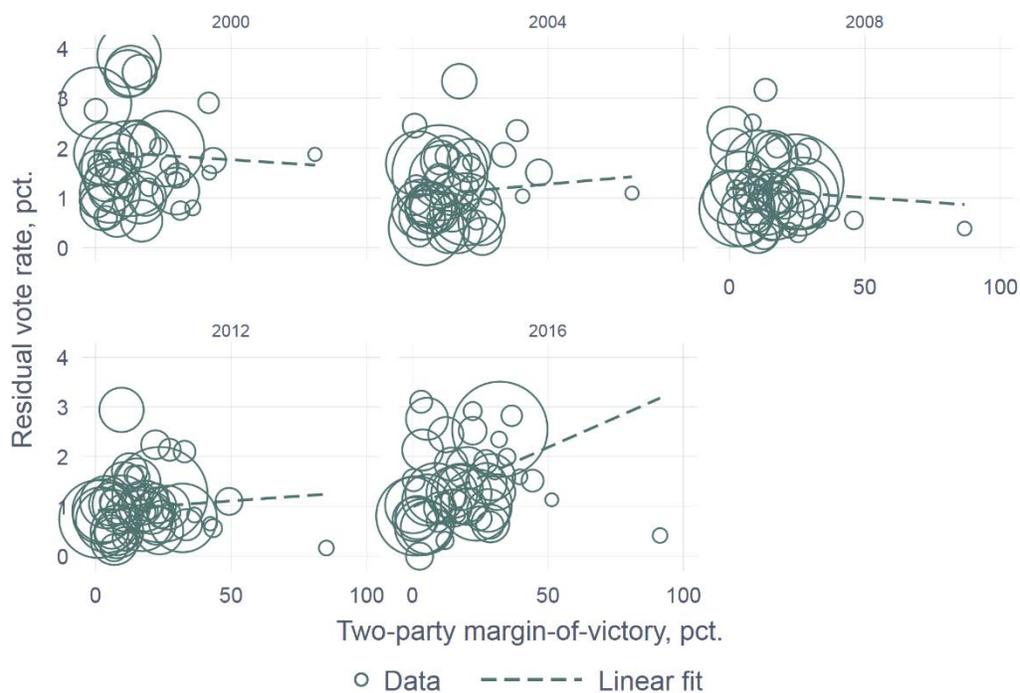


Sources: Data gathered by the authors and Dave Leip's Atlas of U.S. Presidential Elections.

³ More precisely, the best-fit line's equation is $y = 0.99 (0.16) + 0.024 (0.012) x$, with $R^2 = .18$ and $n = 46$. (Standard errors of coefficient are in parentheses.) Observations are weighted by turnout in 2016. Robust standard errors.

⁴ With DC excluded, the best-fit line's equation is $y = 0.93 (0.16) + 0.028 (0.023) x$, with $R^2 = .23$ and $n = 45$.

Figure SM7. Correlation between the residual vote rate and two-party margin-of-victory in each state, 2000–2016.



Sources: Data gathered by the authors and Dave Leip's Atlas of U.S. Presidential Elections.

Table SM2. Regression of residual vote rate on two-party margin of victory at the state level, 2000–2016. Robust standard errors.

	Year				
	2000	2004	2008	2012	2016
Margin-of-victory	-0.003 (0.012)	0.005 (0.010)	-0.004 (0.008)	0.004 (0.005)	0.024* (0.012)
Intercept	1.93*** (0.28)	1.03*** (0.18)	1.20*** (0.18)	0.92*** (0.12)	0.99*** (0.16)
R ²	.00	.01	.01	.01	.18
N	41	42	45	48	46

* $p < .05$, ** $p < .01$, *** $p < .001$

Source: Data gathered by the authors and Dave Leip's Atlas of U.S. Presidential Elections.