Reducing the undervote with vote by mail

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Abstract

We study how ballot completion levels in Colorado responded to the adoption of universal vote by mail elections (VBM). VBM systems are among the most widespread and significant election reforms that states have adopted in modern elections. Vote by mail elections provide voters more time to become informed about ballot choices and opportunities to research their choices at the same time as they fill out their ballots. By creating a more information-rich voting environment, VBM should increase ballot completion, especially among peripheral voters. The empirical results show that VBM elections lead to greater ballot completion, but that this effect is only substantial in Presidential elections.
I. Introduction

Voting requires more than just showing up at a polling place on or before Election Day. Researchers have long observed that many voters fail to vote for some contests on the ballot (Magebly 1984; Bowler, Donovan, and Happ 1992; Bullock and Dunn 1996; Darcy and Schneider 1989; Selb 2008; Kimball and Kropf 2008; Shocket, Heighberger, and Brown 1992; Nichols and Strizek 1995; Dubin and Kalsow 1996; Reilly and Richey 2009; Wattenberg, McAllister and Salvano 2000; Vanderleeuw and Engstrom 1987; Vanderleeuw and Utter 1993). In the literature, scholars have generally termed these abstentions “undervoting,” but have also used the term “rolloff” when voters skip contests that appear later on the ballot. The degree of undervoting is not limited to a few races or referenda placed at the end of a lengthy ballot (Hamner and Traugott 2004), and have significant consequences for election outcomes (Augenblick and Nicholson 2016). In following with some recent studies (Hanmer and Traugott 2004, Miller 2013), we operationalize undervoting by a measure called ballot completion, which calculates a percentage from the number of votes cast out of all possible votes available on a ballot. In this paper, we examine whether the adoption vote-by-mail elections (VBM) and the use of mailed ballots affect the amount of undervoting in Colorado elections.

We hypothesize that universal VBM elections reduce abstentions because the mailed ballot provides all voters, and specifically those with less political information and interest, more time and opportunities to obtain information about all ballot contests. Voting on a mailed ballot provide voters with more time and cues to become informed about ballot choices and prevents a decay of this information prior to marking the ballot, leading to fewer abstentions. Although all forms of mail-assisted voting (i.e., excuse-only absentee mail voting, no-excuse absentee mail
voting, and permanent absentee mail voting) provide more time for voters to find information, voters’ self-selection into these forms of voting means they may be primarily used by high-information or partisan voters who already fill out mostly complete ballots. Universal VBM elections extend the benefits of mailed ballots to the entire electorate, which can result in more complete ballots from less frequent and less politically interested voters.

We find that universal vote by mail elections reduce, but do not eliminate, ballot abstentions. Supporting the theory that low-information voters are more affected by using a mailed ballot, we further find that VBM’s effect on ballot completion is mediated by the type of election and its corresponding change in the composition of the electorate. In high turnout Presidential elections where the electorate is comprised of more inexperienced, lower information, and less frequent voters, voting by mail significantly increases ballot completion rates. On the other hand, VBM has no detectable effect in midterm elections, in which the electorate is composed of primarily higher-information frequent voters. This finding suggests that by giving them time to research their ballot choices, VBM particularly aids voters who are less familiar with the contesting candidates and issues and who hold weaker partisan attachments. VBM elections provide these less experienced voters with more time and opportunities to acquire the information needed to make vote choices for less familiar contests.

Our paper proceeds in the following way. In section two we review previous research on undervoting, making several important distinctions in the literature about how this concept has been measured. Here we differentiate between those who studied undervoting as the difference between voting for two contests at different locations on the ballot versus a measure that considers voting for the totality of ballot contests. Section three looks at causes of undervoting and identifies the information decay that occurs between the time when a voter
makes their choices and when they record those choices on the ballot as a potential source of undervoting. Section four discusses our conceptualization of ballot completion, which measures abstention from the totality of ballot choices available to a voter. Section five discusses the research setting in which we test our several hypotheses for undervoting. Section six presents our findings, including both a direct test of the adoption of VBM using dummy variables and a series of models testing the effect of mail ballot usage by employing a unique measure of the percentage of ballots cast by mail. These results of all these models show that both the universal VBM system and the use of mailed ballots increase ballot completion, but only in Presidential elections. Section seven discusses the implications of our findings for the conduct of elections and future research.

II. Previous research

ii. i. Theories explaining undervoting

Researchers have identified several explanations for undervotes, including voter fatigue and confusion related to lengthy ballots (Magleby 1984; Bowler, Donovan, and Happ 1992; Bullock and Dunn 1996; Darcy and Schneider 1989; Selb 2008; Augenblick and Nicholson 2016), cumbersome and difficult to use election processes and equipment (Sinclair and Alvarez 2004; Kimball and Kropf 2008; Miller 2013), rational abstention related to races for which voters have no real interest or stake in, and low information campaigns that fail to provide voters with sufficient information with which to make choices among contesting ballot choices (Wattenberg et al. 2000). In addition, researchers have found many of these explanations are mitigated by social and demographic traits of voters and their affective predispositions (Vanderleeuw and Engstrom 1987; Vanderleeuw and Utter 1993; Bullock and Dunn; Clubb and Traugott 1972; Sheffield and Hadley 1984; Wattenberg, McAllister, and Salvanto 2000). The
consensus in the literature is that undervoting is due to lengthy ballots, voter disinterest in less visible ballot contests, and the resulting lack of information about these ballot contests. Moreover, these causes are extenuated for some voter demographics but are partly offset by ballot procedures including some forms of electronic voting (Miller, Tuma, and Woods 2015).

**ii. ii. The effect of mail balloting on undervoting**

The literature on how voting by mail affects ballot completion has found mixed results. Dubin and Kalsow (1996) found that absentee mail voters in California actually roll off more than Election Day in-person voters. Similarly, Alvarez, Beckett, and Stewart (2011) found that absentee voters in California showed higher rates of residual votes than in-person voters for the presidential, gubernatorial, and senatorial races as well as on ballot propositions. Augenblick and Nicholson (2016) confirmed Dubin and Kalsow’s and Alvarez et al.’s findings of higher undervoting rates among California’s mail absentee voters with their own study of the same population. It is not clear why mailed ballots in California show lower completion rates, and the studies propose different explanations for the finding. Alvarez et al. (2011) attribute the finding to the lack of checking and notification systems on mailed ballots that would normally provide feedback to an in-person voter when races are filled out incorrectly or incompletely. They find that these systems substantially reduce the residual vote for the races they study, but only for the in-person voters who can use them. On the other hand, Augenblick and Nicholson propose a rational abstention explanation for this undervoting, suggesting that since voters must select into receiving a mailed ballot in California, any undervoting that they observe must be a result of rational abstentions on races considered unimportant by the voters.

Given that mail absentee voters are of higher socio-economic status and more politically active than in-person Election Day voters (Karp and Banducci 2001; Barreto et al. 2006), this
finding of more undervoting among mailed ballot voters is rather surprising. With the exception of voters in states with all-mail VBM elections, absentee mail voters must request a ballot before each election,¹ a behavior that reflects greater voter awareness, interest, and information about ballot contests that is on par with in-person voters. Even though mailed ballots do not warn voters about their mistakes, one would think that the absentee voting population is more capable of carefully completing their ballot and checking it than the average voter, given the self-selection process into the absentee voting population.

Whether this finding applies to all-mail VBM elections is unclear because all voters in VBM elections are mailed ballots, which eliminates the selection process that differentiates mail absentee voters from in-person voters in other states. It is also not clear whether the format of the mailed ballots in California may have increased voter confusion in ways that mailed ballots in other states might not. However, these studies suggest that voting by mail may have at most a small effect on increasing ballot completion since this group of more informed and interested voters still abstained from voting on a number of contests.

Only three studies have analyzed ballot completion under all-mail VBM elections. Hanmer and Traugott (2004) failed to find a significant effect from VBM elections on ballot completion among Oregon voters. The authors note, however, that “historically, rolloff across the Oregon ballot has been low, and neither the introduction of VBM nor the increased number of issues that appear on the Oregon ballot have had an impact on rolloff (2004: 395).” Kousser and Mullin (2007) examined the impact of precinct-level adoption of all-mail VBM elections for specific elections in California. They mention in a footnote that voters in mail ballot precincts in the 2000 presidential election were actually more likely to undervote than in-person precinct voters, but this effect was not present in the 2002 midterm election. Conversely, Southwell
(2009) examined a time series dataset of rolloff levels in Oregon and found that ballot rolloff declined significantly after the adoption of all-mail VBM elections.

**ii. iii. Explanations for mixed findings on the effect of mail balloting**

These mixed findings on the effect mail-assisted voting has on undervotes could arise from several sources including research design, measurement of ballot completion, and the research settings of the studies. Most of the studies (Augenblick and Nicholson 2016; Dubin and Kalsow 1996; Hanmer and Traugott 2004; Kousser and Mullin 2007) that examine the relationship between voting by mail and undervoting employ cross-sectional research designs, looking at voters who used mailed ballots and comparing them to voters who cast ballots in-person in the same election. Only one study (Southwell 2009) uses a time-series dataset that looks at the change in participation before that after the adoption of VBM elections. We identify only one study that uses panel (time-series cross-sectional) data (Alvarez et al. 2011), which allows for identifying an effect both within and between elections. Although the authors of the other past studies were careful to include control variables, data that is only in one dimension (either over time or across jurisdictions) is subject to confounding from omitted variables that could be controlled for with fixed or random effects with panel data. For example, time-series data could be subject to omitted variable bias from differential campaign mobilization over time, and cross-sectional data could be missing key demographic or other factors that vary by jurisdiction. These potentially confounding factors could have led studies to misidentify or fail to find effects from mail-assisted voting on undervoting.

The second factor that might contribute to the mixed findings on the effect of mail-assisted voting on undervoting is the measurement of the dependent variable. Some studies such as Hanmer & Traugott (2004) and Southwell (2009) have examined undervoting by looking at
the difference in aggregate votes between a race at the top of the ballot (e.g., House Representative or President) and a race at the bottom (e.g., a county judge or ballot proposition). This measure relies on the assumption that undervoting is more likely to be present at the end of the ballot, where races are generally less salient to the voter. However, this may not always be the case, such as when people show up to vote, but deliberately do not mark a choice for President. Also, this measure does not account for undervoting that occurs when people skip races in the middle of the ballot. Measuring undervoting by rolloff between two races could therefore result in a variable that is biased when compared to other measurements, such as the ballot completion rate. Our measure of undervoting using the ballot completion rate captures all forms of undervoting by looking at the total number of votes cast aggregated from all races and dividing by the number of possible votes that could be recorded.

The third major factor contributing to the mixed results of past studies is the research settings in which these studies have been conducted, and in particular the different types of mail-assisted voting available to voters. All fifty states allow some or all voters to request an absentee mail ballot. Only three states, Oregon, Washington, and Colorado, mail all eligible voters a ballot before Election Day. In Oregon and Washington this is the only way a voter can receive a ballot and vote. In Colorado, in-person voting both on and before Election Day is also available to eligible voters. Mail-assisted voting in all states except for Oregon, Washington, and Colorado generally requires the voter to request a ballot, a requirement that assumes the voter is aware of an upcoming election. In the universal VBM states, this prior level of information is not required. One effect of this system is that the selection process that results in more informed and interested voters using absentee ballots does not exist in these states; everyone who is an active registered voter is automatically sent a ballot for each election. Studies that examine the
effects of other forms of mail-assisted voting like no-excuse absentee voting are subject to a selection problem that is not present when looking at VBM’s adoption in Oregon, Washington, and Colorado.

Receiving an unrequested ballot in the mail may also have the effect of informing and mobilizing eligible voters who might not otherwise have voted or even known of a pending election. Others (Southwell 2009; Menger, Stein, and Vonnahme 2015) have shown that voter turnout significantly increases in states following the adoption of mail-assisted voting systems. We further suspect that VBM elections bring ballots to persons who are not likely to be familiar with most of the candidates and issues on the ballot. Since these voters are less familiar with the candidates and issues, they can particularly benefit from the extra time and ability to look at outside information that mailed ballots give them. Therefore, the effect of mailed ballots on ballot completion for all voters might be quite different from the effect of mailed ballots on a select group of voters who choose to use this method in other mail-assisted voting systems.

III. Explaining VBM election effects on the undervote

iii. i. Voting as a process of preference formation and expression

How might VBM elections reduce undervotes? Mailed ballots give them more time to consider the ballot and better access to information about the contests and candidates. Wattenberg et al. (2000, p. 234) argue that voters approach the ballot “as if it were test, picking out the questions that they can answer.” As opposed to filling out a ballot in a voting booth with the next voter waiting to use the booth, filling out a VBM ballot is like taking an untimed, open-book test. Voters are not constrained by what they can answer, but what they want to answer. In addition to not having the same time pressure as in-person voting creates, mailed ballots also allow voters to consult outside information, enabling them to create preferences on the spot. We
decompose the voting process into two discrete steps: preference formation and preference expression. In this stylization, voters form preferences throughout the campaign, which they then express at a polling place on Election Day. VBM eliminates the temporal gap between preference formation and preference expression. While voters must decide on their choices prior to entering the voting booth in a traditional polling system, VBM allows voters to record their preferences as they form them.

During campaigns individuals are confronted with an overwhelming amount of information when forming their candidate preferences. The extant literature suggests that voters are hard pressed to retain even a small portion of the information doled out during a campaign (Miller 2013; Alvarez and Gronke 1996; Civettini and Redlawsk 2009; Conover and Feldman 1989; Dalager, 1996; Graber, 1988; Herstein, 1981; Holbrook, 1999; Lodge, McGraw, and Stroh, 1989; Lodge, Steenbergen, and Brau 1995; Nicholson, 2003; Rahn, 1993). Moreover, the influence of campaign information on vote choices is an open question (Druckman 2004; Bartels, 1993; Russell and Thaler 1996).

Lodge et al. (2002) argue that voters don’t have to recall campaign messages for these messages to shape candidate choices. Voters cull “the affective value from each specific candidate message, [and] immediately integrat[e] these assessments into a ‘running tally’ that holds the individual’s summary evaluation of the candidate (Lodge et al. 2002:311),” without having to retain the campaign message in memory. Other researchers (Green, Palmquist and Schickler, 2002; Fiorina, 1981) argue that party identification serves as a longstanding ‘running tally’ for candidate preferences and challenge the hypothesis that voters alter their partisan attachments and subsequent vote choices as a result of campaign information.³
Whether voters remember specific campaign information or rely on a “running tally,” voting at traditional polling places separates the steps of forming preferences for candidates from their subsequent expression on the ballot. Voters form preferences for the various candidates and ballot items and only later record those preferences at the polling place. The time delay between preference formation and expression can create decays in information about ballot preferences that could contribute to incomplete voting. A voter might not remember her preference for every race on the ballot, particularly when ballots contain many items. Furthermore, if the voter is unaware of the presence of some contests on the ballot, she may be forced to form an “ad hoc” preference while in the voting booth without any external sources of information. This gap in time between the formation of a preferences and their expression on or before Election Day can result in memory decay (Miller 2013; Ottati et al. 2002). Logically, this information decay between voting decisions and when they are marked on the ballot should increase the rate of undervoting when voters use traditional polling place ballots.

For Lodge et al. (1995), the recall of campaign messages is not a necessary and sufficient condition for preference expression. The retention of the online tally of candidate preferences directly influences candidate selection. However, the online tally theory requires enough messages about a candidate that voters can recognize the candidate and associate their perceptions with his or her name. While this may not be a problem for high-profile races at the top of the ballot, this process would become more difficult for lower-salience races. Although frequent voters could be inundated with campaign literature and advertising on even the most local and minor of races, this is not necessarily true for infrequent voters. Even if a voter has received messages from all the candidates on the ballot, keeping track of preferences for all the candidates on a ballot can be beyond the capability of most peoples’ memory. Although some
voters pre-record their choices on paper before entering the voting booth, we do not believe this behavior is common since it requires a substantial amount of time and effort to research each race prior to traveling to the polls.

**iii. ii. How mail balloting connects preference formation and expression**

For voters in VBM election systems, preferences can be expressed at the same time as they are formed. There are two characteristics of mailed ballots that make this process possible. First, voters can sit down at their kitchen table or office and fill out their choices on the ballot while looking at campaign literature, browsing campaign websites, or looking at voter guides. These sources of information can remind voters of previous campaign messages they have heard or allow them to form preferences on candidates they may have never even heard of before. This information can come from other persons (e.g., the voter’s spouse), the internet, or printed material like voter guides, none of which are available inside a traditional in-person voting booth. Except for disabled persons, no one other than the in-person voter is allowed in the voting booth, which prevents the in-person voter from consulting other information sources while casting her ballot. To prevent voter fraud many states prohibit electronic devices such as cell phones in the poll booth that might also help voters make ballot choices.4

Second, mailed ballots present voters with the ability to spend more time forming these preferences and filling out the ballot. While voters are still time limited by their other priorities, they can take as long as they wish to form preferences by accessing information about races, candidates, and initiatives at the same time as they complete their ballots. By contrast, the time a person spends in the voting booth is not sufficient for them to consult via a cell phone or connect to the internet. Stewart (2016) reports that in-person Election Day voters spent between 2-10 minutes casting their ballots in selected jurisdictions. By combining the steps of preference
formation and preference expression, mailed ballots can potentially reduce or eliminate the information decay that results in undervoting.

How long do voters spend on mailed ballots, and how many voters consult outside information while filling out their ballots? We would not expect mailed ballots to have any effect on undervoting unless voters actually take advantage of these opportunities. Fortunately, a survey of Colorado voters that we conducted in 2014 provides some descriptive information relevant to these questions. The telephone survey was conducted between October 22 and November 10 with 1,560 voters. Although we did not ask exactly how long voters spent filling out the ballot, we found that 15% reported spending more than one day on the ballot. As expected when given the opportunity to fill out their ballots at their leisure, 59% of all respondents reported that they consulted other sources of information while they completed their ballot. The most frequently used sources of information included the internet (32%) and non-partisan voter guides (42%), followed by campaign literature (7%) and newspapers (7%). We obviously do not know whether any of their choices were ultimately affected by their information search, but the results do show that over half of mail ballot voters actively seek out information on candidates as they encounter them on the ballot. Along with the ability to take multiple days filling out the ballot, this opportunity would not have been available to voters who cast ballots in-person at traditional polling places.

**iii. Possible counter-arguments to our theory**

There are at least two possible objections to the argument that voting by mail reduces undervoting by eliminating the decay of preferences over time. The first is that undervoting is mostly attributable to disinterest, rather than preference decay. According to this counterargument, people skip voting for certain offices because they do not have a preference,
not because they have a preference that they do not recall. There are three conditions in which voter preferences would be missing: indifference to the choice setting, informed ambivalence, or ignorance of the choice setting. The first two counterarguments are plausible objections to the logical arguments that we put forward. VBM will have no effect for voters who are entirely indifferent to a choice opportunity (an uncontested race, for example), or for voters who are fully informed but ambivalent (for example, between two well-known but equally reviled candidates). For these voters, the convenience of VBM might still increase turnout, but would have no effect on ballot completeness. The third condition is not a valid counterargument, since the presence of the mailed ballot would correct for any ignorance of the available choices. Mailed ballots provide immediately available information to the voter about which races and items are applicable to her jurisdiction, which can contribute to a more focused information search. For example, many voters might not know their state house district, and seeing it on the ballot at a polling place is too late to form a candidate preference based on anything other than party identification. But the information contained on mailed ballot provides this relevant information to voters, allowing them to conduct a focused information search on those items in which she is eligible to vote.

The second main counterargument is that traditional ballots already contain the information that voters need to complete their ballot. Candidates have party labels, and initiatives and referenda include ballot language to assist voters with making informed decisions. Party labels provide a signal to voters about candidates’ preferences, priorities, and shared group attachments. They also provide a way for voters to hold governing coalitions accountable for policy outputs and outcomes. To the extent that this argument applies to any given individual voter, mail ballots provide no advantage since preference formation and expression are already
closely connected through the information (albeit minimal) that is available on the ballot. Mail ballots allow voters to easily access additional information about races and candidates while completing their ballot, including reputation, endorsements, policy positions, and other information not contained in the party label heuristic. Whether voters actually access additional information about races and candidates depends on the degree of party voting.

If voter preferences are shaped by longstanding partisan preferences, a portion of undervoting should be a function of voters’ strength of partisan preferences and presence of partisan cues on the ballot. Alternatively, if voters are acquiring campaign information on which to base their vote choices, the gap in time and subsequent decay in information may increase undervoting independent of the strength of partisan attachments. Both explanations of vote choice require exposure to information. Partisan attachments may play an important role in voters’ exposure to campaign messages. Parties might be expected to direct their campaign messages at persons who are likely to vote and support their respective candidates. Even if candidates choose to persuade undecided voters, the budget constraints of campaigns lessen the likelihood they will contact infrequent voters (Stein, Owens, and Leighley 2003). We might expect that higher turnout Presidential elections bring out more infrequent voters whose partisan attachments are weak and who are not as likely as frequent voters to seek out or to receive campaign messages from contesting campaigns. As more inexperienced and infrequent voters ballot, the decay in voter information rises and undervotes increase (Wattenberg et al. 2000). Consequently, we expect VBM elections to have a stronger positive effect on ballot completion in higher turnout Presidential elections.

IV. Measuring undervoting
Researchers have often measured undervoting as the difference between ballots cast for two races at different positions on the ballot, e.g., President and U.S. House of Representatives (Wattenberg et al. 2000). This operationalization of undervoting poses challenges for testing the voter fatigue and information-based explanations of undervoting. This specific measure combines elements of both the voter fatigue (i.e., distance between contests on the ballot) and information-based explanations of undervotes (high and low information ballot contests), lessening our ability to isolate the separate effects of these explanations even when using individual level data (e.g., Wattenberg et al. 2000). It also relies on the assumption that the races on which voters are more likely to abstain are the less salient races located further down the ballot, which may not be true for all voters. Any undervoting that occurs at the top or middle of the ballot would not be captured by measuring rolloff. A more inclusive measure that considers all the opportunities for a voter to register a preference in a single election provides a comprehensive picture of voter behavior (Hanmer and Traugott 2004, Miller 2013).

Our measure of ballot completion is the ratio of actual registered preferences to the number of possible registered preferences (i.e., the product of the ballots cast and number of contests). For example, if there were 10 contests on the ballot and 10 voters, there would be 100 possible discrete voting opportunities. If 2 people only voted in one contest, 2 people voted in only half of the contests, and 6 people voted in all contests, then the ballot completion measure would be $72/100 = 0.72$ or 72%. Our measure includes all federal, statewide, state house, and countywide contests.6

V. Setting and Research Design

The state of Colorado adopted voting reforms that made voting by mail progressively more available and easier to use. Beginning in 1992, voters did not have to provide an excuse to
request an absentee ballot. In 2008, the state adopted permanent vote-by-mail lists, in which each registered voter had the option to sign up one time to receive a mail ballot in every future election. In 2013, Colorado further adopted an all-mail VBM election system in which every registered voter is automatically mailed a ballot for every election. The progressive liberalization of mail-assisted voting in Colorado provides us with an opportunity to test whether the adoption of VBM reduces undervotes more than no-excuse and permanent absentee mail-in voting within the same electorate.

Since mail balloting became progressively more accessible over time, we employ models using both a continuous measure of mail ballot usage and discrete dummy variables for the election system. The dummy variable analysis tests the effect of adopting the universal vote by mail system. The subsequent subsection uses a continuous measure of mail-in voting which is defined as the percentage of total ballots cast that employed mailed ballots. This analysis is subject to omitted variable bias due to a possible selection process that shaped who uses mailed ballots, but it allows for us to see the effect of the gradual increase in all forms of mail-assisted voting rather than just the adoption of universal VBM in 2013. Note that under all VBM systems, voters can choose to return their mailed ballot in-person or by the mail. We do not separately analyze how ballots are returned because this is the very last step in the voting process and thus occurs only after the voter has already completed the ballot to the extent she will.

We attempt to avoid the problem of misattributing higher ballot completion from omitted variables like demographics or mobilization to the presence of VBM by using a panel research design. We obtained data from the Election Assistance Commission (EAC) and the Colorado Secretary of State’s Office for the number of mailed ballots and undervotes for the 2010, 2012, 2014, and 2016 general elections. These data allow us to observe the relationship between mail
balloting and undervotes in midterm (i.e. 2010 and 2014) and Presidential (2012 and 2016) elections before and after the adoption of VBM. Since the dataset contains observations from 64 counties in 4 years, we can use fixed effects and other methods to ensure any observed effects are seen both over time and cross-sectionally within each election. Using county-level data from the Colorado Secretary of State, we tabulated ballot completion scores for every county for the 2010, 2012, 2014, and 2016 general elections.

VI. Findings

vi. i. Dummy Variable Models

Average countywide ballot completion rates for the races we examine in Colorado have been historically high and have exhibited modest growth over time, rising from 88% to 92% between 2010 and 2016. The percent of mailed ballots cast in Colorado counties has experienced significant growth over time, increasing from 59% in 2010 to 95% in 2016. Given the very high rate of ballot completion and its small variation among Colorado counties over time, we have modest expectations for the substantive effects of voting by mail on ballot completion. We return to this point in the discussion of our findings.

[Figures 1a and 1b about here]

Table 1 reports the results of two county-level models showing the effect of VBM adoption on the rate of ballot completion. These models include controls for the number of ballot contests, county level population size (logged), mean income (in thousands), median age, percentage of the population with a college education, and percentage of the population that is Anglo, Black, and Hispanic. We include a dummy variable for Presidential elections in both models and an interaction term for the combination of Presidential elections with the presence of VBM in Model 2. The interaction between Presidential elections and VBM allows us to test
whether the all-mail election system increases ballot completion more in higher turnout 
Presidential elections or in lower turnout midterms.

[Table 1 about here]

Models 1 and 2 present estimates for the direct effect of all-mail voting on ballot 
completion and its effect on ballot completion in Presidential elections. As expected there is a 
highly significant and positive relationship between the adoption of the VBM system and ballot 
completion. The estimate reported in Model 1 and depicted in Figure 2 shows that adopting 
universal VBM is associated with a 2.24% increase in the rate of ballot completion. This effect 
is almost as large as the gap between midterm and presidential election voters (2.51%).

The number of contests on the ballot is associated with a 0.47% lower ballot completion rate. This fits with expectations from the literature on ballot fatigue and the effects of ballot length. On average there have been 12.9 ballot contests per election since 2010 with a range 
from 7 to 24 and a standard deviation of 4. None of the county level demographic measures are 
related to the incidence of ballot completion at the conventional significance level of \( p < .05 \). County population size, however, has a highly significant and positive effect on ballot 
completion, with a 10-fold increase in population associated with a 2.28% higher ballot 
completion rate. It is not clear why more populous counties show less undervoting, but it may be 
due to unmeasured factors like the salience of the races on the ballot to the voters.

Model 2 presents the same estimates reported in Model 1 with the addition of the 
interaction between Presidential elections and percent of ballots cast by mail, that is, the effect of 
universal VBM on ballot completion in Presidential elections. As hypothesized the coefficient 
for this interaction term is large, positively signed, and statistically significant. The effective 
coefficient for VBM in only Presidential elections is 10.9%. Substantively this suggests that the
adoption of VBM elections increases the ballot completion rate by almost 11%, but only in Presidential elections. In midterm elections, the effect of mailed ballots seen in Model 1 is now negatively signed but statistically insignificant. These latter findings lend further support for our hypothesis that mail balloting increases ballot completion in Presidential rather than mid-term elections. As observed in Model 1, the number of contests on the ballot has a significant and negative effect on ballot completion. With the exception of population size, no other demographic measure is significantly associated with ballot completion at conventional levels.

[Figure 2 about here]

Figure 2 shows the substantive effect of adopting VBM in both presidential and midterm elections as calculated using a parametric bootstrap of Model 2. It shows that adopting VBM essentially closed the gap in the ballot completion rate between midterm and presidential elections. The findings reported in Models 1 and 2 support our hypothesis that mail balloting under VBM elections increases ballot completion. The effect, however, is small, and largely limited to Presidential elections.

**vi. ii. Percent VBM Models**

Although the results from the previous section show the clearest effect of adopting universal VBM on ballot completion rates, there are some limitations of these models. Since there is only one midterm and one presidential election after the adoption of VBM observed in the dataset, it is possible that the effect we attribute to the adoption of all-mail elections is actually due to unobserved variables that changed by year. Differences in each of these pairs of elections could have independent effects on ballot completion, effects we cannot readily observe and measure with the first two models reported in Table 1. These omitted effects might include year-level election contest competitiveness, campaigning and voter mobilization, and election...
administration. To ensure that these results are robust to unmeasured factors, we need a more continuous independent variable that varies within counties as well as across time. For this reason, we calculate models using the percent of the vote cast by mail in this section.

Using this variable creates a slightly different interpretation for these models than for the dummy variable models. Since voters could choose to sign up for permanent absentee lists and request absentee ballots without excuse prior to 2013, the percent of the vote cast using mailed ballots is partially a result of voter self-selection. Even after the adoption of VBM in 2013, voters can still choose to use an in-person voting method if they prefer. However, the rate of mail ballot usage shows a noticeable jump between 2012 (65.6%) and 2014 (97.0%), so the administrative changes in the election system affected this variable substantially. Even the variation between counties can be at least partially attributed to the differences in the ways that counties administer the VBM options, such as the number of ballot drop-off locations. However, we must note that there is a selection process that shapes this independent variable, especially for the years prior to 2013. Therefore, these models should be interpreted as the effect of using mailed ballots on ballot completion rather than the adoption of VBM. We must also interpret these models with the caveat that the selection process could result in another causal pathway, where voters who fill out more complete ballots might be more likely to use mailed ballots.

Models 1 and 2 replicate the models from Table 1 with the exception of using the continuous independent variable of the percent of vote cast on mailed ballots. Model 1, which does not contain an interaction term, shows that each percentage point increase in the use of mailed ballots is associated with a statistically significant 0.05% increase in ballot completion. Since the adoption of universal VBM in 2013 increased the use of mailed ballots by 31.6% on average, this coefficient means that adopting all-mail elections increased ballot completion by
1.48%. This result is smaller than the 2.24% effect seen in Table 1, but is in the same direction and shows the same statistical significance.

Model 2 also shows similar results to the dummy variable Model 2 in Table 1. The percent mail ballot usage is now negative and statistically insignificant on its own, but the interaction term between Presidential elections and the percent mail ballots is highly significant and positive. Substantively, this model shows that the adoption of VBM elections in 2013 increased ballot completion by 5.97% in the 2016 Presidential election, while the effect in the 2014 midterm election is unclear but appears to be slightly negative. Figure 3 shows this interactive effect graphically. The graph clearly depicts a steeper relationship between mail ballots cast and ballot completion rates for Presidential than for midterm elections.

[Figure 3 about here]

For a further robustness check, we also estimated a model of ballot completion reported in Model 3 with fixed effects for counties. Model 3 includes independent regressors for the percent mailed ballots cast, the number of ballot contests, a dummy variable for Presidential elections, and its interaction with the percent of mailed ballots cast. It does not include the control variables from the first two models since these are collinear with the county fixed effects.

The estimates for the county fixed effects model of ballot completion support our hypotheses, largely replicating the findings reported in Model 2. The interaction of Presidential elections and percent of ballots cast by mail has a significant and positive relationship with ballot completion. Similarly to Model 2, the effective coefficient of 0.232 substantively shows a 7.28% increase in ballot completion in Presidential elections since the adoption of VBM elections. The number of ballot contests has a significant and negative effect on ballot completion, with largely the same substantive effect observed in Models 1 and 2.
We also calculate a model that includes crossed random effects for both years and counties. As long as the county- or year-level error terms are not correlated with the regressors, Model 4 provides robustness against unmeasured factors at both the year and county level. This model shows that the percentage of vote cast by mail is associated with an unexpected and significant decrease in ballot completion by 0.16% for every percentage of the vote cast on mailed ballots. However, this model also shows the significant and positive effect of percent mail ballot usage on ballot completion in Presidential elections. Substantively, this model shows that the adoption of VBM decreased ballot completion by 4.99% in midterm elections, while increasing ballot completion by 0.88% in Presidential elections. While these coefficients are smaller than the effects seen in Table 1 and much smaller than Models 2 and 3 in Table 2, they are in the same direction and the effects are significant.

We have no obvious explanation for the statistically significant negative coefficient for the effect of VBM on midterm elections, and suspect further research over time is needed to see if this finding recurs with more elections. It is possible that after controlling for omitted county factors (e.g., administration of elections) and time-specific variables (e.g., candidates and campaigns) we are merely observing a selection effect among voters who chose, before the adoption of VBM, to vote by mail. Similar to Dubin and Kalsow (1996), we may be observing that those who select into absentee voting in midterm elections might actually fill out less complete ballots than those who use traditional in-person methods.

**VII. Discussion**

Undervoting is a product of ignorance, disinterest, fatigue, and forgetfulness. Our findings suggest that when voters are given the opportunity and time to garner sufficient information to match their preferences with ballot choices, undervoting declines by a small but
substantively important amount. VBM elections provide voters with the time and opportunity to
develop and express their preferences at the same time, which leads them to complete their
ballots at slightly higher rates than we observe with in-person voting at polling places.

The relationship between mail ballots cast and undervoting is only observed in
Presidential elections, where there is higher turnout and a higher proportion of the electorate is
composed of infrequent and politically inattentive voters who are less familiar with the ballot
contests. This suggests that undervoting by more frequent voters is likely the result of rational
abstention rather than a result of information decay between preference formation and
expression. It is possible that while they feel a strong sense of duty to cast a ballot, some
frequent voters only consider higher-profile races to be salient enough to vote on.

Though we have detected a significant effect for mail balloting on ballot completion that
is robust to several specifications and enhanced during Presidential elections, the magnitude of
this effect is very modest. Even in Presidential elections the substantive effect of an average
increase in mail balloting from VBM adoption only nets a 6% increase in ballot completion, or
just one or two additional votes on a typical Presidential year ballot. This owes in large part to
the fact that Colorado has historically had a very high rate of ballot completion for the races we
measure, averaging 92% in 2016. Ballot completion rates in Colorado are among the highest in
the nation, lessening the opportunity for any electoral reform to have a large if even significant
effect on ballot completion. However, the finding that vote by mail does not fully eliminate
undervoting suggests that some at least some abstention on ballots cannot be attributed to
information decay and is most likely the result of rational abstentions. It also suggests that there
is a limit to the extent that voting reforms such as VBM can affect ballot completion. If voters
using mailed ballots are still abstaining from voting in some races, there seems to be little chance that a further change in the voting system could have any effect on this undervoting.

We have identified and confirmed that mail balloting increases ballot completion, although the effect is relatively modest. As other states and counties with much lower ballot completion rates add VBM elections to their repertoire of balloting options, e.g., California in 2018, we should have an opportunity to observe whether the magnitude of VBM’s effect on ballot completion is greater than observed in Colorado. Are the effects of VBM limited to a modest increase in ballot completion? Perhaps they are. Voters might experience less fatigue and thus complete a greater share of their ballots in an otherwise identical manner. Alternatively, greater ballot completion might derive from voters engaging with a more information-rich environment. This would affect both the quantity and quality of voter decision-making in VBM elections. Whether VBM affects the quality of voter’s choices; i.e., how well they reflect a voter’s preferences, is a subject that could be addressed by future studies.
Bibliography


Stewart, Charles. 2016. Personal communication with the authors.


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| Observations | 256 | 256 |
| R-squared    | 0.417 | 0.436 |

Cluster robust standard errors in parentheses.

*** * p < 0.01, ** * p < 0.05, * * p < 0.1
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Cluster robust standard errors in parentheses. Model 3 uses fixed effects for counties. Model 4 uses random effects (crossed) for both counties and years.

*** p < 0.01, ** p < 0.05, * p < 0.1
Figure 1a
Mean Ballot Completion Rate: 2010-2016

Graphs by year
Figure 1b
Mean Percent of Mail Ballot Cast: 2010-2016

Graphs by year
The dots represent calculated substantive effect predictions, and the bars represent 95% parametric confidence intervals.
Figure 3: Substantive Effect from Table 2, Model 2

The line represents calculated substantive effect predictions, and the shaded area represents 95% parametric confidence intervals.
### Appendix: Descriptive Statistics

Table 2: Descriptive Statistics of Variables

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Endnotes

1 In seven states—Arizona, California, Georgia, Hawaii, Minnesota, Montana, New Jersey, Utah—and the District of Columbia—voters can request one time that a ballot be mailed before every election.

2 See Gronke and Miller (2012) for a more qualified finding for the effect of VBM elections on voter turnout.

3 An alternative explanation suggests party attachment acts to selectively absorb, reject or ignore information that supports or rejects the voter’s partisan attachment. Again, Green et al. (2002:110) offer evidence that partisan identification changes more gradually than party evaluation, evidence that the authors claim leaves this explanation unsupported.


5 County clerks began mailing ballots to all registered voters in their respective counties starting on October 18, 2014. Three waves of interviewing were conducted with a sample of registered voters beginning October 23-26, October 31- November 1-3, and November 5-7. Lists of all people who cast a ballot on or before Election Day as well as those who registered and cast a ballot within 21 days of Election Day or on Election Day were obtained from the Colorado Secretary of State’s (SOS) office. Phone numbers for these voters were obtained from SOS’s list of registered voters and a national telephone registry database with a 78% rate of successful matching. Of those successfully matched, the response rate for the survey was 34%.

6 The measure excludes judicial retention elections, but not county judicial races. Colorado uses the merit system to select and retain judges. Each ballot contains an exceptionally large number of judicial retention elections. From 2010-2014, there were 364 retention elections in Colorado.
Over 98% were retained and the average vote margin was 70-30. If included in the analysis, retention elections would be over 85% of the cases. Additionally, retention elections are obviously unlike any other type of election. They apply to legal, rather than political institutions, and do not represent a clear choice between alternatives. Rather, retention elections represent a choice between an incumbent and an institutional process to select a replacement in which voters have no direct role.