

Residual Votes and Abstentions in the 2016 Election

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Abstract

This paper provides a preliminary analysis of the increase in the residual vote rate from 2012 to 2016, when it increased from 0.99% to 1.87% nationwide. It is reasonable to assume that this spike in the residual vote rate is due to a rise in abstentions. However, there are currently other trends in election administration, such as an increasing reliance on vote-by-mail, that could also be driving up the residual vote rate. And, even if the recent up-tick in the residual vote rate is primarily due to an increase in abstentions in 2016, it is not a priori obvious that the source of new abstentions was equally distributed among disaffected Democrats and Republicans. The analysis in this paper relies on a combination of public opinion data and election returns to address these issues. We find, first, that the increase in abstentions in 2016 was most likely due to disaffected Republicans, rather than an across-the-board phenomenon. We also confirm that the increase in the 2016 residual vote rate was not due to changes in voting technologies between 2012 and 2016. We address three issues in the conclusion that this analysis raises: (1) the potential for the growth of protest voting in the U.S., (2) the likelihood that there is a significant under-reporting of voter abstentions in public opinion surveys, leaving a role for aggregate analysis to study this phenomenon, and (3) cautions about the use of the residual vote rate as a metric to gauge the accuracy of voting technologies.

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When a voter fails to cast a vote for president, what does that signify? Before the 2000 election, 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 all that. The Florida recount, with its tales of hanging chad and butterfly ballots, alerted students of elections to the possibility that the lack of a vote for president might have nothing to do with voter choice at all, but rather the result of 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 rose to 1.87% in 2016, compared to 0.99 % in 2012 and 1.05% over the past three presidential elections.¹ As we show in this paper, this spike in the residual vote rate is unlikely to be due to the sudden failure of the nation's voting machines. Rather, it is most likely due to a spike in abstentions, mostly Republicans unwilling to vote for Donald Trump.

The rise in the number of abstentions in the 2016 election has implications for the use of the residual vote rate to measure the performance of voting machines, which is how this metric was used immediately after the 2000 election (Alvarez et al 2004; Alvarez, Ansolabehere, and Stewart 2005; Ansolabehere 2000; Brady 2004; Herron and Sekhon 2005; Buchler, Jarvis, and McNulty 2004; Stewart 2006), and is currently being used in the Elections Performance Index.²

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

² <http://www.pewtrusts.org/en/multimedia/data-visualizations/2014/elections-performance-index>

Without implicit or explicit controls for abstention, the residual vote rate risks becoming an invalid measure of voting machine performance.

Conversely, the residual vote rate may be a valuable tool for measuring the degree of abstention at the top of the ballot in presidential elections. As we show in this paper, the vote-choice question in public opinion surveys appears to produce under-estimates of the abstention rate in the vote for president. 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 be able to estimate the amount of abstention in any given presidential year.

This is the first iteration of analysis that attempts to build such a statistical model so that the degree of abstention in the 2016 presidential election can be better estimated. The approach here is primarily inductive and exploratory.

The remainder of this paper proceeds as follows. We start by reviewing two relevant literatures, studies of the residual vote rate and studies of abstention in presidential elections. We then examine the descriptive data concerning the residual vote rate, both temporally and cross-sectionally. Following that, we explore the degree to which partisanship and ballot access laws influenced the residual vote rate in 2016. Next, we place 2016 in a broader context by embedding it in a pooled cross-sectional time-series analysis that examines the residual vote rate at the county level since 2000. We conclude by discussing the substantive findings of the paper and proposing directions for future research.

I. Intellectual Background

Residual votes and ballot roll-off

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 widely used since then.³

From the beginning, it has been recognized that the residual vote rate is due to the joint contribution of at least two major factors: (1) intentional abstention by voters and (2) machine malfunctions. Each of these major factors could have multiple sources. For instance, abstention could be caused either by voter alienation or indifference. (See the next subsection for a further discussion.) Machine malfunctions could be due to outright failure, such as hanging chad or stripped gears on a mechanical lever machine, or voter confusion, such as presenting misleading ballot designs or using 4-point font to print candidate names. Machine malfunctions could interact with administrative practices to amplify or diminish the residual vote rate. For instance, counties that diligently cleaned the holders of punch-card ballots after each election probably had lower residual vote rates than counties that let chad accumulate in the holders over time.

In addition to abstention and machine issues, there is the matter of administrative practice. The 2000 election heightened the awareness of election administrators to the procedural factors that lead to the growth of residual votes. This led many election jurisdictions to improve their voting-machine maintenance regimes. It also led many to give greater oversight to the vote-counting process, to ensure that ballots were not overlooked on election night or during the canvass. It is now clear, for instance, that some of the high residual vote rates found

³ In addition to the citations above, 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). In addition, 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.

in Georgia in 2000 were due to some county officials just not diligently counting all the ballots they received (Stewart 2004). Tightening up vote-counting procedures could easily have had the effect of reducing the residual vote rate after 2000, even without a change of voting equipment or tendency of voters to abstain.

The residual vote rate is closely related to another measure, ballot roll-off. The two are related, but are distinguishable both in terms of conception and implementation.

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.” This quote nicely summarizes the conceptual and implementation differences between the residual vote and roll-off. Conceptually, roll-off studies tended to focus on the issue of down-ballot “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 was measured as the difference between the number of votes cast for the top-of-the-ticket race (usually U.S. president, but possibly governor or U.S. senator) and votes cast for down-ballot races.

From a measurement perspective, the advantage of focusing on roll-off is that it allows the analysis of voting patterns in states that do not collect turnout data. Not reporting turnout data as a separate statistic was common before 2000, but has become less common since then. However, the older roll-off measure is contaminated by factors related to machine performance, insofar as the baseline measure of turnout — total votes for the top-of-the-ballot race — has already been diminished by any mechanical or usability failures that may infect the entire ballot. As a consequence, ballot roll-off is generally a second-choice measure for studying issues of voting machine performance.

Because of the advantages of the residual vote rate as an overall measure of voting machine performance, it has tended to supplant roll-off as a measure, even when the focus of study has been down-ballot races (e.g., Alvarez, Beckett and Stewart, 2013). However, a few studies still rely on roll-off, especially when there is a desire to include data from states that do not gather and report turnout data (e.g., Reilly and Richey 2011).

Abstention in presidential elections

Electoral abstention fits within the large political science literature on turnout. Failure to vote is, of course, one form of abstention. The main theory framing the turnout literature is the “calculus of voting” suggested by Riker and Ordeshook (1968) and inspired by Downs (1957) which, in turn, has been adapted in many ways to focus on topics such as economic endowments of voters, candidate policy differences, and election administration practices.

Our interest in this paper is not on turnout *per se*, but what happens conditional on turnout. In other words, we are interested in what happens when a voter has presumably decided that *something* makes it worthwhile to pay the cost of voting. Therefore, the question becomes this: once the voter has decided to stand in a voting booth or pull out the mail ballot, in which races will the vote mark a choice?

The political science literature has tended to frame the issue of abstention-conditional-on-turnout in terms of the probabilistic spatial model. Two spatial dynamics are said to be at work in determining abstention, *abstention due to alienation* and *abstention due to indifference*. In the former, a voter becomes more likely to abstain if all the candidates are viewed as ideologically distant from the voter. In the latter, the voter will become more likely to abstain if all the candidates are seen as interchangeable. Public opinion studies have found evidence of both

abstention-due-to-alienation and -indifference in presidential (Adams, Dow, and Merrill 2006) and U.S. Senate elections (Plane and Gershtenson 2004).

Abstention-due-to-alienation and –indifference are at the root of the literature on protest voting, which has been primarily the subject of comparative politics. The presence of blank, null, or spoiled (BNS) ballots has especially been notable in countries with compulsory voting. In many countries with compulsory voting laws, rates of BNS ballots — what we call the residual vote rate — are often quite high, and have often been interpreted as protest votes, that is, abstentions-due-to-alienation (Schwartzman 1973; Alves 1985; Kinzo 1988; Lamounier 1989; Power and Roberts 1995). However, it has also been observed that compulsory voting systems also tend to have higher residual vote rates in down-ballot contests, which is also consistent with abstention-due-to-indifference even in these countries.

Empirical evidence from 2016. Returning our focus to the United States, popular accounts of the 2016 election provide reasons to believe that some number of voters (i.e., those who turned out, rather than stayed at home) abstained in the presidential race, for either alienation or indifference reasons, and that these numbers were higher than average.

The case for abstention-due-to-alienation starts with the “disruptive” character of the Republican nominee, Donald Trump. Fitting this assessment of Trump into the standard spatial model is less than straightforward, because Trump’s issue stances — at least at the beginning of his campaign — were an unorthodox package. And yet this may be precisely the point of 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 drove some Republicans away from voting for him in the general election even when the issues he espoused were not alienating.

Evidence that Republican voters may have been alienated from voting for Trump shows up in two ways in public opinion research. First, Republicans who supported candidates other than Trump in the primaries or caucuses were more likely to report abstaining in the general election, among respondents to the 2016 Cooperative Congressional Election Study (CCES). (See Table 1.)⁴ Among the 5,670 CCES respondents who reported they supported Trump in the primaries, precisely zero reported abstaining in November; Republican abstentions came entirely from non-Trump primary supporters.

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

Candidate support	Abstention pct.	N
Donald Trump	0.00%	5,670
Ted Cruz	0.19%	2,866
John Kasich	0.29%	1,016
Marco Rubio	0.26%	1,137
Another Republican	0.25%	618
Total	0.11%	11,307

Note: Independent Republican leaners are included as Republicans. The small number of respondents who reported voting for a Democratic candidate in the primaries/caucuses are excluded.

Source: 2016 CCES, Common Content

Second, ideologically moderate Republicans were more likely to abstain in the general election than Republicans who occupied the far right of the ideological spectrum (Table 2).

Leaving aside the small number of liberal Republicans who showed up in the survey, Republican

⁴ 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.

Election Day abstainers tended to come from the middle-of-the-road/moderate-conservative side of the party, with abstention becoming less common as we move rightward.

Table 2. Reported abstention in the 2016 general election among Republicans, given ideology.

Respondent ideology	Abstention pct.	N
Very liberal	0.00%	84
Liberal	0.00%	137
Somewhat liberal	0.00%	247
Middle of the road	0.18%	2,628
Somewhat conservative	0.26%	3,320
Conservative	0.10%	6,225
Very conservative	0.06%	3,479
Not sure	0.00%	200
Total	0.14%	16,320

Note: Independent Republican leaners are included as Republicans.

Source: 2016 CCES, Common Content

The Democratic Party also had a disruptive candidate, although the nature of the disruption was different. Bernie Sanders, the gadfly of the Democratic establishment, offered a platform that can be simply characterized as ideologically extreme, rather than the dog's stew of issues chosen without regard to ideological coherence that characterized Trump's initial policy positions. Nonetheless, the animosity that grew up between supporters of Sanders and the eventual nominee, Hillary Clinton, suggested that Democrats might have been primed for its own form of abstention-due-to-alienation in the general election.

However, evidence from the CCES provides little support for such a neatly symmetrical view of what happened among the Democrats on this score. For instance, Sanders's primary voters reported abstaining at only a slightly greater rate than Clinton's supporters once November rolled around (Table 3). Thus, despite well-publicized lingering animosity among the

Clinton and Sanders camps after the nomination was decided, at least among Democratic CCES respondents, this animosity failed to carry over into the November balloting.

Table 3. Reported abstention in the 2016 general election among Democrats given primary/caucus support.

Candidate support	Abstention pct.	N
Hillary Clinton	0.05%	9,201
Bernie Sanders	0.07%	6,022
Total	0.05%	15,223

Note: Independent Democratic leaners are included as Democrats. The small number of respondents who reported voting for a Republican candidate in the primaries/caucuses or another Democrat are excluded.

Source: 2016 CCES, Common Content

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. In fact, the opposite is true. If anything, *centrist* Democrats reported abstaining at greater rates than leftists on Election Day (Table 4). However, this pattern is less pronounced than the Republican pattern. (See Figure 1 for a visual summary of Tables 2 and 4.)

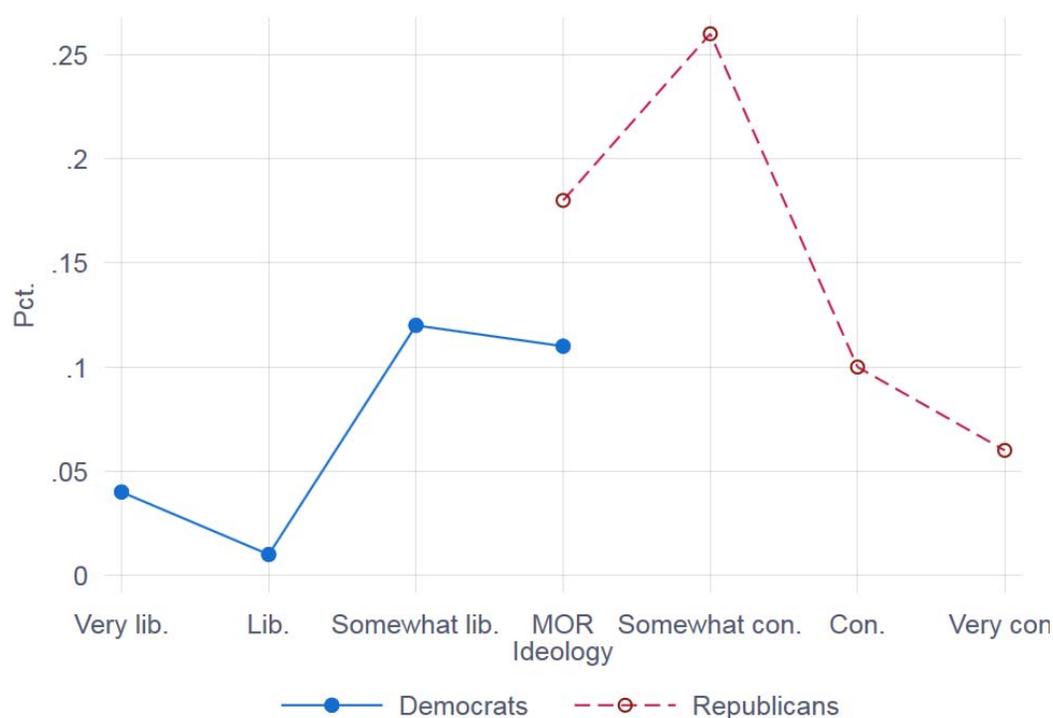
Table 4. Reported abstention in the 2016 general election among Democrats, given ideology.

Respondent ideology	Abstention pct.	N
Very liberal	0.04%	4,061
Liberal	0.01%	6,085
Somewhat liberal	0.12%	3,877
Middle of the road	0.11%	5,242
Somewhat conservative	0.02%	970
Conservative	0.00%	816
Very conservative	0.00%	436
Not sure	0.00%	484
Total	0.06%	21,971

Note: Independent Democratic leaners are included as Democrats.

Source: 2016 CCES, Common Content

Figure 1. Reported abstention in the 2016 election by Democratic and Republican identifiers, by ideology.



Source: CCES 2016, Common content

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 the two nominees, Trump and Clinton. This is easy to test, by first calculating the absolute difference in respondents' placements of the two major-party candidates on the standard 7-point ideological scale, and then examining the abstention rate as a function of perceived ideological difference.

The results of this simple test are reported in Table 5. Among those who saw no ideological difference between the candidates, the abstention rate was much higher than if even a slight difference was perceived. And, 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 5. 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	0.36%	1,573
1	0.18%	2,941
2	0.21%	5,164
3	0.15%	8,474
4	0.04%	9,206
5	0.04%	6,152
6	0.06%	2,202

Source: 2016 CCES, Common Content

Of course, this is an overly simple test of abstention-due-to-indifference, for at least two reasons. First, the flow of causality is ambiguous — a respondent might just as easily rationalize abstention by simply 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 is likely to 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. (For instance, we exclude all self-reported liberal Republicans and conservative Democrats.) We also exclude self-identified independents and members of minor parties.

We performed the estimation using both probit and linear probability models and report the results in Table 6.⁵ Comparing the probit and linear probability analyses, three effects consistently stand out: (1) Republicans were more likely to abstain than Democrats, (2) Republicans who supported Trump in the primary were less likely to abstain than Republicans who supported other candidates, and (3) respondents who saw big ideological differences between Trump and Clinton were less likely to abstain.

⁵ We performed a linear probability analysis because being a Trump support in the primary perfectly predicted not abstaining; thus, these observations were excluded in the probit analysis. The linear probability analysis allows us to take into account these Trump supporters.

Table 6. Probability of respondents reporting they abstained in the 2016 presidential election.

	Probit	Linear probability
Republican (Democrat excluded category)	1.13*** (0.30)	0.0059*** (0.0021)
Republican voted for Trump in primary	—	-0.0029*** (0.0005)
Democrat voted for Sanders in primary	0.14 (0.19)	0.0003 (0.0006)
Republican ideology (positive = conservative)	-0.069 (0.042)	-0.00047 (0.00033)
Democratic ideology (positive = conservative)	0.074* (0.034)	0.00019 (0.00013)
Perceived ideological difference b/t Trump & Clinton	-0.13*** (0.03)	-0.00062*** (0.00018)
Intercept	-3.07*** (0.20)	0.0021** (0.0008)
N	25,180	30,511
Llf	-302.54	—
R ²	0.064 (pseudo)	0.0019

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

Source: 2016 CCES, Common Content

Using the coefficients from the linear probability model, it appears that being a Republican had the biggest effect on abstention among these three factors. Republicans were 0.59 percentage points more likely to abstain than Democrats, Republicans who supported Trump in the primary were 0.29 points less likely to abstain, and respondents who perceived a maximal ideological difference between Clinton and Trump were 0.37 percentage points more

likely to abstain than respondents who saw no difference.⁶ Sanders supporters in the primaries were not more likely to abstain than Clinton supporters, all things equal, nor were Republican moderates. Ideology was barely statistically significant in the probit analysis, and insignificant in the linear probability analysis.

Thus, to the degree that the individual-level analysis tells a consistent story, Republicans were more likely to abstain in 2016, especially those who had opposed Trump in the primaries. Regardless of party, those who perceived big ideological differences between Trump and Clinton were less likely to abstain.

There is one important detail in the analysis summarized in Table 6 that give us pause, which is 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). 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.⁷ In the next section, we will argue that the aggregate data suggest that the Election Day abstention rate was closer to a full percentage point nationwide, not a tenth of a percentage point, and could have been as high as two percentage points in some places.

Thus, the individual analysis gives 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, what we can learn about abstention in the 2016 election using public opinion data appears to be limited.

⁶ This last effect was estimated by multiplying the perceived ideological difference coefficient (-0.00062) by the maximum ideological difference (6).

⁷ 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 voting in the election, but abstaining in the presidential race.

II. The 2016 Residual Vote Rate in Context

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

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

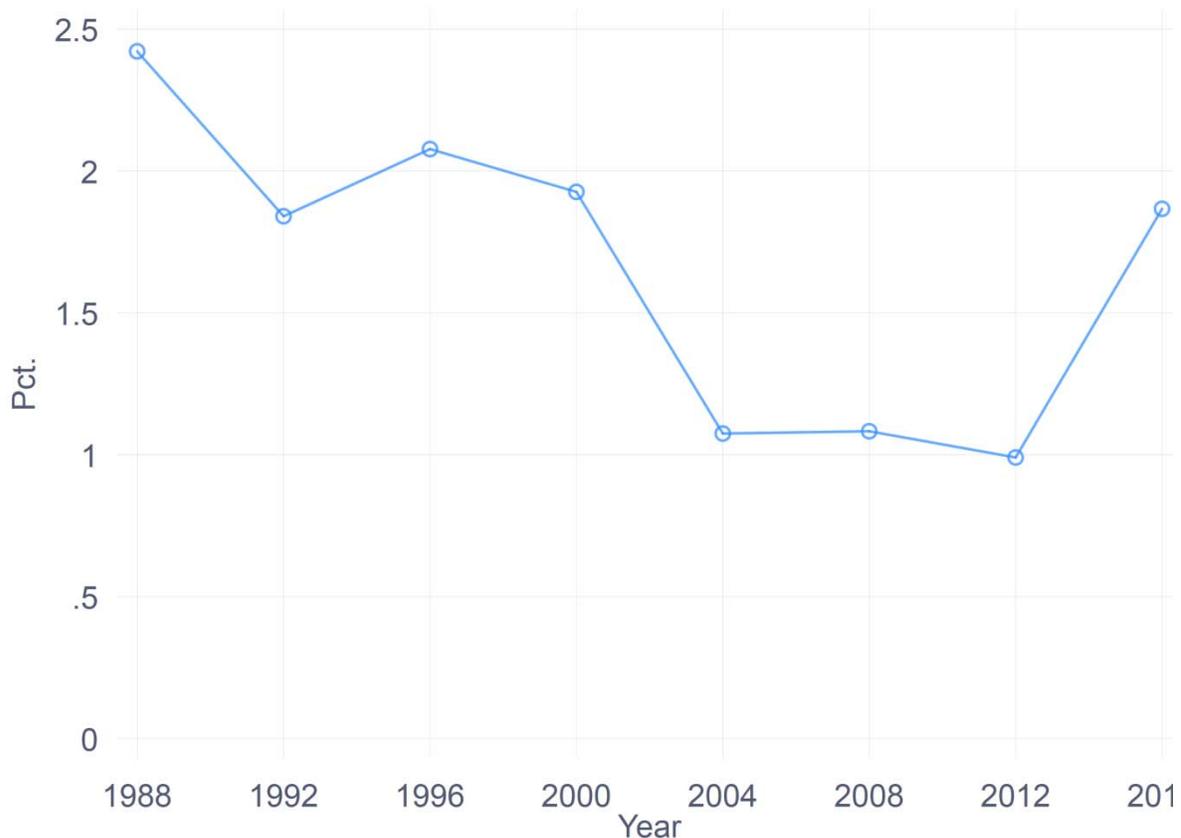
Because few jurisdictions report over-

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

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

The national residual vote rate time series that runs from 1988 to 2016 (Figure 2) shows a clear break after 2000, which in large part was caused by a combination of new voting machines and other administrative changes that occurred following 2000. In the years immediately preceding (and including) 2000, the residual vote rate hovered around 2%. It was cut in half in the year immediately after 2000, with the rate spiking back up to near 2% in 2016. As we show below, the 2016 spike cannot be attributed to a change in voting technologies between 2012 and 2016, and therefore is likely to be due to a rise in abstentions in 2016.

Figure 2. Residual vote rate nationwide in presidential elections, 1988–2016.



Source: Election Data Services (1988–2000); the authors (2004–2016)

The average residual vote rate from 2004 to 2012 was 1.05%; the residual vote rate in 2016 was 1.87%. The difference, 0.82 percentage points, is a good starting point for quantifying the increase in abstentions in 2016 compared to the immediate past. This increase is on top of any pre-existing abstention rate that was included in the residual vote rate. Because the baseline abstention rate in prior elections has been estimated to be around 0.5% (Stewart 2014), it is reasonable to assume for starters that the 2016 abstention rate was a bit over 1% nationwide. In the previous section we reported that only 0.11% of CCES respondents reported abstaining in 2016. At least provisionally, it seems that the survey response produced a significant under-reporting of abstentions.

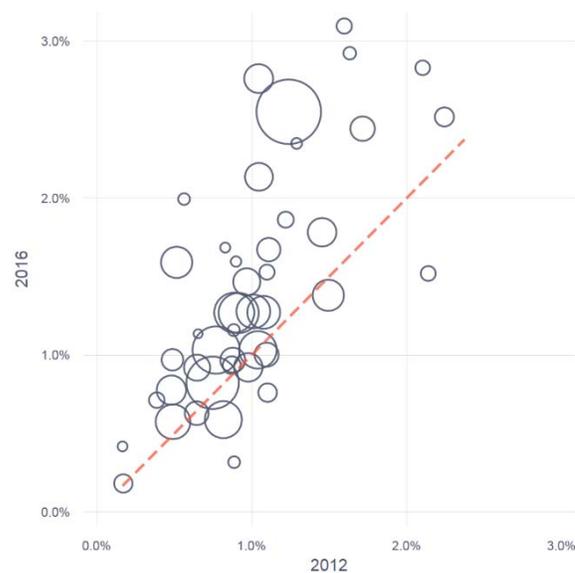
Figure 3 presents scatterplots that compare the residual vote rates in 2016 and 2012 at the county and state levels (Figures 3a and 3b, respectively). To aid in legibility, cube roots have been taken of the percentages in the county graph. Overall, there are moderate-sized correlations across time at both levels of aggregation: $r = .25$ in the case of counties and $r = .70$ in the case of states.⁸ The presence of moderately high correlations at the state and county levels of residual vote rates between 2012 and 2016 suggest that underlying the residual vote rate in any given jurisdiction is a set of legal, administrative, and cultural practices that are slow to change across adjacent presidential election cycles.

Figure 3. Comparison of residual vote rate, 2016 vs. 2012.

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



b. States



Source: Data gathered by the authors

Inspection of the graphs in Figure 3 reveals that the residual vote rate went up in the great majority of counties (1,754 of 2,452) and states (37 of 45). This is good preliminary evidence

⁸ The correlations are calculated weighting by turnout in 2016. The correlations using the cube-root transformations is $r = .45$ for the counties.

that the residual vote rate spike in 2016 had some common nationwide root. However, the increase was greater in some states and counties than in others, which also suggests that variations in short-term political factors that affected some parts of the country more than others also were in play, too.

A side note about Nevada

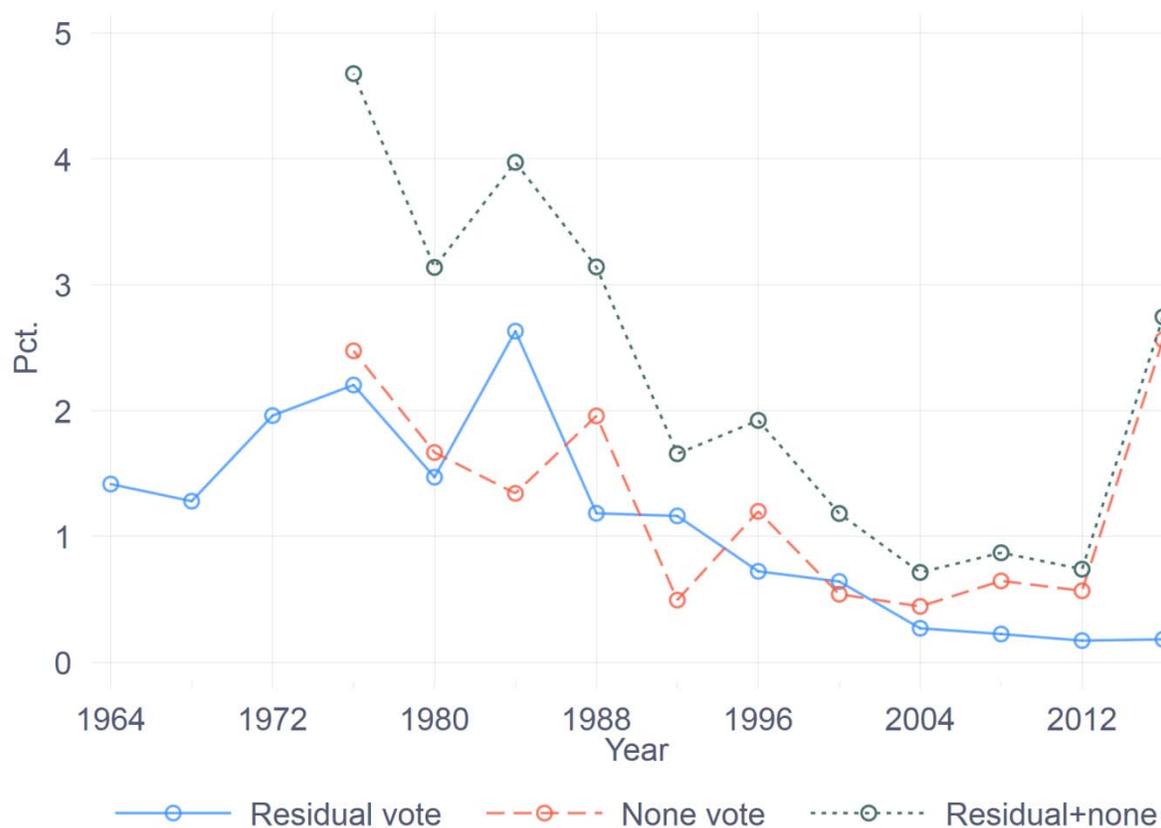
Before proceeding with the nationwide analysis of the residual vote rate, we pause to consider the case of Nevada. Nevada is interesting because in the 1970s it provided a ballot mechanism that allows voters to register an abstention in the presidential race, by offering the choice of “none of these candidates” (NOTC). Presumably, voters making this choice would have abstained if they had voted in any other states.⁹ Therefore a comparison of Nevada’s residual vote rate over time alongside its “none of these candidates” rate (we will call this the “none rate”) is instructive.¹⁰

Figure 4 shows the relevant Nevada time series going back to 1964. The NOTC option was first offered in presidential elections in 1976, so the none 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 that time to 2012, both the residual vote rate and the none rate gradually declined, to the point that in 2012, the residual vote rate in Nevada was 0.17% and the none rate was 0.57%, totaling 0.74%. In 2016, the residual vote rate only ticked up a small amount, to 0.18%, but the none rate spiked to 2.56%, for an increase of nearly 2 percentage points.

⁹ 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.

¹⁰ For research into Nevada’s NOTC option, see Damore, Waters and Bowler (2012).

Figure 4. Residual vote and none-of-these-candidate vote in Nevada presidential elections, 1964–2016.



Source: Nevada Secretary of State.

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.

Summary

The residual vote rate in 2016 returned to levels not seen since the days of *Bush v. Gore*. The dramatic surge in the NOTC vote in Nevada, but not the residual vote rate, provides direct evidence that at least in one state, there was a surge in the number of voters who purposefully refused to vote for one of the candidates on the ballot. With the NOTC option unavailable anywhere other than Nevada, the only option for disaffected voters elsewhere was to abstain, if they turned out to vote at all. However, at the same time, the residual vote rate showed a healthy degree of autocorrelation with levels seen in 2012. This further suggests that there still exist persistent factors that contribute to the residual vote rate that are beyond the reach of short-term political forces.

III. 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 it varied across-sectionally in 2016, both at the state and county levels. We start with cross-sectional analysis so that we can ultimately test specific partisan hypotheses that might explain variation in the residual vote rate in 2016 but not in other years.

Maps describing the geographic distribution of the residual vote rate in 2016, at both the county and state levels, are provided in Figure 5. Six states (Connecticut, Mississippi, Missouri, Oklahoma, Pennsylvania, and Texas) do not reliably report turnout rates statewide, so are shaded gray in both maps. Alaska does report turnout. However, its election returns are reported by state senate district, which hinders allocating the residual vote rate into that state's boroughs.

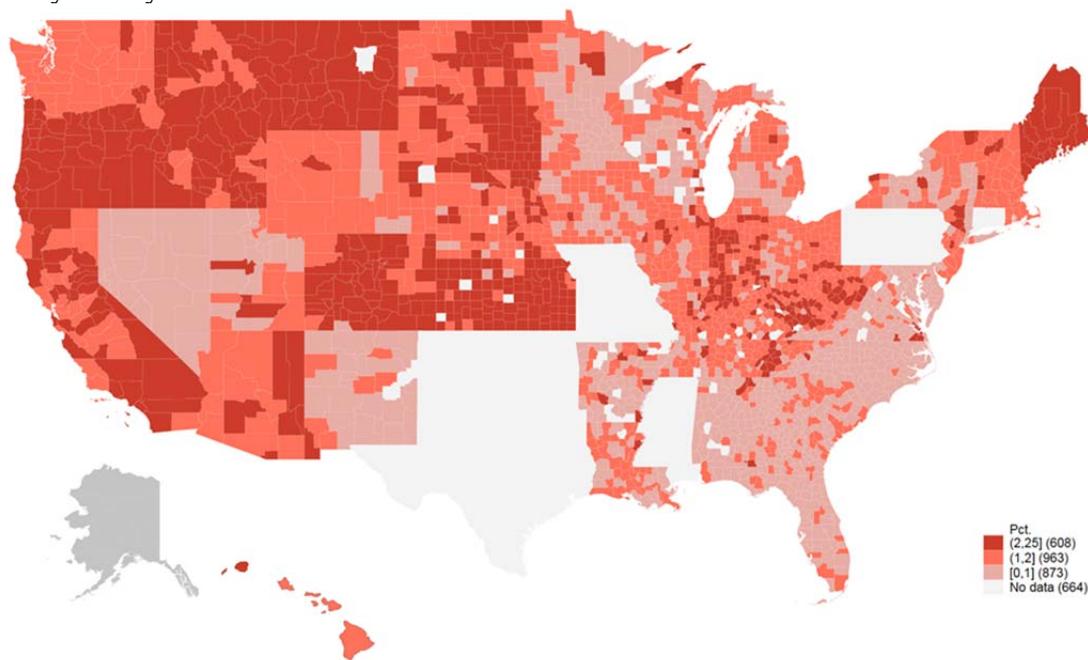
A comparison of the two maps in Figure 5 reveals, first, that residual vote variation within most states was much less pronounced than variation between states. This suggests that any explanations for why the residual vote rate varies will need to account for factors such as

legal regimes and administrative practices that are often determined by state legislatures. Both maps show 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 Donald 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, as well. (We address these issues below.)

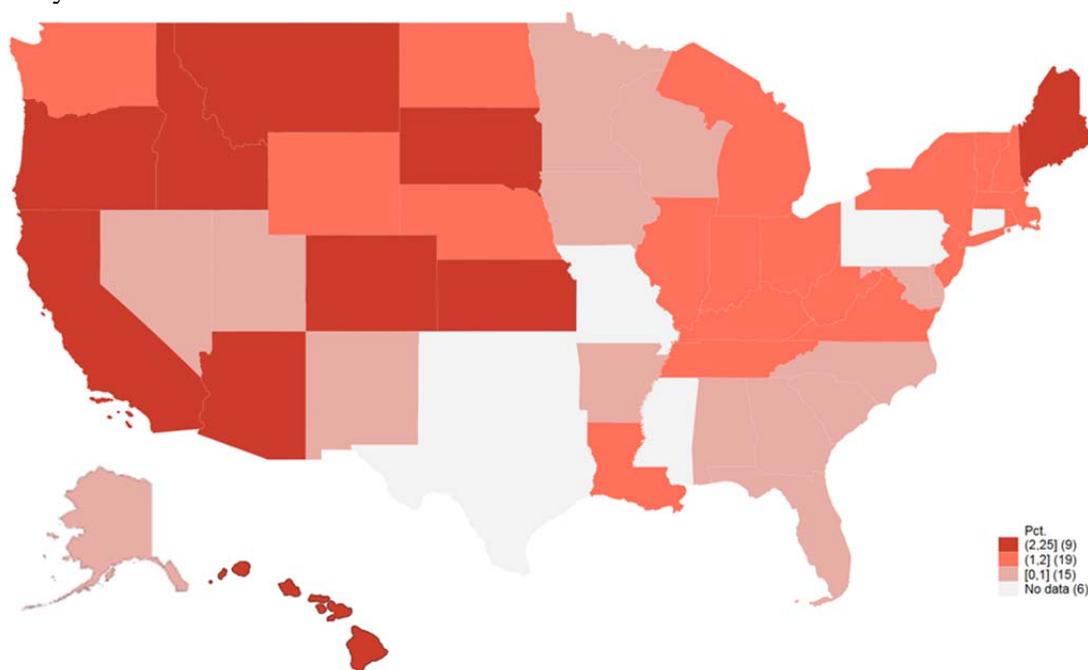
The two major categories of explanations about variations in the residual vote rate have focused on the accuracy of voting machines, and on the behavior of voters. For the remainder of this section, we start by examining the relationship between the 2016 geographic variations in the residual vote rate as a function of voting technology, before turning our attention to non-technology-related explanations.

Figure 5. Residual vote rate, 2016

a. By county



b. By state



Source: Data gathered by authors

Voting technology and the residual vote in 2016

The literature on the relationship between voting technology and the residual vote rate that emerged immediately after 2000 found that older technologies, especially punch-card machines, had significantly higher residual vote rates than newer technologies. Once New York retired 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-to-no 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 a priori unlikely that cross-county variation in the residual vote rate in 2016 would be strongly related to voting technology. Nonetheless, voting technology is one factor we need to test for.

In a simple bivariate test, the residual vote rate in 2016 *was* slightly greater in counties that used optical scanners than in counties that used DREs. The residual vote rate in optical scanning counties was 1.45%, compared to 1.20% in counties that used DREs.¹¹ A simple *t*-test rejects the null hypothesis that these percentages are equal at a *p* value of $< .0005$. However, this difference in the residual vote rate across the two major types of voting machines may simply be an artifact of the types of machines used in different states. If we conduct this simple statistical test in the context of a (state-level) fixed-effects regression, DREs now have a *higher* average residual vote rate than optical scanners, by 0.15 percentage points.¹²

¹¹ There were 1,607 and 724 counties that used optical scanners and DREs, respectively. In addition, the average residual vote rate for the 42 counties that used hand-counted paper was 2.20%; the average residual vote rate for the 78 counties that used a mix of technologies was 1.67%. Averages here, and elsewhere in the paper, are calculated after weighting by turnout.

¹² The *t*-statistic testing the difference in residual vote rates between DREs and optical scanners in the fixed-effects regression is 2.73, $p = .006$.

As has been shown in past work (e.g., Ansolabehere and Stewart 2004), the estimated effects of voting technologies on the residual vote rate can be sensitive to specification, especially in cross-sectional analysis. 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

Turning to explanations of voter abstention, we focus on four major factors, one behavioral, two legal, and the fourth strategic. The first factor, which we term behavioral, is the relative distaste partisans felt for the major-party nominees, especially the nominees of their own party. The second and third factors, which we term legal, are (1) the ability of voters to write in presidential candidates if they find the nominated candidates unpalatable and (2) the extent of mail-ballot use in a state. The fourth factor, which we categorize as strategic, is 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.

Behavioral reasons for abstention. If some voters abstained because of their distaste for one or more of the candidates on the ballot, then we should see more abstentions where support for those candidates is weakest. More specifically, if some fraction of Republicans — presumably more 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 for abstentions to be higher in counties where Trump’s support among Republicans was the softest. 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.

Support for Trump and Sanders in the primaries was likely correlated with overall partisan strength within a county. Therefore, it was important for us to control for partisan strength, which we did by taking the average of the vote received by Republican candidates in each county from 2000 to 2012.¹³ 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 us 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 in the states.¹⁴ In addition, because we are running state-level fixed effects, we can 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.

Table 7 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

¹³ That is, the "Republican strength" variable was the average vote share of George Bush (2000 and 2004), John McCain (2008) and Mitt Romney (2012).

¹⁴ 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 7. 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	-0.0020 (0.0024)
Sanders primary share	-0.0095** (0.0029)
Republican strength	0.040*** (0.007)
Republican strength ²	-0.037*** (0.007)
Constant	0.0087*** (0.0020)
N	1,566
R ²	.54

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

Source: Data gathered by the authors.

curvilinear relationship, with the highest residual vote rates coming in counties with evenly split partisanship.¹⁵ 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.

At least in this aggregate cross-sectional analysis, we see little support for standard stories arising from the 2016 election that would link party factionalism to general election abstention. Counties that rejected Trump in the primaries were no more likely to see abstentions

¹⁵ Taking first derivatives and setting them to zero, the maximum of the Republican strength effect occurs when average Republican vote share is 54.0%.

than counties that embraced him, while counties that embraced Sanders were *less* likely to see high rates of abstention.

The availability of minor-party and write-in options. Abstention may not be the only option available to disaffected partisans. First, disaffected partisans might vote for minor-party candidates, such as Libertarian Gary Johnson or Independent Evan McMullin (for Republicans) or Green Jill Stein (for Democrats). Second, disaffected partisans might 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.

Third-party options were readily available in 2016. On the right side of the ideological spectrum, the Libertarian Party was on the ballot of every state, while Evan McMullin was an official option in 42 states, either because he was on the ballot (11 states) or a certified write-in (31 states).¹⁶ On the left, the Green Party was on the ballot in 44 states. Hence, there was at least one high-visibility alternative on the ballot for many Republicans and Democrats in virtually every state, and in many states, there was a second high-visibility alternative candidate for Republicans to choose from. In addition, the third-party options extended to lesser-known non-major candidates, such as Darrell Castle (Constitution Party), Gloria LaRiva (Socialism and Liberation), and Rocky de la Fuente (American Delta).

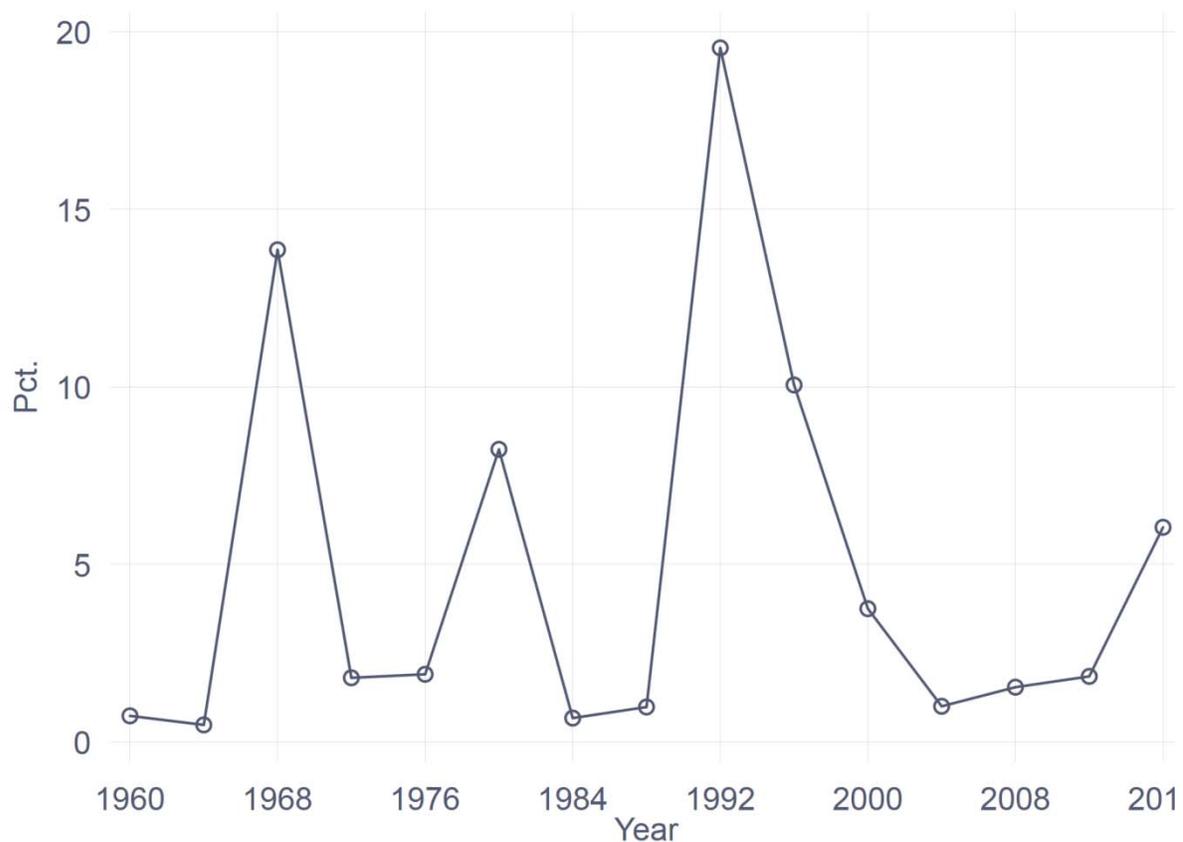
Based on the election returns, 6.04% of voters took advantage of one of these minor-party candidates in 2016, well over the 3.75% of the vote that went to minor-party candidates in 2012.¹⁷ (See Figure 6.) While these percentages are nowhere close to years like 1968, 1992, and 1996, they did approach the 8.24% level for the minor-party vote in 1980, when John Anderson

¹⁶ https://ballotpedia.org/Ballot_access_for_presidential_candidates.

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

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 major presence on the left among minor-party candidates was the Green's Jill Stein, at 1.06% of the vote. 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.

Figure 6. Percent of the national presidential vote received by non-major-party candidates, 1960–2016.



Source: Dave Leip's Presidential Atlas

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 them, 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 a provision for registration.²⁰

Although most states allow write-in votes for president, it must be remembered that 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. In a recent paper by about the 2016 recount in Wisconsin, for instance, it was discovered that the largest discrepancies between the election-night vote tally and the recounted vote were due to the failure of many municipalities to count all their write-in votes, if they counted them at all (Ansolabehere et al 2017).

Based on the tendency of poll workers to undercount write-in votes, 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*. Stated another way, when there is an increase in disaffected voters who 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.

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.

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 did not allow any 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.

Mail ballots and residual votes. With our focus on the role of abstention in producing the 2016 spike in the residual vote rate, it is possible for us to 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 mails 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. Using responses to the Census Bureau’s Current Population Survey Voting and Registration Supplement, the percentage of voters using the mails to return ballots doubled from 2000 to 2012, growing from 10.2% of voters to 21.1%.

Even in the absence of the abstention hypothesis, our 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. Stated another way, the residual vote rate gains made in the Golden State were taken away entirely by the state’s liberalization of its absentee-ballot laws.

The mechanisms linking the rise of vote-by-mail with an increase in the residual vote rate are straightforward. The Help America Vote Act (HAVA) mandated that in-person voters, on Election Day or during early voting, be notified if their ballots contained an over- or under-vote. Vote-by-mail voters are afforded no “second-look” at their ballot. Even voters in VBM states who return their ballots in person, which accounts for about half the voters in these states, drop off their ballots without scanning them personally, and thus without being warned of an inadvertent marking error at the top of the ballot. Furthermore, the processing of postal mail introduces the possibility of stray marks being added to mail-in ballots, especially when the ballots are folded.

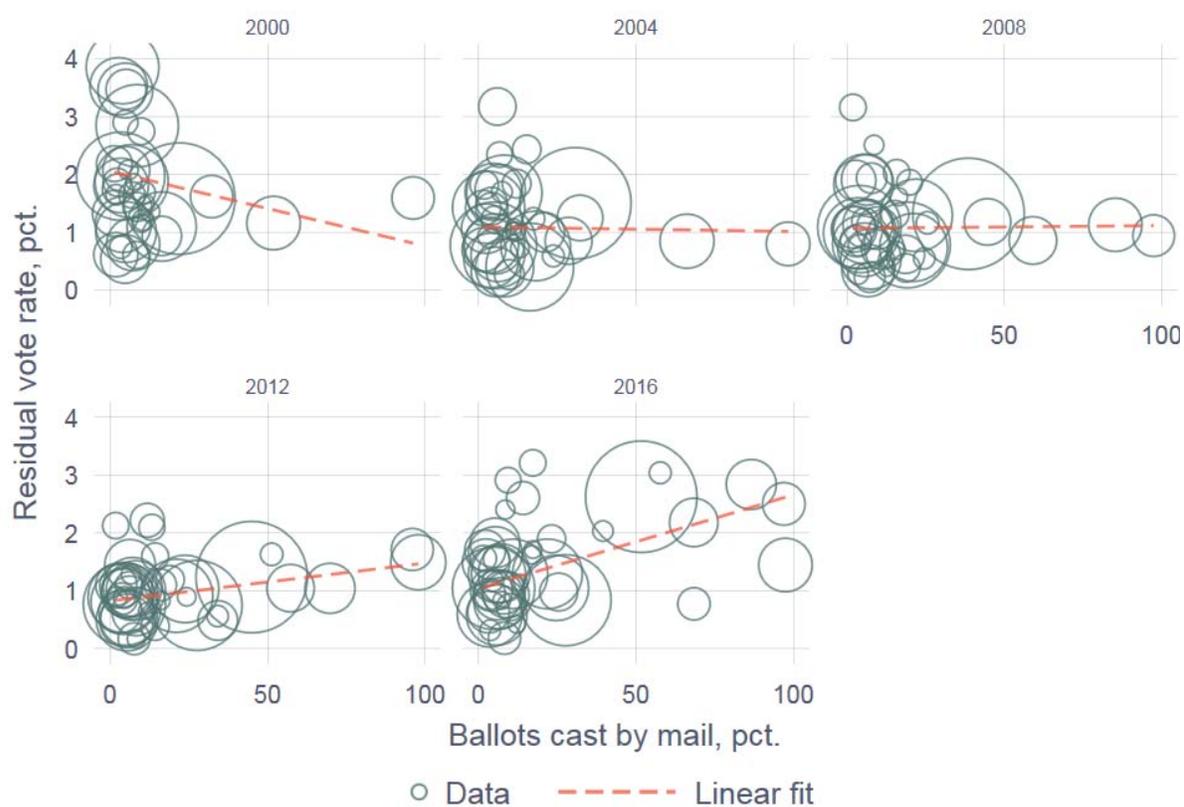
Thus, there is likely to be a direct effect between the use of the mails to vote and the rise of the residual vote rate. There may also be indirect effects, although we are less certain about the signs of those effects. One could argue, for instance, that delivering the ballot to every voter in a state weeks before the election could prompt disaffected voters to seek out alternatives to abstaining more diligently, and thus a rise in voting by mail might attenuate the positive correlation between mail ballots and residual votes. On the whole, these types of indirect effects are currently speculative and likely to be weak in any case. For that reason, we focus our attention here on the direct effect.

Because the use of mail ballots is determined so strongly by state law, 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 quite high ($r = .59$). This correlation was much weaker in 2012 and non-existent before then, as is illustrated by the scatterplots in Figure 7 and the regressions in Table 8.²¹

Figure 7. 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

²¹ There is a significant right-skew to the variable measuring mail-ballot use. However, transforming the data, for instance, by taking logarithms, does not change the substantive conclusions reported here.

Table 8. Regression of residual vote rate on fraction of ballots cast by mail at the state level, 2000–2016.

	Year				
	2000	2004	2008	2012	2016
Ballots cast by mail	-0.013 (0.009)	-0.000 (0.005)	0.000 (0.003)	0.0054** (0.0020)	0.016*** (0.003)
Intercept	2.06*** (0.19)	1.09*** (0.12)	1.07 (0.09)	0.83*** (0.06)	1.04*** (0.12)
R ²	.05	.00	.00	.20	.35
Adj. R ²	.02	-.03	-.02	.18	.34
N	38	39	42	44	45

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

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

This analysis urges caution in jumping to the conclusion that the only source of an increase in the residual vote in 2016 was abstention-due-to-alienation. At least some of this increase could have been due to the coincident rise in vote-by-mail.

Strategy and the casting of “wasted votes.” 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).

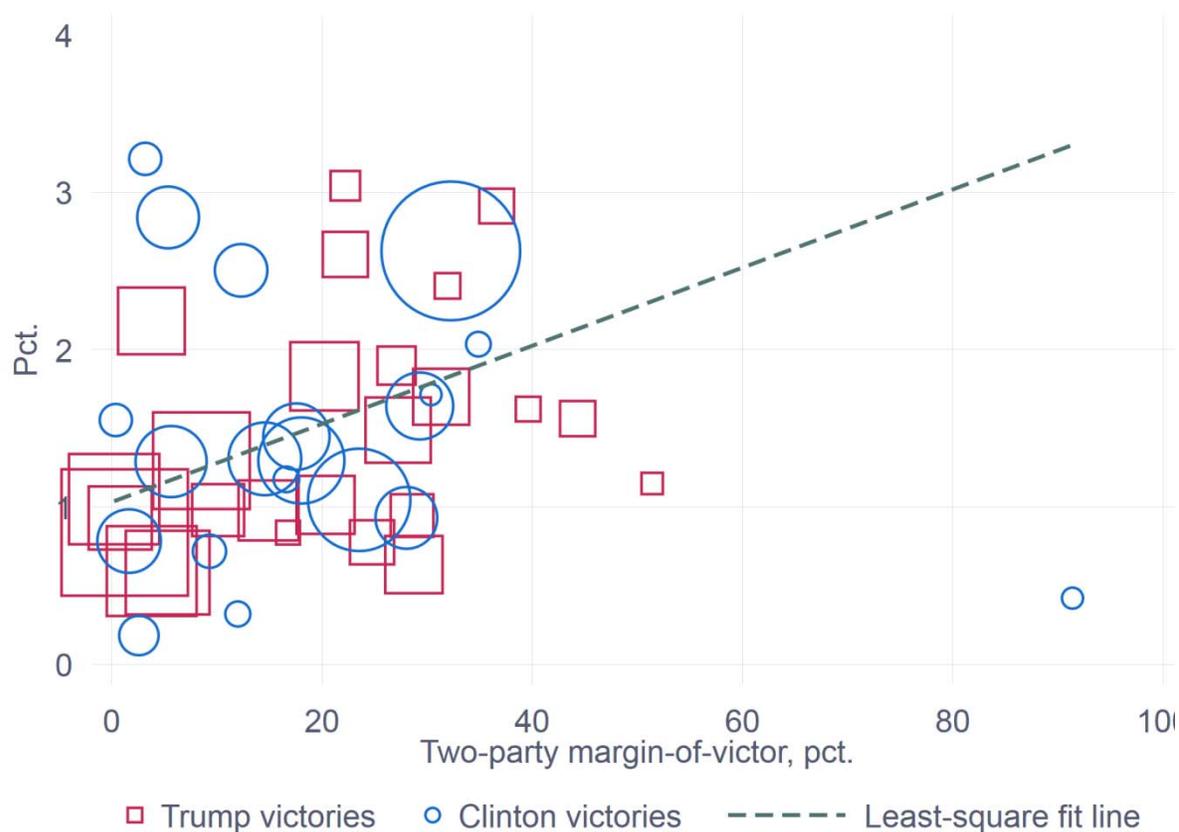
If abstention is one of the available choices among those who come to the polls, and if at least some voters see a trade-off between their vote being expressive and their vote determining the outcome of the election, then we could imagine that abstention would be less in a highly competitive state compared 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, which are illustrated in Figure 8, are consistent with the idea that voters take into account the strategic circumstances when they decide whether to abstain. 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 over 3.²² 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.²³

²² More precisely, the best-fit line's equation is $y = 1.03 (0.16) + 0.025 (0.008) x$, with $R^2 = .19$ and $n = 45$. (Standard errors of coefficient are in parentheses.) Observations are weighted by turnout in 2016.

²³ With DC excluded, the best-fit line's equation is $y = 0.97 (0.16) + 0.029 (0.008) x$, with $R^2 = .23$ and $n = 44$.

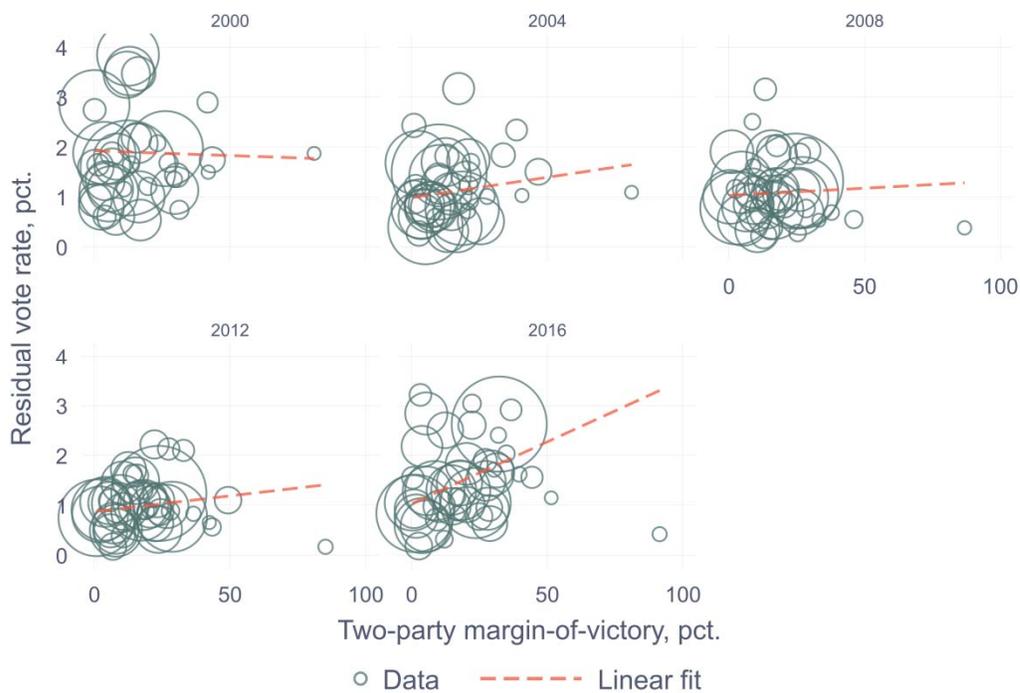
Figure 8. Correlation between the residual vote rate and two-party margin-of-victory in each state, 2016.



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

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. Table 9 displays the results of a series of regressions that establish this finding, while Figure 9 displays the data. In the simple bivariate analysis, 2016 is the only year since 2000 in which the residual vote rate has been lower in low-margin (“battleground”) states than in high-margin states.

Figure 9. 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 9. Regression of residual vote rate on two-party margin of victory at the state level, 2000–2016.

	Year				
	2000	2004	2008	2012	2016
Margin-of-victory	-0.002 (0.015)	0.008 (0.010)	0.003 (0.007)	0.006 (0.005)	0.025** (0.008)
Intercept	1.93*** (0.24)	0.99*** (0.15)	1.03*** (0.13)	0.87*** (0.09)	1.03*** (0.16)
R ²	.00	.02	.00	.04	.19
Adj. R ²	-.03	-0.01	-.02	.01	.17
N	38	39	42	44	45

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

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

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

Of course, this analysis begs the question of why voters may have been more sensitive to the strategic environment when deciding whether to abstain in 2016 than in the recent past, when there has been similar attention to results in a limited number of competitive states. Responding to this question is a task to be addressed in future research.

Summary

The analysis presented in this section has offered a preliminary look at the cross-sectional relationship between the residual vote rate in 2016 and various factors related to voting machine performance, partisanship, and election laws. The analysis produced mixed results when examining the role of voting machine performance — depending on the specification, DREs produced slightly more or slightly fewer residual votes. It also produced a counter-intuitive

finding that states with liberal write-in laws saw higher residual vote rates than states that did not allow write-in votes at all.

Finally, perhaps the most interesting finding is that counties at both extremes of the partisan perspective — the strongest Democratic and Republican counties — had lower residual vote rates than counties with more balanced partisanship. While it is always dangerous to make individual-level inferences from aggregate data, this finding does suggest that strong partisans were probably less likely to abstain than weak partisans. This would not be a surprising finding, except for the fact that some might imagine that the bad blood between Clinton and Sanders supporters would have had the greatest effect in the bluest of counties. Instead, the exact opposite appears to have been true.

Much of the analysis in this section has examined state-level factors that might influence variations in the residual vote rate, some of which are independent of the abstention hypothesis. We found, ironically enough, that more liberal write-in laws were associated with higher residual vote rates in 2016, and that a greater reliance on mail ballots was also associated with higher residual vote rates. Finally, higher residual vote rates were associated with states that were less competitive, and thus places where an abstention, or even a vote for a minor-party candidate, would be less likely to be “wasted.”

IV. 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 rose nearly a point compared to 2012, and approached the level of 2000.

This raises an interesting question: 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 expand the analysis originally undertaken by Ansolabehere and Stewart (2004) and Stewart (2006), which placed the estimation of the residual vote rate in a fixed-effect framework. 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 (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 above 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.

The analysis was performed on a dataset that included observations from every presidential election from 1988 to 2016. County is the unit of analysis. Because the number of states requiring counties to report turnout has grown over the years, the number of counties reflected in each year’s analysis grows as well, growing from 1,354 in 1988 to 2,450 in 2016.

Table 10. Residual vote rates, 1988–2016, with machine effects included. County fixed effects.

Variables	Coeff. (s.e.)	Coeff. (s.e.)
<u>Year</u>		
1988	0.0057*** (0.0004)	0.0049*** (0.0004)
1992	-0.0002 (0.0004)	-0.0011* (0.0004)
1996	0.0019*** (0.0004)	0.0011** (0.0004)
2000	Excluded	Excluded
2004	-0.0083*** (0.0003)	-0.0069*** (0.0003)
2008	-0.0083*** (0.0003)	-0.0066*** (0.0004)
2012	-0.0092*** (0.0003)	-0.0077*** (0.0004)
2016	-0.0046*** (0.0003)	-0.0030*** (0.0004)
<u>Voting technology (opscan excluded)</u>		
-Punch card	—	0.0061*** (0.0004)
-Mechanical lever	—	-0.0022*** (0.0005)
-Paper	—	-0.0023** (0.0006)
-DRE	—	-0.0001 (0.0003)
-Mixed	—	-0.0006 (0.0005)
Intercept	0.019*** (0.0003)	0.017*** (0.0004)
N	16,291	16,291
R ²	.44	.45

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

Source: Data gathered by the authors

The results of this analysis are reported in two columns in Table 10. In the first column, we have simply included the year dummy variables, to describe year-to-year fluctuations in the residual vote rate before taking into account changing voting technologies. Here we see a pattern of coefficients that is broadly consistent with the graph in Figure 2. Because the omitted year is 2000, the analysis of the year dummies revolves around the pre- and post-HAVA period. Before Florida and the HAVA-era reforms there are two positive coefficients and one coefficient that is statistically no different from zero, which indicates that in the late 1980s and 1990s, the residual vote rate nationwide was actually greater than what the nation observed in 2000. While the year coefficients after 2000 are all negative, the one associated with 2016 is smaller in magnitude, by roughly a factor of two, which is consistent with an increase in the residual vote rate in 2016 because of an increase in abstentions.

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 had residual vote rates that were about 0.62% higher than optical scanners, whereas mechanical lever machines and hand-counted paper has a slightly lower residual vote rate than optical scanners.

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 dummy variables. Most notably, the magnitude of the 2016 dummy variable was cut by about 50% once we accounted for changes to voting technologies. This suggests that if there had not

been a wholesale modernization of voting machines in the 2000s, the residual vote rate in 2016 might very well have exceeded 2000 by between $\frac{1}{2}$ and $\frac{1}{3}$ of a percentage point.

Furthermore, it should be noted that there is no statistically significant difference in the residual vote rates of counties that use DREs or optically scanned ballots. Because virtually all the churning between voting technology types these days is between DREs and optical scanners, it is very unlikely that the change in the residual vote rate between 2012 and 2016 is due to the migration of counties from one technology (usually DREs) to another (usually optical scanners).

V. Discussion and Conclusions

By way of conclusion, we start with the empirical questions that are at the core of this paper. The residual vote rate in the 2016 election was nearly a percentage point higher in 2016 than it was in 2012. The multivariate statistical analysis suggests that once we control for county-specific effects, the pure “year effect” increased the residual vote rate by about half a percentage point. If we were to pick a single cause in this up-tick in the residual vote rate, it would be abstention due to alienation from the candidates and, more specifically, abstention among Republicans.

This is the first cut at this analysis, and much more work needs to be done to firmly establish abstention-due-to-alienation among Republicans as the primary cause of the residual vote rate increase. However, if this explanation is born out, it would have at least three implications for the study of elections and voting systems in the United States.

First, this analysis 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 situation may be ripe for it to become more frequent in the near future. For instance, protest voting was in evidence in the recent U.S. special election in Alabama, in which Democrat Douglas Jones narrowly defeated

Republican Roy Moore by 20,715 votes.²⁴ 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 as a young man.

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,²⁵ but rather, casting a write-in vote.

In that race, 22,780 write-in votes were cast, or 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.²⁶ Thus, the write-in vote in Alabama proved to be a consequential protest vote.

A second implication of the analysis in this paper is that abstention as an electoral choice may be under-appreciated by relying on public opinion surveys to study the phenomenon. As we note in the body of the paper, the rate of abstention in the 2016 presidential election that was revealed through answers to the CCES was an order-of-magnitude less than was seems most likely from an analysis of aggregate election returns. Why abstainers are under-represented in

²⁴ 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>.

²⁵ 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.

²⁶ 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.

the CCES remains for speculation at this point.²⁷ It may be that respondents to public opinion surveys are less prone to abstention, or that there is a social desirability bias involved in giving an “abstention” answer. In either case, this is a phenomenon that may be inherently difficult to discern with any precision using survey research, owing to the fact that the secret ballot makes it impossible to verify whether respondents answer the vote-choice question accurately.

Although there are certainly methodological barriers to the use of aggregate analysis to gauge the extent of abstention in presidential elections, the approach taken in this paper to explaining fluctuations in the residual vote rate over time is promising for estimating *changes* in the abstention rate from election-to-election. The drawback to this method, represented here by the results reported in Table 10, is that year-specific dummy variables included in a fixed effects regression pick up changes in the residual vote rate that are not confined to intentional abstention. For instance, the sharp decline in the residual vote rate from 2000 and 2004 was probably not caused entirely by a drop in abstentions across these two years, although that may have been part of the story.²⁸ Instead, most of the explanation for this drop has been in terms of administrative practices that were implemented in the wake of the 2000 *Bush v. Gore* affair. In any event, the analysis in this paper suggests that year-to-year fluctuations in the residual vote rate are politically interesting in their own right, and deserve more study.

Finally, the analysis presented here suggests caution in 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

²⁷ We note that the ANES in 2016 did not even give respondents a clear opportunity to report that they abstained in the presidential contest.

²⁸ The argument in favor of interpreting the drop in the residual vote rate from 2000 to 2004, controlling for changes in voting technology and county-specific fixed effects, as evidence of a decline in abstentions is that the close 2000 election kicked up party competition in the ensuing years, especially in battleground states, thus reducing the portion of the electorate that was indifferent between the two political parties. Overall turnout certainly surged between 2000 and 2004, which has been used as evidence of this intensification of partisan electoral animosities across these years.

in the EPI based on its success in quantifying the relative performance of voting machine types as documented in the academic literature. 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 had failed to 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 through a simple dummy-variable approach represented by the analysis in Table 10. The limitation of this approach, of course, is that if all states improve the accuracy of their voting machines at the same time, as was virtually the case between 2000 and 2004, then no states get credit for that improvement.

To conclude, most students of elections focus on who wins and loses, and explanations for electoral outcomes. That’s as it should be. 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, the failure of some voters to provide a counted vote for the president. 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 with the intention to send a message. 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.

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