The Impact of COVID-19 Surges on Voter Behavior in the 2020 US General Election

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Abstract

COVID-19 caused worldwide disruption to virtually every aspect of human life, including elections. This study assesses the impact of potential COVID exposure, convenience voting policies, and partisanship on voter behavior in the 2020 US general election. Using a new data set comprising county and state data, we demonstrate that countywide COVID-death rates depressed turnout from 2016 levels. COVID mortalities, partisanship, and the availability of different balloting options contributed to changes in the use of mail and early-in person voting. Early spikes in COVID deaths had the largest impact, suggesting once voters chose whether or how to vote, they kept to their decisions, despite the availability of new information about declining infection rates, new vaccines, and improved treatments.

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COVID-19 caused worldwide disruption to virtually every aspect of human life, including elections. Considerations regarding how best to respond to the pandemic divided politicians and citizens along partisan lines. Many democratic regimes imposed quarantines intended to reduce the spread of COVID and introduced voting policies designed to minimize the health risks to citizens and election workers.

This study addresses two overarching questions about the impact of the pandemic, partisanship, and voting policies on the 2020 US general election: Did these factors influence turnout or how voters cast a ballot? Were voters primarily affected by early surges in COVID mortalities or did they mainly respond to later news of declining infection rates, new vaccines, and improved treatments?

This research relies on a new dataset that combines state-level information about voting policies with county-level data for COVID mortalities and voter participation in the 2020 election. The inclusion of corresponding data for the 2016 election enabled us to isolate the effects of COVID, voting policies, and partisanship on voter participation.

First, we provide an overview of the effects of COVID on state voting policies and the political agenda in 2020 and the findings of previous studies. Next, we

present preliminary results for the relationships between COVID deaths, voting policies, and partisanship on voter turnout and voting methods. Then, we model the effects of these factors on voter participation, controlling for relevant voter characteristics and the electoral context.

The findings demonstrate that COVID fatality rates and election policy changes in response to the pandemic had limited effects on turnout, but much larger effects on the method citizens used to vote. They show the previous availability of convenience voting options and the timing of COVID deaths were important in structuring electoral participation. We conclude that election procedures, partisanship, health considerations, and previous voting habits influenced voter behavior during the pandemic crisis.

The Pandemic, State Policies, and Voter Participation

COVID-19 was a major concern among most voters. During the months prior to the election, between 65% and 70% of Americans worried that they or a family member would contract the disease (Kamisar and Holzberg 2020). The pandemic's impact on public health varied by geography, party, and over time. COVID mortalities were greatest in Democratic localities during the early days of the pandemic (See Appendix Figure A-1. Also see Sehgal, et al. 2022, pp. 857 – 859). COVID mortalities became slightly more prevalent among Republican localities as Election Day approached.

The factors that affected the distribution of COVID fatalities also led to lifestyle changes among various segments of the population. Individuals in the

predominantly Democratic counties hardest hit by this deadly unknown disease were the most likely to practice social distancing, and those in Republican-dominated counties were the least likely to take precautions (Bisbee and Lee 2022). The effects of partisan cues and the prevalence of COVID diminished once initial shock over the pandemic subsided. However, consistent with a Bayesian decision making process, the adjustments to daily living patterns made early in the pandemic persisted because individuals discounted information they received later (Bisbee and Lee 2022). These findings raise questions about the relative impact of the incidence of COVID mortalities, the timing of surges in the mortalities, and voter partisanship on whether or how voters participated in the 2020 election.

The voting options state and local governments introduced to protect voters and election workers from COVID also had the potential to affect voter behavior (Congressional Research Service 2020). Numerous states revamped plans for conducting the election. Eleven states introduced COVID-excuse or no-excuse absentee voting (NEAV) policies. Five states, including California, Nevada, and the District of Columbia, switched from NEAV to universal vote-by-mail elections (VBM), wherein election officials mailed each registered voter a ballot.[1] Of the remainder, five previously authorized universal VBM elections, twenty had offered NEAV, and another five continued to require voters to present a qualified excuse to vote absentee, such as a disability, age, or out-of-town travel. Twelve NEAV states

[1] Hawaii and Utah had enacted universal VBM policies prior to the pandemic.

mailed each registered voter an absentee ballot application, but this did not boost mail voting (Herrnson et al. 2022). Additionally, 37 states, including the five with restrictive absentee voting requirements, offered early in-person voting (EIPV) as another option for avoiding crowded Election Day polling places.

As is the case with many aspects of election administration, party control had an impact on the states' responses to the pandemic. States with unified Democratic control were the most likely to make it easier to vote, states with Republican "trifectas" were the least likely, and those with divided party control were in the middle (Herrnson et al. 2022). The partisan differences resulted, in part, from Democrats prioritizing access to the polls and Republicans' concerns about the potential for voter fraud. The positions staked out by candidates Biden and Trump undoubtedly influenced the voting initiatives implemented by state leaders. Early, high COVID death rates among Democratic voters also helped solidify Democratic governors' and state lawmakers' predispositions toward adopting safe, convenient mail voting policies. Increasing opposition to mail voting among Republican voters (Clinton et al. 2022) resulted in most GOP leaders continuing to oppose this policy despite the late surge in mortalities in Republican counties. Whether the timing of outbreaks affected voter behavior is an open question.

A large body of research supports the role of politicians' and voters' beliefs about the impact of election laws on voter participation (Wolfinger and Rosenstone 1980). Convenience voting options, voter registration laws, and other aspects of electoral ecosystems affect the costs of voting (Alvarez, Atkeson, and Hall 2013; Li,

Pomante, and Schraufnagel 2018; Schraufnagel. Pomante, and Li 2020). Convenience voting options influence how individuals cast a ballot (Gronke et al. 2007; Gronke and Toffey 2008; Stein and Vonnahme 2008; Giammo and Brox 2010; Hale and McNeal 2010; Larocca and Klemanski 2011; Leighley and Nagler 2013; Herron and Smith 2014; Ritter and Tolbert 2020). The growing availability of these options has fueled two related trends: an increase in mail voting and a decline in Election Day voting (e.g., Ritter and Tolbert 2020). Moreover, the introduction of universal VBM elections led to small increases in turnout, especially in elections held at some time other than November of even-numbered years (Barber and Holbein 2020; Berinsky, Burns, and Traugott 2001; Gerber, Huber, and Hill 2013; Gronke and Miller 2012; Kousser and Mullin 2007; McGhee, Paluch, and Romero 2020; Southwell 2009; Southwell and Burchett 2000; Thompson et al. 2020). Nevertheless, policy changes that reduce voting costs less than universal VBM are associated with decreased turnout (Burden et al. 2014).

New voting methods can have consequences beyond the potential to influence voter turnout. Roughly half of all voters switch methods when offered a new option (Hamel, Leighley, McNeese, and Stein 2018). The "switchers" have higher ballot rejection rates than "standpatters" (Baringer, Herron, and Smith 2020; Cottrell, Herron, and Smith 2021). Most research shows neither party benefits substantially from the introduction of a new voting method (Stein 1998; Karp and Banducci 2000; Berinsky et al. 2001; Hassell 2017; Southwell and Burchett 2000; Barber and Holbein 2020; Thompson et al. 2020; Stewart 2020a; Amlani and Collitt 2022).

Whether generalizations about partisan advantages in normal, non-crisis elections apply to the 2020 election is unclear. First, the pandemic was unparalleled in its disruption of people's lives. Second, voting options, particularly mail ballots, evolved into a salient partisan issue. Both factors had the potential to affect voter behavior. Individuals in the five states with very restrictive voting polices probably weighed the importance of voting against the risk of catching COVID in a crowded Election Day polling place. Voters in NEAV or universal VBM states may have balanced the possibility their mail ballot could go uncounted against the health threat posed by voting in person or the lesser risk of dropping off a mail ballot. The calculus of individuals in states that offered NEAV or universal VBM prior to the pandemic likely differed from that of voters in states that liberalized mail voting in 2020. That is, a combination of familiarity with mail ballots and COVID concerns may have resulted in voters in the former having a greater inclination to vote by mail than voters in the latter.

Case studies and comparative analyses of the pandemic's effects on voter turnout in 2020 have produced inconsistent results. Flanders, Flanders, and Goodman (2020) find a positive relationship between exposure to COVID risk and turnout in the 2020 primary election in Michigan, a weaker relationship in Mississippi, and no significant relationship in Missouri. Morris and Miller (2022) report the pandemic depressed turnout in the 2020 primary in Milwaukee, Wisconsin, particularly among Black voters. Scheller (2021) shows that high COVID rates and age were associated with low primary turnout among elderly Floridians.

Atkinson et al. (2022) demonstrate elderly voters were more likely to vote by mail and younger voters in person in both the 2020 primary and general elections in New Mexico. Shino, Smith, and Uribe's (2023) study of Florida in 2020 shows that elite cues influenced actual and self-reported voter behavior; politically aware Trump supporters who cast a mail ballot were the most likely to misreport the method they used to vote. Bokemper, Huber, and Gerber's (2023) study of Connecticut shows apprehensions about COVID discouraged in-person voting, even among voters informed about safety measures introduced in polling places.

National-level studies also report disparate findings. Herrnson et al. (2022) show states that introduced VBM elections or no-excuse/COVID excuse absentee voting in 2020 experienced the largest increases in turnout over 2018 and 2016, followed by states that previously offered VBM or NEAV. States that neither had nor introduced these methods had the smallest increases. Amlani and Collitt (2022) report turnout in 2020 increased over 2016 in counties that switched from NEAV to VBM elections but not in counties that adopted NEAV. They also find the new voting policies advantaged neither major party. However, their analysis accounts for neither the effects of COVID deaths nor cases. Parzuchowski et al. (2021) report COVID deaths and cases was positively associated with Democratic turnout. Baccini, Brodeur, and Weymouth (2021) find the pandemic reduced Trump's vote share relative to the 2016 level. Bisbee and Honig (2022) report that COVID-related anxiety advantaged establishment over anti-establishment candidates in 2020, including in the Democratic presidential nomination contest and both parties'

primaries for the House of Representatives. However, neither Baccini et al. (2021) nor Bisbee and Honig (2022) assess the effects of the methods available for voting. Using a combination of survey and state-level data, Herrnson and Stewart (forthcoming) show having contracted COVID lowered one's probability of voting, but having a relative, friend, or colleague contract or die from COVID had the opposite effect. Voting policies and party identification also were found to influence whether an individual voted by mail, early in person, or on Election Day.

Research also shows pandemic-related administrative challenges affected other aspects of voter participation. Coll (2022) demonstrates protective barriers, social distancing, and other COVID safety measures increased wait times for in-person voting in 2020. Poll worker shortages also may have led to delays at the polls. For some individuals, the usual inconveniences that accompany Election Day voting undoubtedly were overshadowed by the risk of COVID exposure. Administrative shortfalls had the potential to dampen turnout and foster a substantial surge in mail voting.

Despite their inconsistent results, each of the preceding studies provides insights into the pandemic's actual or potential impact on the 2020 election. This study adds to existing findings by using county-level data to assess whether COVID, state election policies, and the emergence of voting methods as a partisan issue led to changes in voter behavior. It also lends insights into the effects of the timing of COVID surges on how or whether a voter casts a ballot.

Hypotheses

We test seven hypotheses to assess the combined effects of COVID risk, state voting policies, and voter partisanship on voter behavior in the 2020 US election. The turnout hypotheses are:

H1) Voter turnout decreased with the rise in COVID-related deaths in a county.

H2) Voter turnout increased the most in counties with access to mail ballots and in-person early voting.

We have modest expectations for these hypotheses. Although habitual voters adjust their behavior in response to changes in voting policies, health, and other personal circumstances, they rarely abandon the practice of voting altogether (Barber and Holbein 2020; Berinsky, Burns, and Traugott 2001; Kousser and Mullin 2007; Southwell 2009; Gronke and Miller 2012; Gerber, Huber, and Hill 2013; Burden et al. 2017; McGhee, Paluch, and Romero 2020; Southwell and Burchett 2000; Thompson et al. 2020).

We have stronger expectations for the hypotheses that test the effects of COVID risk, the influence of convenience voting options, the timing of their introduction, and partisanship on the methods voters used to cast a ballot. The literatures on voter behavior and voting policies (cited above) and partisan cue-giving, policy information, and public responses to COVID policies suggest the pandemic influenced how some, but not all, voters cast a ballot (Bisbee and Da In Lee 2022; Clinton et al. 2022; Shino et al. 2023).

H3) Heightened COVID-related deaths led to an increase in voting before Election Day, either by mail or early in-person.

H4) Access to a convenience voting method increased the use of that method.

H5) Voters in counties that experienced a surge in COVID deaths early in 2020 experienced the largest drop-off in Election Day voting and the largest increases in mail voting. (We are agnostic about the impact of surges on early in-person voting.)[2]

H6) Counties in states that implemented more liberal mail (or early) voting practices in 2020 had lower rates of mail (or early) voting in 2020 than counties that had already implemented these more liberal practices.

H7) Republican-dominated counties experienced smaller decreases in Election Day voting, while Democratic-dominated counties recorded larger increases in voting by mail. (We are agnostic about the impact of partisanship on early in-person voting.)

The last three hypotheses direct our investigation toward the subtleties of voter decision making. They enable us to estimate the relative and interactive effects of partisan frames and familiarity with a balloting option, and the persistence of early voting decisions under changing circumstances. Hypothesis 5 directs attention to the steadfastness of voting decisions reached at the height of the

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[2] Voters in counties that experienced a large early COVID surge may have decided to eschew the opportunity to vote early to minimize their exposure to the disease during a period of heightened risk, or they may have preferred EIPV over casting a ballot at a crowded Election Day polling place.

pandemic. Similar to the persistence of pandemic-inspired lifestyle changes (Bisbee and Da In Lee 2022) and the inability of safety measures to encourage in-person voting (Bokemper et al. 2023), we anticipate once individuals in counties that experienced an early surge of COVID deaths decided how to vote, they resisted changing that decision even when the pandemic appeared to subside, medical innovations made it less virulent, or safety protocols were introduced in polling places. Conversely, voters in counties that experienced a late surge in COVID had already habituated themselves to the belief that COVID was an insignificant threat and had little reason to modify their previous voting habits.

Data and Methods

We estimate a series of regression-based models that predict aggregate-level changes in turnout and voting methods. The models are of two types. The first relies on fixed-effects regressions to provide the cleanest estimates of the effects of COVID mortality and policy change on turnout and the use of voting methods. However, by its nature, fixed-effects regression removes from the analysis important county-level demographic and political factors that are essentially constant across the period covered in this paper. Among these factors are partisanship, race, and demographic factors that typically appear in studies of voter turnout (see Herrnson and Stewart 2022). Thus, the second set of models substitute county-level political and demographic covariates for the fixed-effects coefficients, which allows us to provide

provisional insights into how these factors influenced adaptation to COVID at the aggregate level.[3]

The turnout dependent variable is expressed as a percentage of voting-age population (VAP). Measures of voting mode usage are taken from the 2016 and 2020 Election Administration and Voting Survey (EAVS), published by the U.S. Election Assistance Commission.[4]

Although the EAVS dataset is the most comprehensive data source for the dependent variables we study, it has two major shortcomings: missing data and the failure of states to conform their data reporting to the survey instructions. The latter challenge arises from the fact that many state laws do not neatly correspond to the three-fold classification of voting modes (Election Day, in-person early, and mail/absentee). Instead, some states conflate all pre-Election Day voting into a single category, which results in a lack of correspondence between the data and actual voter behavior. Our close examination of the reported data led us to exclude from the analysis data from Iowa and Montana from both 2016 and 2020; Alabama,

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[3] The estimates produced with and without fixed effects should be interpreted differently. Fixed effects regression leverages changes within counties to estimate the influence of policy change and COVID on turnout and voting mode usage, and thus estimates are often interpreted, with reason, in causal terms. The estimation without fixed effects is more of a cross-county estimator, to the degree the explicit covariates fail to control for all other factors that influence the dependent variables.

[4] Voter turnout is expressed as a percentage of voting-age population (VAP). The raw turnout figures are from item F1a in EAVS; VAP is from the American Community Survey conducted by the U.S. Census Bureau. Use of voting mode is from EAVS. Election Day voting, EIPV and turnout are from items F1b (votes cast at a physical location) and F1e (votes cast on a provisional ballot), respectively. Mail-ballot usage is the sum of F1c (Uniformed service and overseas voting act ballots and Federal write-in absentee ballots), F1d (domestic mail ballots), and F1g (mail ballot cast in universal VBM jurisdictions). EIPV is measured by item F1f.

Indiana, Maine, Rhode Island, South Carolina; South Dakota, Utah, and Vermont from 2016 but not 2020; and Missouri for 2020 but not 2016. Reporting anomalies led to the exclusion of a small number of counties (see Appendix B for details).

The independent variables included in the analysis follow, to the degree possible, those used in Herrnson and Stewart's (2022) individual-level analysis of voting in 2020. The variables can be grouped into five broad categories: (1) COVID exposure, (2) state election policy, (3) county partisanship, (4) other voter characteristics, and (5) state political context.

COVID exposure is measured as the cumulative number of *COVID deaths* from COVID recorded in the county by September 1, 2020, expressed in terms of deaths per 100,000 residents.[5] For 2016, COVID deaths is set to zero.[6] Deaths were chosen to indicate the severity of COVID outbreaks because they are recorded with greater reliability than cases. The September 1 cut-off point was chosen because it approximates the date when absentee mail ballots would first be available to voters, enabling those given this option to begin deciding whether or how to vote. (We provide more detail for this variable and its implications for the analysis in Appendix C.)

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[5] Data about COVID deaths and cases is from the CDC Data Tracker, https://covid.cdc.gov/covid-data-tracker/#datatracker-home.

[6] By setting COVID deaths to zero in 2016, the expected values of the dependent variables in 2020 in counties with zero COVID deaths in 2020 are recorded in the variable indicating observations from 2020.

Timing of COVID surges. Using the same data source that reported the number of COVID deaths, we calculated for each county the week prior to election week when that county experienced its greatest number of COVID deaths. The *COVID peak* variable was the number of weeks prior to election week when this peak occurred. If COVID deaths peaked on the week that included Election Day, November 3, *COVID peak* was coded 0; if it occurred on the week that included October 1, it was coded 4; etc.

State election policies. The state-level voting policies that structured an individual's voting behavior have two dimensions: the specific voting options offered and whether an option was first introduced in 2020. The policy variables are constructed from a variety of measures, including Voting Rights Lab (n.d.), the National Conference of State Legislatures (2020a), and the National Association of State Election Directors (2020). The measure of mail-ballot policies is from Herrnson et al. (2022).

Mail voting policies for county *c* in election year *y* are divided into three categories: (1) *Universal VBM,* in which all registered voters are automatically mailed a ballot, (2) *No excuse* mail ballots, and (3) excuse-required mail balloting (the comparison group).

Counties also are coded according to their states' *Early voting* policies. The basic coding is dichotomous, equal to 1 if county *c* is in a state that allows early in-person voting in year *y*, 0 otherwise.

Because we are interested in the effects of voter familiarity changes on voter behavior, we included a series of dummy variables that record whether county *c* was in a state that newly adopted one of the two more liberal mail-voting policies (*Early voting, old)* or first allowed for early in-person voting in 2020 (*Early voting, new).* We detail the construction of these variables below.

County partisanship is based on the two-party vote share of the county in the immediately prior presidential election (*Democratic% $_{t-1}$*). The measure of partisanship in 2016 is based on Barack Obama's two-party share in 2012; the measure of partisanship in 2020 is based on Hillary Clinton's two-party share in 2016.

Other voter characteristics**.** We include aggregate measures of individual factors standard in models of voter turnout, including variables analogous to those Herrnson and Stewart (2022) used to study voter behavior at the individual-level measured. These measures, taken from the American Community Survey*,* are:

- Percentage of adults who are married (*% married*)
- Percentage of adults who are Black (*% black*)
- Average age of adults (*Mean age*)
- Percentage of adults who, at a minimum, graduated from high school (*% high school graduates*)
- Population density

State political context. The analysis controls for three state-level contextual factors that possibly affect turnout and choice of how to vote, competition, and

quality of statewide election administration. State partisanship and competition are operationalized as:

- *Blue state* = 1 if the respondent's state gave more than 60% of the two-party vote to the Democratic candidate in the previous presidential election, 0 otherwise;
- *Red state* = 1 if the state gave more than 60% of the vote to the Republican candidate, 0 otherwise;
- Battleground states = 0 (the comparison group).
- *EPI score* = = the state's elections performance score for 2020 as calculated by the MIT Election Data and Science Lab.[7]

To aid in interpretation of the coefficients, prior to estimating the models we transform all non-binary variables to lie within the [0,1] interval. The coefficients compare the relative effects of the variables' minimum and maximum values on the dependent variables of interest.

Results

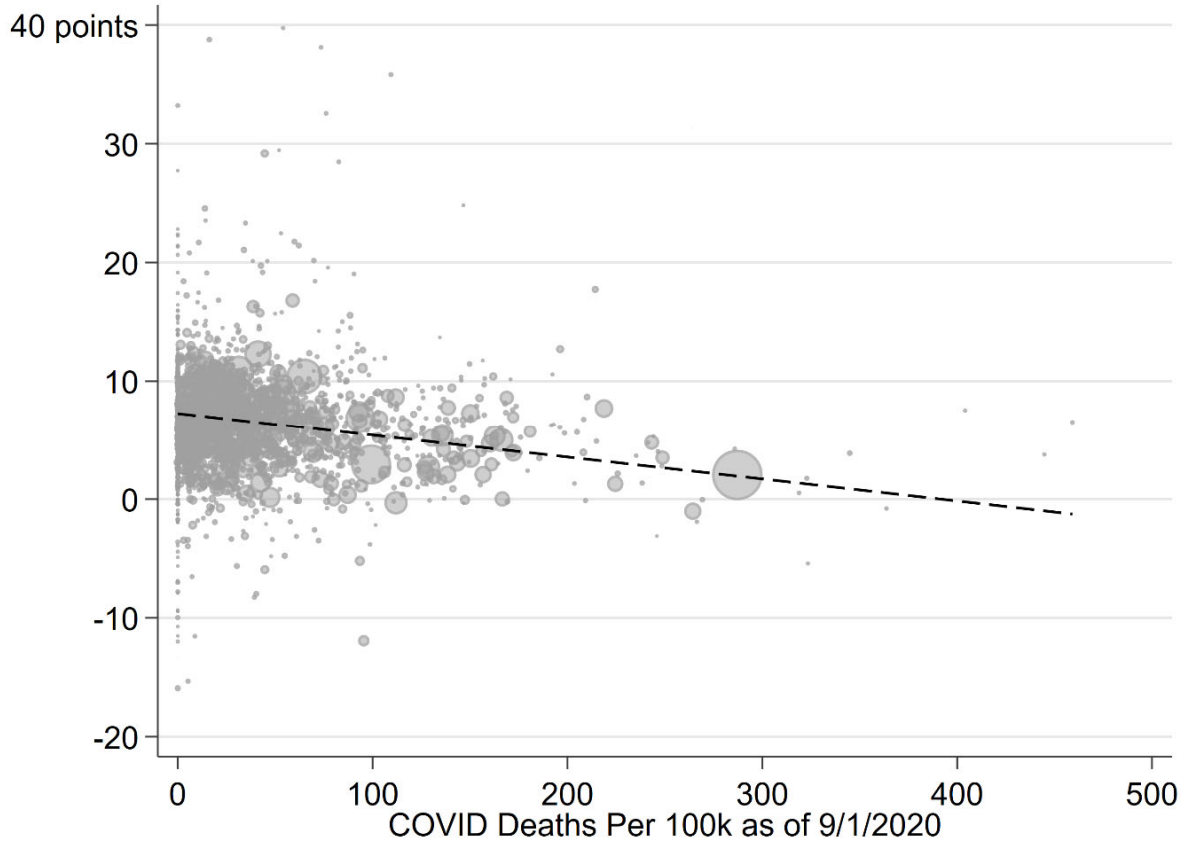
We begin our analysis by examining the bivariate relationships between voter turnout and voting methods used (the dependent variables) and COVID deaths and voting policies (the primary independent variables). The data tokens in Figure 1 show the preliminary results for the relationship between COVID death rates as of

[7] https://elections.mit.edu

September 1, 2020 and the change in turnout rates from 2016 to 2020. The size of each token corresponds to the size of the population of the county it represents. The results indicate voter turnout fell most in counties with the highest COVID death rates. Each 100 mortalities per 100,000 residents was associated with a 1.85 percentage-point decline in turnout. For example, the average turnout change between 2016 and 2020 among the 452 counties with no COVID deaths was 5.88 points. The average change among the 35 counties with mortality rates above 200 per 100,000 residents, including New York City, was 2.53 percentage points.[8]

[8] New York City, comprising all its five counties, is the largest jurisdiction in the analysis. Visual inspection of Figure 1 led us to explore whether New York City was asserting a disproportionate influence on the regression describing the relationship between COVID deaths and turnout change. If we conduct the regression by trimming the outlying 10% of observations on either side of the COVID deaths distribution, the resulting slope is virtually unchanged from conducting the regression on all the observations although, of course, goodness-of-fit statistics decline.

Figure 1. Preliminary findings for COVID death rates and change in turnout from 2016 to 2020.



Note: Observations are weighted by the county voting-age population. The slope of the regression line is -0.0185 (s.e. = .0010). Data tokens displayed truncated at -20 and 40 points along the *y*-axis; least-squares fit based on all observations.

The preliminary results also suggest not all convenience voting policies had the same effect: turnout increased the most in the states that either adopted universal VBM in 2020 (7.8-point average increase) or had already adopted universal VBM (7.5 points; see Figure 2). However, average differences across mail-

policy types were substantively small, although they were statistically significant.[9] The results also indicate there were small, yet statistically significant differences across states according to their early in-person voting policies.[10] Turnout among states that had early voting prior to 2020 or first implemented it in that election was virtually identical, at 6.5 points and 6.4 points, respectively. Turnout grew by only 5.3 points among states that allowed early in-person voting in neither year. Figure 2 illustrates, yet again, that within states, turnout increased much less in populous counties than in small ones.

[9] An analysis of variance analysis to test equality across mail-ballot policy types produces a result of $F_{4,2365} = 80.29$ ($p < .00005$).

[10] The analysis of variance analysis results in $F_{2,2367} = 28.57$ ($p < .00005$).

Figure 2. Preliminary findings for voting policies and change in turnout from 2016 to 2020.

Note: Observations are weighted by county population. Data tokens displayed truncated at -20 and 40 points along the *y*-axis; policy averages based on all observations.

These preliminary results further suggest that COVID death rates and voting policies affected the method voters used to cast a ballot. Each increase of 100 mortalities per 100,000 residents is associated with a 9.6 percentage-point increase in mail voting, a 4.0-point increase in early voting, and a 14.3-point decrease in Election Day voting (see Appendix Figure D-1).

Changes in mail policy also influenced the voting modes used (see Appendix Figure D-2 and Table D-1). Overall, voting by mail and early in-person voting

increased 20.4 points and 7.2 points, respectively, while Election Day voting declined 26.5 points. The largest increase in mail ballots occurred in counties that first adopted universal VBM in 2020, followed by counties that either previously had NEAV policies or adopted them for 2020. The increase in mail voting in counties that retained excuse requirements was small, at 4.1 points. In existing universal VBM states, where mail voting was already close to 100%, mail voting did not increase much further.

Changes in early voting policy had more modest effects on voter behavior in 2020 (see Appendix Figure D-3 and Table D-2). Early voting increased by 3.9 points over 2016 in states that offered EIPV prior to 2020 and by 20.6 points in states that did not. It is noteworthy that the growth in mail voting outpaced early voting by 16 points in the states that previously offered EIPV. As with the results for voter turnout, there is significant variation both across states and across counties within states, indicating other factors also influenced voter behavior.

Multivariate Analysis

We approach the multivariate analysis in two ways, (1) with county fixed effects to account for county-specific confounders and (2) without fixed effects, using explicit controls for county- and state-level independent variables. Standard errors are clustered by county. There are trade-offs across all these choices. Fixed-effects regression is the best method for producing unbiased estimates of the causal effects of COVID and voting policies on turnout and the use of different voting methods. However, the fixed effects approach, by its nature, prevents the analysis of

substantively interesting cross-sectional influences, such as the year a convenience voting option became available, county, partisanship, and race. The two sets of results are substantively similar for the most part (see Appendix Table E-1). We focus on the fixed-effects results first.

Table 1 illustrates the results of greatest interest—the impact of COVID deaths and policy change. Consistent with our first hypothesis, per capita COVID deaths had a larger impact on voter turnout than any other variable. Across the entire range of counties, the expected turnout difference between the county with the highest per-capita death rate as of September 1, 2020 (Galax City, Virginia) and the 536 counties with no deaths at that time was 8.1 percentage points. However, as shown below, the differences in turnout among counties that had less extreme death rates were notably smaller.

Table 1. Effects of COVID and policy change on voter behavior, 2016 and 2020.

	Turnout	Mail	Early	Election Day
COVID deaths	-0.0802***	0.394*	0.0736	-0.484***
	(0.00853)	(0.177)	(0.107)	(0.087)
Voting policies				
No Excuse	-0.0173***	0.0858***	-0.0665*	-0.0243
	(0.00433)	(0.0261)	(0.0228)	(0.0147)
Universal VBM	0.00397	0.323***	-0.123***	-0.221***
	(0.00703)	(0.043)	(0.037)	(0.031)
Excuse required (ref. cat.)	0	0	0	0
Early voting	0.0163***	-0.0503	0.211***	-0.169***
	(0.00419)	(0.0370)	(0.028)	(0.019)
Year = 2020	0.0699***	0.104***	0.0461**	-0.131***
	(0.00206)	(0.0185)	(0.0171)	(0.011)
Intercept	0.548***	0.204***	0.0856***	0.699***
	(0.00221)	(0.0203)	(0.0166)	(0.0130)
R^2	.816	.725	.348	.824
N	5,382	5,431	5,431	5,431

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

Note: Standard errors are clustered by county.

As anticipated, convenience voting options had small effects on changes in voter turnout. Counties in states with NEAV had slightly lower increases in turnout rates compared to counties in states that either required an excuse or had universal VBM. EIPV policies resulted in less than a 1.0-point increase in turnout. These modest effects are consistent with the findings of previous studies (Barber and Holbein 2020; Berinsky, Burns, and Traugott 2001; Gerber, Huber, and Hill 2013; Gronke and Miller 2012; Kousser and Mullin 2007; McGhee, Paluch, and Romero 2020; Southwell 2009; Southwell and Burchett 2000; Thompson et al. 2020; Burden et al. 2014; Herrnson and Stewart forthcoming).

Of greater interest are the effects of COVID and policy change on the use of different voting methods. Here, the results strongly support the third and fourth hypotheses. High COVID death rates are associated with a substantial increase in voting by mail, a modest growth in voting early (n.s.), and a decline in Election Day voting. NEAV policies are associated with an 8.6-point increase in mail balloting. Not surprisingly, the adoption of universal VBM policies is connected to an even greater—32.3-point—increase. The availability of EIPV options contributed to a 21.1-point boost in early voting. VBM and EIPV policies contributed to substantial declines in Election Day voting, but NEAV policies did not.

Moreover, the ability to choose among convenience voting options also led to changes in voter behavior across the two elections. EIPV options are associated with a 5-point decline in mail voting and NEAV options contributed to a slightly larger decrease in early in-person voting. Universal VBM policies are associated with a 12.3-point drop-off in early in-person voting.

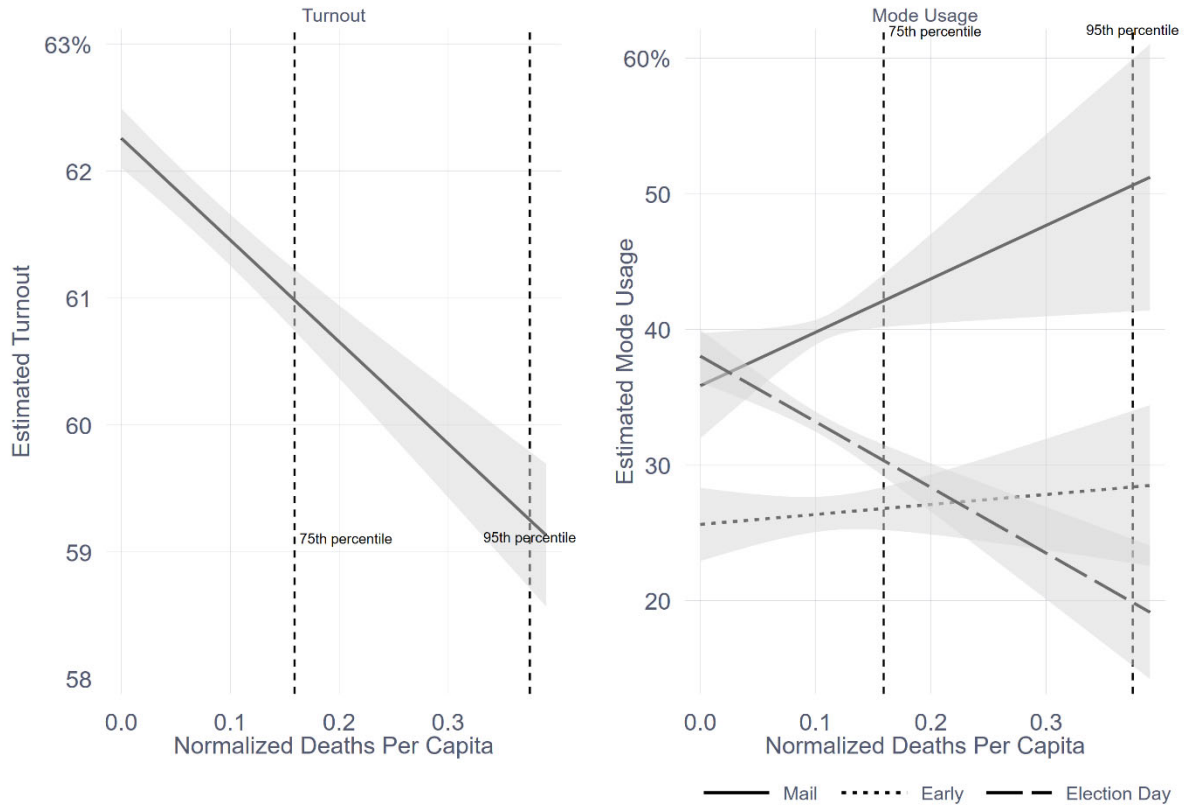
It is important to recall that the distribution of COVID deaths is highly right-skewed—95% of the observations (weighted by VAP) are between 0 and 0.327 on a variable that has been normalized to lie within the [0,1] interval.[11] The effects of COVID deaths on the change in voter turnout in most typical counties are much more modest than the 8.0-point difference between the county experiencing the highest COVID death rate and counties that report a death rate of zero. The first

[11] The skewness statistic of the COVID variable is 2.17 and kurtosis is 8.00.

graph in Figure 3, which displays the estimated level of voter turnout while holding all other variables at their means, illustrates that voter turnout in a county located at the 75th percentile of the distribution of COVID-related deaths is estimated to be only 0.9 points less than turnout in a county with no COVID deaths by September 1, 2020 (57.6% vs. 58.5%); a county at the 95th percentile is estimated to have a turnout only 2.7 points less (55.8% vs. 58.5%).[12]

[12] The exception is that the dummy variable indicating observations from 2020 is set to one.

Figure 3. Estimates for turnout and voting methods used by COVID death rates.



Note: The *x*-axis range spans the minimum to the 95th percentile of COVID deaths.

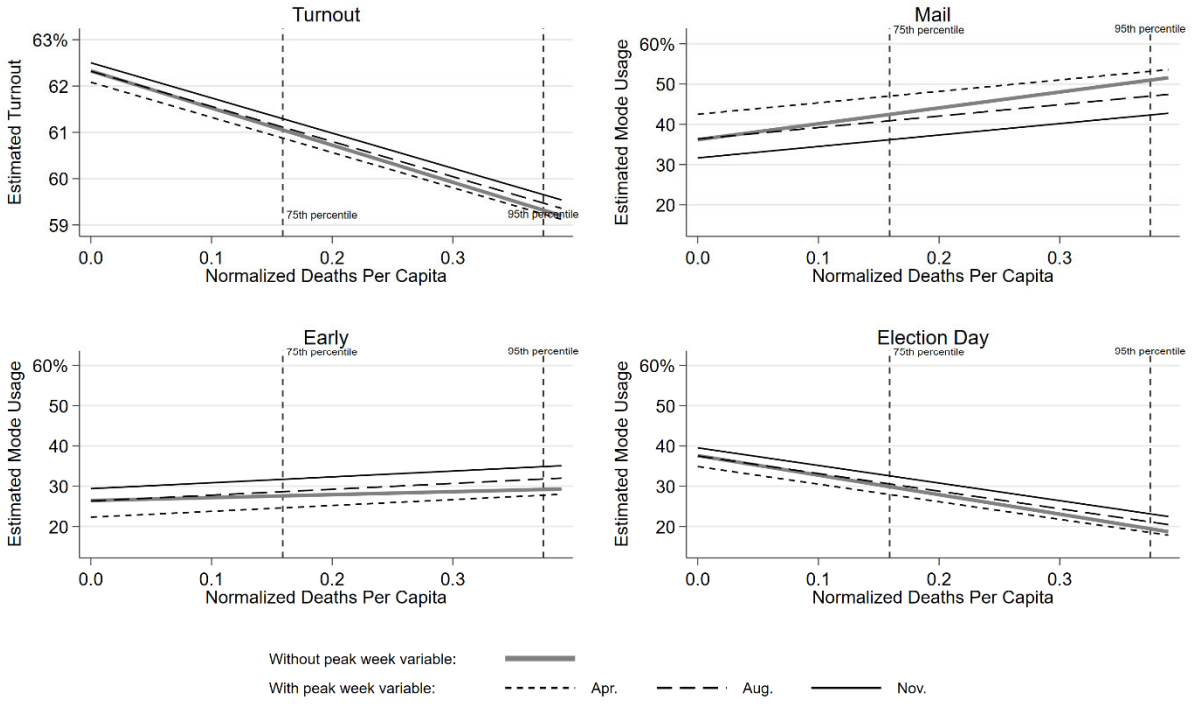
The second graph in Figure 3 shows the impact of COVID on changes in voting methods used. Once again, COVID had a modest effect on voter behavior in most counties. The estimated usage of mail ballots in a county at the 75th percentile of COVID deaths is 5.9-points greater than in a county with no COVID deaths (35.8% vs. 41.8%). This is a fraction of the difference between counties at the extremes of the distribution. COVID mortalities also had modest effects on votes cast early in-person or on Election Day in most counties, but huge effects on counties suffering the highest COVID mortality rates.

COVID surges and voter behavior

Thus far we have shown that counties with larger COVID fatality rates experienced a greater decline in turnout, larger increases in early in-person and mail voting and decreased voting on Election Day. To assess whether early COVID surges had a more decisive effect on voter behavior than news of receding death rates, improved vaccines, and more effective treatments, we add the peak week that records the number of weeks prior to Election Day when a county experienced its greatest one-week spike in deaths. We report the full set of regression results in Appendix F. Figure 4 shows estimated turnout levels and voting method-usage as a function of COVID deaths when the peak weak for COVID deaths was at three points in time: the first week of April, the first week of August, and the first week of November.[13]

[13] More precisely, the "first week" of these months is defined as the week when the first of the month occurred. These were 40, 13, 0 weeks, respectively, before Election Day.

Figure 4. Influence of COVID surge timing on turnout and voting method used.



Note: The solid grey line is the slope for COVID deaths without the inclusion of the "peak week" variable. Black lines estimate values of the dependent variables with the "peak week" variable set to the first of April (Week 40), August (Week 13) and November (Week 0).

Consistent with the fifth hypothesis, the results indicate that the earlier the surge in a county's COVID death rate, the more its turnout declined, mail ballots increased, and in-person voting fell—both before and on Election Day. Compared to a county that experienced its COVID surge on the week of the election, a county that had its surge during the first week of April experienced, on average, a 0.4-point (n.s.) drop in turnout, an 11.2-point increase in mail ballots, a 7.3-point reduction in EIPV, and a 4.8-point (n.s.) reduction in Election Day voting.

The timing of policy change and voter behavior

The 2020 election witnessed a sea change in voting policies. Election reform traditionally has been incremental and characterized by regional patterns that matched demographics, history, geography, and political culture. The most consequential changes introduced in 2020—universal VBM and statewide EIPV programs—are administratively complex, usually require considerable advanced planning, and are challenging to execute under the best of circumstances. The accelerated timetable for their introduction in 2020 compounded the challenges normally faced by election officials implementing new voting policies. Timing also resulted in educational campaigns that were shorter than those that typically accompany a major electoral innovation. This undoubtedly made the campaigns less effective in boosting voter familiarity with or confidence in a new voting option. A lack of familiarity with new voting options informs Hypothesis 6 : counties in states that first adopted more liberal mail practices in 2020 experienced lower rates of mail voting or early voting in 2020 than counties that had previously provided these practices. As discussed later, the heated partisan rhetoric surrounding these options also may have discouraged voters from using a newly available voting method.

We test this hypothesis by dividing all the policy dummy variables in two, separately indicating counties in states that had a convenience voting policy option available before 2020 versus those where an option was adopted for the 2020 election. The three practices assessed are: (1) moving from excuse-required to NEAV, (2) moving from NEAV to universal VBM mail, and (3) moving from not

allowing EIPV to allowing it.[14] We use the model that incorporates covariates discussed above to assess the effects of the timing of voting policy implementation on voter behavior rather than the fixed effects model because each of the three policy change variables are collinear indicating the policy in county *c* at time *t*.

The results in Figure 5 show experience with a voting system mattered (see also Appendix G Table G-1). Voters in states that first adopted NEAV in 2020 were 9.2 percentage points more likely to use a mail ballot than voters in states that retained an excuse requirement (controlling for other factors). This contrasts with the 21.3-point differences in states that had adopted NEAV prior to 2020.[15] Similarly, voters in states that first adopted universal VBM in 2020 were 56.4 percentage points more likely to cast a ballot by mail compared to voters in excuse-required states; the difference in states where universal VBM was previously available was 81.2 points.[16]

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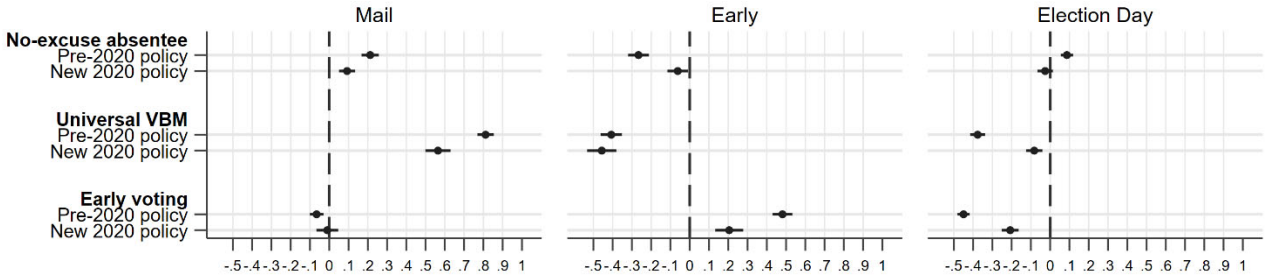
[14] In theory, we could have examined the move from excuse-required mail balloting to universal VBM, but no states made this change in 2020.

[15] The difference between the two sets of counties with no-excuse absentee voting in 2020 was significant at the $p = .002$ level.

[16] The difference between the two sets of counties with universal VBM in 2020 was significant at the $p < .00005$ level.

Figure 5. Effect of policy on vote method used by the timing of policy adoptions.



In the case of EIPV, voters in states that offered this option prior to 2020 were 48.1 points more likely to vote early in person than those had no early voting option; the difference was only 20.5 points for voters in states that first introduced EIPV in 2020.[17] Further evidence of timing effects is voters in counties where a VBM or EIPV option was available prior to 2020, who presumably were more familiar and comfortable with it, were the most likely to reject Election Day voting.

The effects of partisanship on voting methods used

As noted earlier, the 2020 election was unique for the level of partisan disagreement over voting methods. The results of the seventh hypothesis test support our expectation that voters in heavily Democratic counties (operationalized as the two-party vote in the previous presidential election) relied more on voting by mail and less on Election Day voting than voters in Republican-leaning counties. The high correlation between lagged Democratic vote share in 2016 and 2020, requires us to,

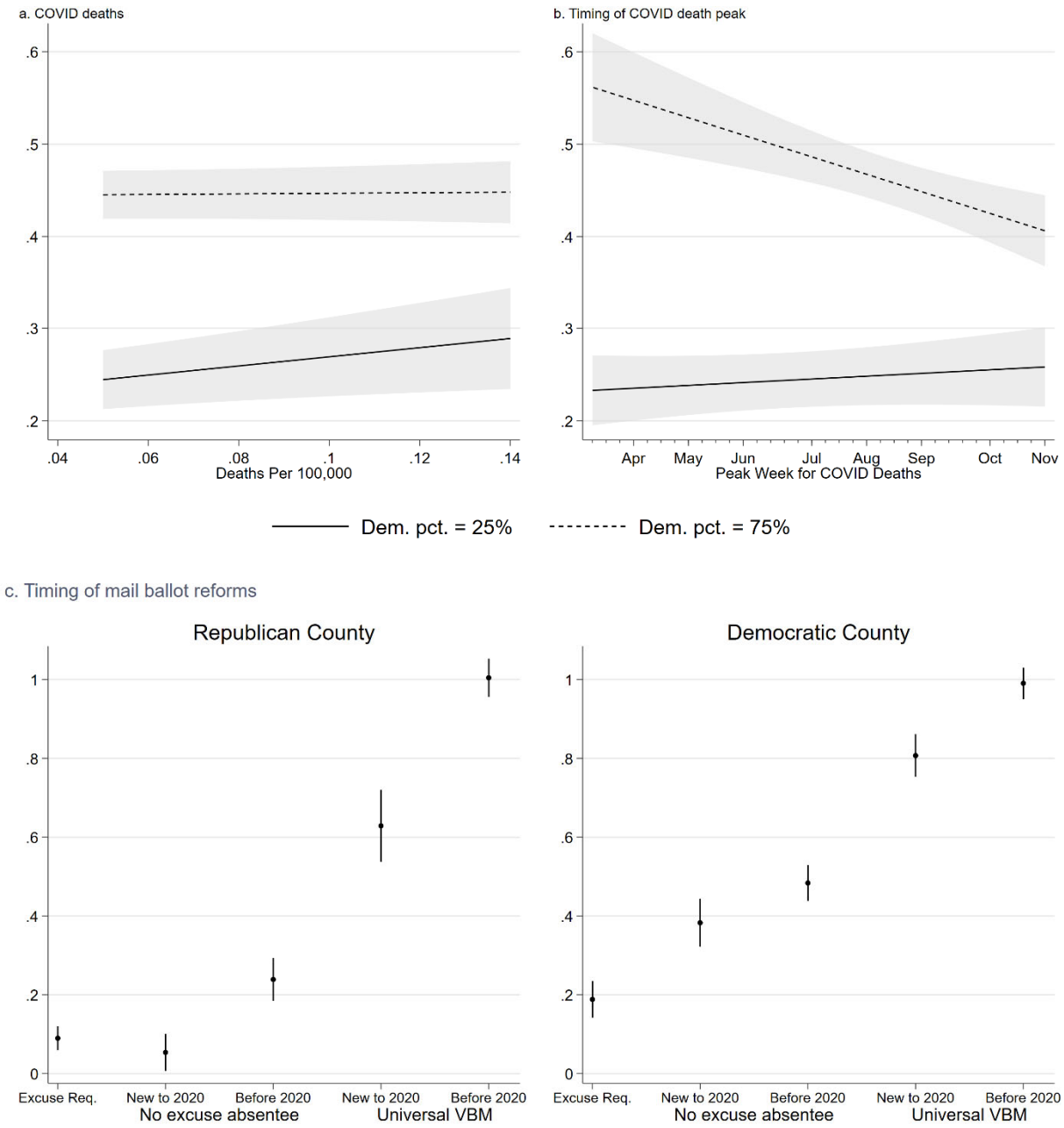
[17] The difference between the two sets of counties with early voting in 2020 was significant at the $p <$ .00005 level.

once again, use the model without fixed effects. The results in Appendix Table G-1 show a strong positive relationship between partisanship and voter behavior—the greater the vote for Democratic presidential candidates, the greater the use of mail ballots and the less the use of in-person voting, either on or before Election Day.

Partisanship had an even greater effect on participation through its synergies with other factors. The addition of an interaction term for partisanship and COVID mortalities demonstrates deaths had little effect on Democratic counties, where about 45% used a mail ballot, and a slight positive impact on voters in Republican counties, where relatively few voted by mail (see Figure 6, panel a).[18] The combined effects of partisanship and the timing of COVID peak deaths had a more pronounced effect of mail voting. On the one hand, voters in Democratic counties that experienced an early COVID surge were significantly more likely to use a mail ballot than voters in other Democratic counties. On the other, late surges led to a slight rise in mail voting in Republican strongholds (Figure 6, panel b).

[18] Regression estimates with the interactions are reported in Appendix H. Estimates reported in Figure 6 were constructed using the Stata `margins` command. A Republican county is defined as one that gave 25% of its vote to Trump in 2016; a Democratic county is defined as one that gave 75% of its vote to Clinton. All other variables are set to their means.

Figure 6. Estimated effects of COVID deaths and timing of mail ballot policies interacted with partisanship of county.



Notes: Regression results reported in Appendix H. Estimated values calculated using the margins command in Stata. A Republican county is defined as one that gave 25% of its vote to Trump in 2016; a Democratic county is defined as one that gave 75% of its vote to Clinton. All other variables set to their means.

There also is evidence of synergies between partisanship and familiarity with a convenience voting method. When voters in Democratic counties were offered a NEAV option, many used it, regardless of when NEAV was first introduced (Figure 6, panel c). Significantly fewer voters in Republican counties took advantage of a NEAV option. In fact, the rate of mail voting in Republican counties where NEAV voting first became available in 2020 was statistically equal to that in counties that required an excuse. The introduction of universal VBM policies had a different effect. Voters of both parties made heavy use of mail ballots in counties if the policy had been in place prior to 2020. Fewer voters used a mail ballot if VBM was introduced in 2020, and voters in Democratic counties were much more likely to use one than voters in Republican counties.

Finally, there were no synergistic effects of party on rates of early in-person voting in states that allowed EIPV prior to 2020. However, in states that first allowed the option in 2020, EIPV rates went up the most in Democratic counties.[19]

Conclusion

This study investigated the impact of COVID and changes in voting policies on voter participation in the 2020 US general election. Using county-level data we demonstrate that the pandemic influenced voter turnout and the choice of voting

[19] See Appendix H for a complete report of regression coefficients.

mode, both directly and indirectly. The most important indirect effects were voters' responses to policy changes prompted by the unfolding health crisis.

As anticipated, the results lend little support for the voter turnout hypotheses. COVID-related deaths led to only a small decline in turnout. Convenience voting policies had neither large nor consistent effects on turnout. The results provide more support for the voting methods hypotheses. COVID deaths were associated with higher rates of mail voting, and liberalizing mail balloting increased the use of this mode at the expense of Election Day voting. The results also demonstrate that counties that suffered a surge in COVID deaths early in the pandemic, more so than others, experienced lower turnout, a rise in mail ballots, and drop-offs in both in-person voting before and on Election Day. Indeed, the variable measuring the timing of the COVID surge tended to have a stronger effect predicting voter behavior than the size of the surge itself. This suggests there is a stickiness to voter behavior; decisions reached in response to information received early in an election cycle are likely to persist, even after countervailing information becomes available. In addition, partisanship had a pervasive effect. Democrats' increased use of mail ballots and Republicans' greater reliance on ballots cast in person, suggest 2020 contributed to a new gap in political participation.

Although the 2020 election took place under unique circumstances that led to considerable changes in voting policies, the results of this study indicate substantial continuity in the behavior of the American electorate. COVID-related health risks did not lead to massive abstentions in the 2020 election. Many voters adhered to

their previous voting habits, including traditional Election Day voting, despite safety concerns and the availability of new voting options. As is the case with most aspects of politics, partisanship had a major role in shaping the rules under which the election was conducted, and partisanship structured voter responses to both those rules and the COVID threat. Following the election, partisan considerations inspired scores of the election reforms proposed following the election. Whether these reforms are enacted, or the recent voting policies or voter behavior endure, this study provides insights that may prove useful to policymakers, politicians, and voters participating in future elections, particularly those that occur during a crisis.

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The Impact of COVID-19 Surges on Voter Behavior in the 2020 US General Election

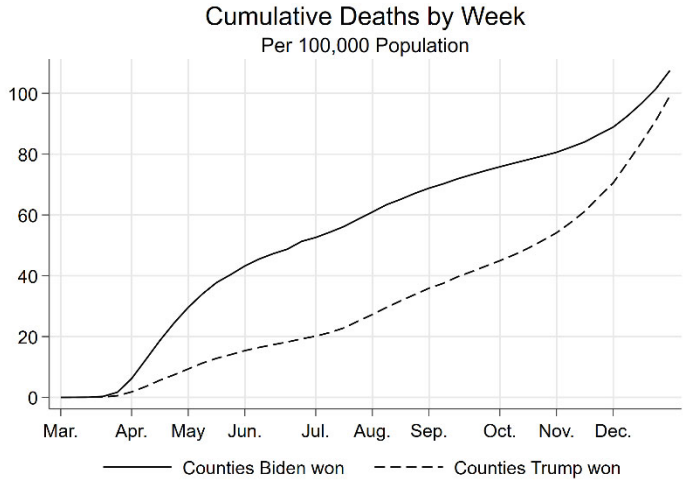
Online Supplemental Materials

Appendix A

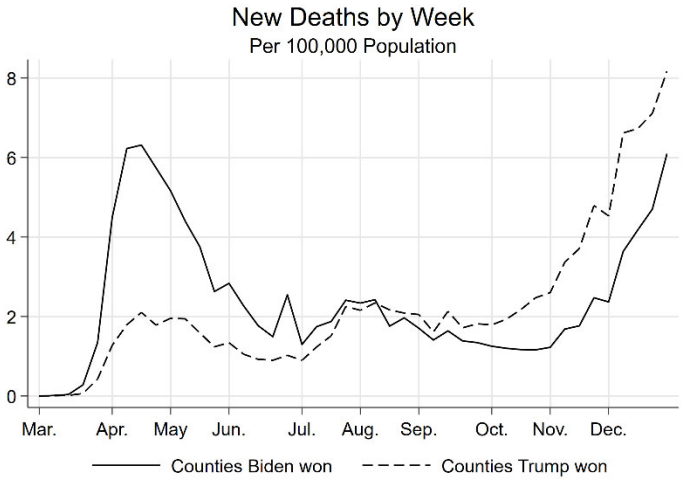
Time Trend of COVID Cases and Deaths

Figure A-1. Per-capita COVID deaths, March 2020 – December 2020.

a. Cumulative deaths



b. Weekly deaths



Sources: COVID cases and deaths are from *New York Times* n.d.; county election results are from Leip 2005; and county population data are from U.S. Census year. County population data: U.S. Census Bureau, County Population Totals: 2010 – 2020, https://www.census.gov/programs-surveys/popest/technical-documentation/research/evaluation-estimates/2020-evaluation-estimates/2010s-counties-total.html.

Appendix B

Cleaning the Election Administration and Voting Survey Data for Analysis

The Election Administration and Voting Survey dataset is the most comprehensive source of data for the type of analysis we conduct in this paper. However, it has two shortcomings: missing data and the failure of states to conform their data reporting to the survey instructions.

There are two major reasons for the shortcomings in the EAVs data. First, except for items related to the implementation of the National Voter Registration Act, states are not required to report any of the data in EAVS. Although the states' compliance with EAVS is now high, the states themselves cannot always compel their local jurisdictions to provide the data, which are later reported to the Election Assistance Commission and recorded in EAVS. The primary shortcoming with the turnout data results from non-reporting by individual jurisdictions. Second, state laws and information systems are not always consistent with the categories used by EAVS. Some states combine mail votes and in-person early votes together, and classify them as "absentee voting," "advanced voting," or "early voting."

One goal of the Election Administration and Voting Survey is to account for the number of voters who cast their ballots using one of the three standard modes of voting—in-person on Election Day, in-person before Election Day, and by mail. The instructions associated with the three major modes are clear about what is requested:

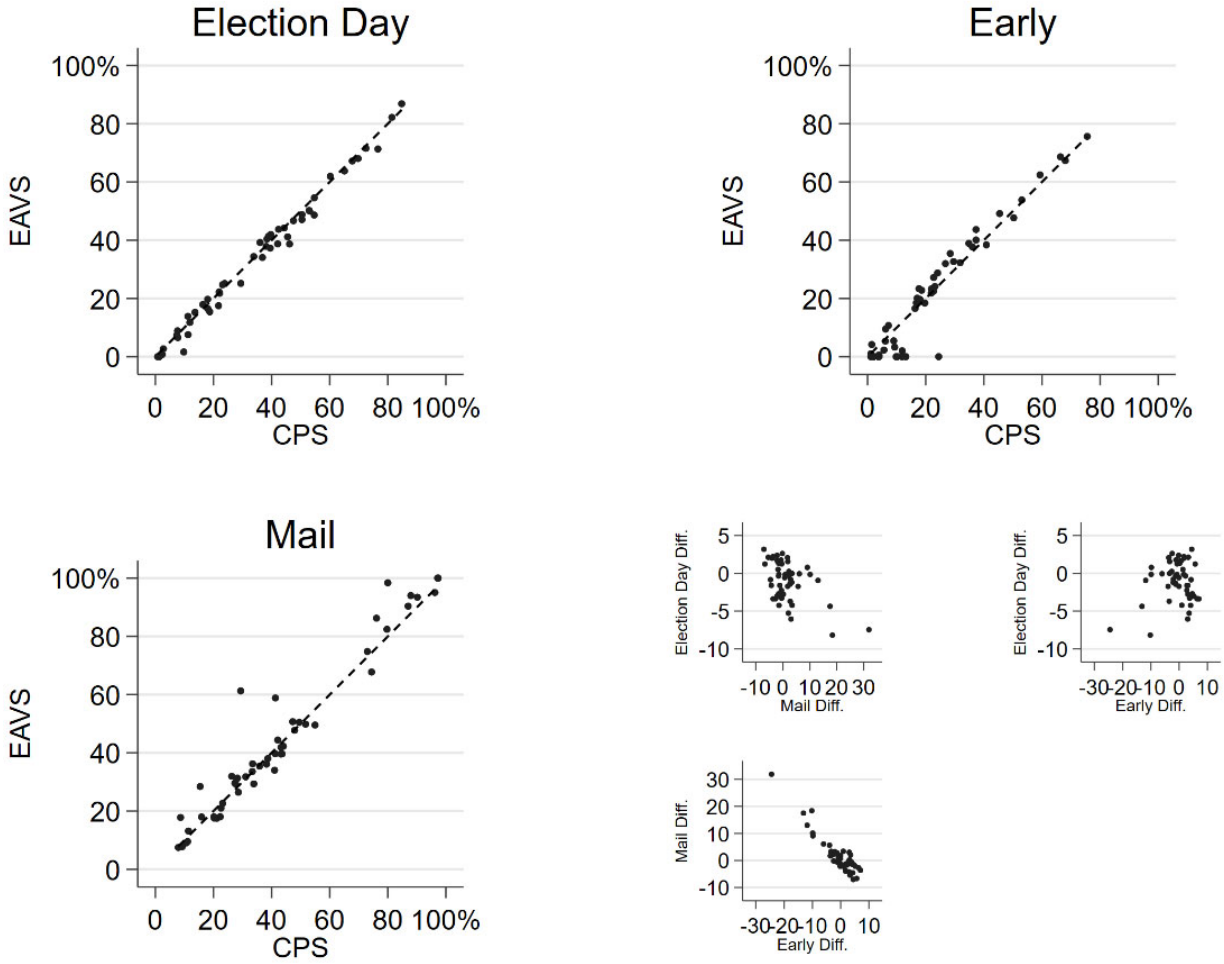
- F1d. Voters who cast a domestic civilian by-mail ballot, and whose ballots were counted: All voters who voted using a by-mail absentee ballot. This should not include voters whose jurisdictions conduct elections entirely by mail; those voters are reported in F1g.
- F1b. Voters who cast a ballot at a physical polling place on Election Day, and whose ballots were counted: All voters who cast ballots in person on Election Day, not including provisional ballots or mail ballots dropped off at the polls.
- F1f. Voters who cast a ballot at an in-person early voting location, and whose ballots were counted: All voters who participated in the election in person prior to Election Day. This includes in-person early voting or in-person absentee voting.

Despite these clear instructions, simple examination of the reported statistics suggested that some states did not report statistics based on these instructions. Instead, some conflated items F1b and F1f, sometimes including in-person early votes in item F1b, and other times including mail ballots in item F1f.

To identify states that were likely out of compliance with the instructions, we compared aggregate statewide usage rates with self-reported vote-mode usage in the U.S. Census Bureau's Current Population Survey Voting and Registration Supplement (CPS).

To illustrate what one finds when one does this, the first three graphs in Figure B-1 show scatterplots of mode usages at the state level as reported in the 2020 EAVS versus what was self-reported by voters in the CPS. Both sources yield nearly identical estimates of the percentage of voters who cast votes on Election Day. It is with early and mail balloting where the agreement breaks down. First, there are clear outliers for both measures. Eleven states reported precisely zero early votes cast but had CPS respondents report they voted in person before Election Day.

Figure B-1. Comparison of Voting Mode Use Across Two Sources, EAVS and the CPS, 2020 Election.



For most of these states, this can be easily dismissed for practical purposes, since the percentage of respondents to the VRS reporting they voted early is so low—Alabama (3.6%), Connecticut (1.3%), New Hampshire (3.9%), New Jersey (2.1%), Oregon (2.1%), and Pennsylvania (1.1%). On the other hand, nearly one-quarter (24.5%) of Rhode Island voters said they voted in person before Election Day but the state reported no early voting. Smaller, but still significant numbers of voters reported casting ballots early in Iowa (13.2%), Mississippi (9.8%), Missouri (11.8%), and Montana (10.2%).

In addition, there were six states that reported some early in-person voting, but respondents to the CPS reported rates of early voting that deviated by more than five percentage points. The largest of these differences, and most substantively interesting, was in Arizona, where the state reported that 2.0% of voters cast ballots in-person before Election Day, but 11.9% of respondents to the CPS reported voting early.

Finally, the fourth subgraph in Figure B-1 shows the three scatterplots that describe the correlations between VRS-CPS differences of the three measures. The strongest pattern here is the high negative correlation ($r = -.927$) between the difference in mail-ballot usage between the two sources and the difference in early voting. The greatest contributors to this negative correlation are Rhode Island, Iowa, Montana, Missouri, Arizona, Mississippi, Colorado, and New Hampshire. It is clear from this figure that there is a substitution between reporting voters as falling into the early- and mail-balloting categories.

The biggest discrepancies in coding occur when voters who presumably actually cast their ballots in-person are recorded as having voted by mail. However, it also needs to be noted that most states fall in the southeast quarter of the fourth subgraph. That is, in most states, voters who actually cast a ballot by mail are probably being classified as having voted early, but the biggest outliers in terms of discordant classification are in-person voters being classified as mail voters.

To be clear, the lack of perfect correspondence between EAVS and the CPS is most likely due to sampling error in the CPS. However, the largest outliers are well outside the scope of the sampling error. They most likely reflect discordance between the actual behavior of voters and the classification of that behavior in state law and administrative records.

We are interested in the behavior of voters, not classification in administrative records. For the most part, we deal with this problem of correct administrative classification by excluding from the analysis states in which the deviation in reported usage of voting modes between the CPS and EAVS was especially large, or the data were missing altogether. Table B-1 reports the states that were excluded and the years when they were excluded.

Table B-1. Exclusion of states from vote-mode analysis due to anomalies in EAVS data.

State	2016	2020
Alabama	Didn't report absentee ballots	Included
Iowa	Didn't break down turnout by mode	Combined mail and early in-person
Indiana	Combined mail and early in-person	Included
Maine	Combined mail and early in-person	Included
Missouri	Included	Combined mail and early in-person
Montana	Combined mail and early in-person	Combined mail and early in-person
Rhode Island	Combined mail and early in-person	Included
South Carolina	Combined mail and early in-person	Included
South Dakota	Combined mail and early in-person	Included
Utah	Didn't break down voting by mode	Included
Vermont	Didn't break down voting by mode	Included

For the final bit of major data cleaning, we checked to ensure that the sum of all the vote-mode sub-aggregates in EAVS (Election Day, early in-person, mail, etc.) equaled total reported turnout for the county. We excluded counties in which the sum of the sub-aggregates differed from the separately-reported total turnout by more than one percentage point.

Appendix C

Sensitivity Analysis of COVID Measures

The empirical analysis of this paper measures the impact of COVID-19 using the cumulative number of COVID deaths reported at the county level as of September 1, 2020. The choice of deaths, rather than cases, was due to considerations of data reliability. The choice of September 1, 2020 was based on theoretical expectations about when information about COVID incidence would have the greatest effect on voter behavior.

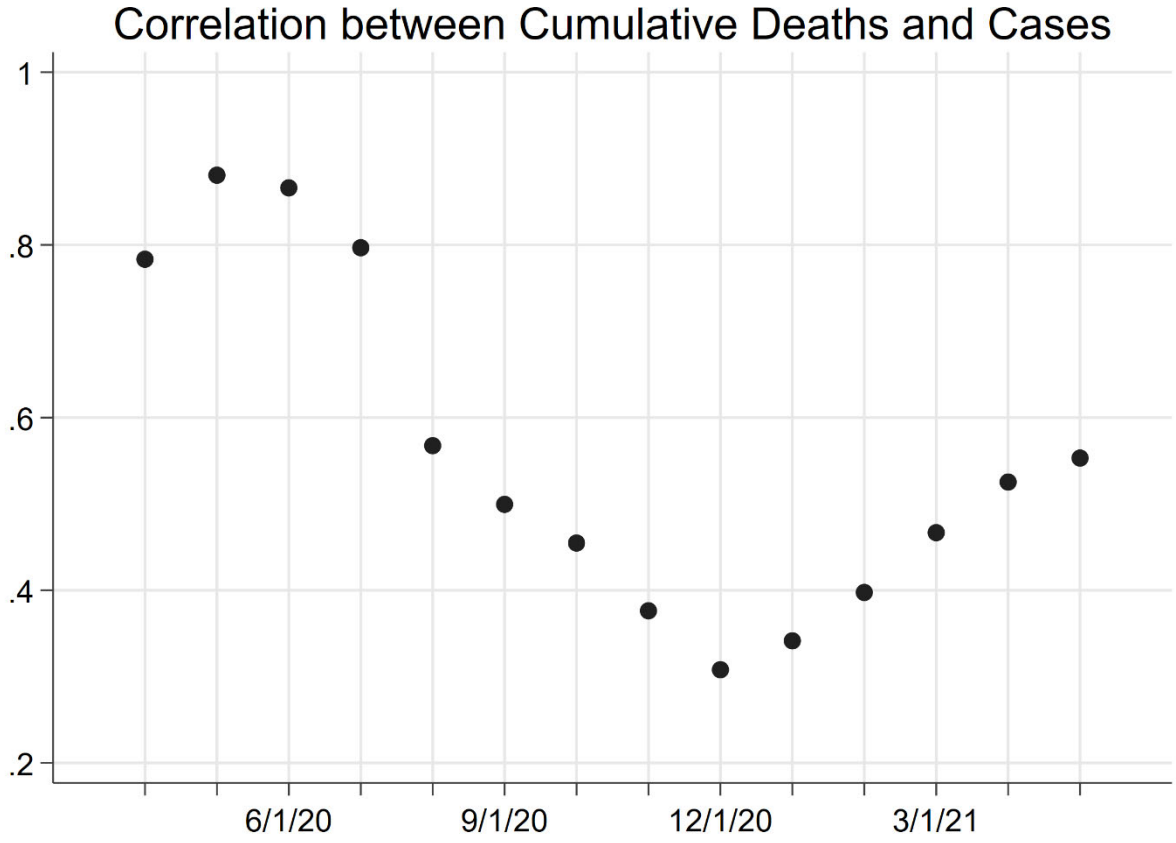
Measuring the number of people who have been infected by the COVID-19 virus and have died due to it have been challenges since the global outbreak began in late 2019. The novel nature of the virus and the general unavailability of accurate testing early in the pandemic severely limited the ability of public health professionals to track the spread of the disease in the early months. This, of course, had serious public health implications. Early estimates of the case fatality rate of COVID—that is, the number of people who died of the disease—ranged from 0.4% to 15% in the early months (Rajor et al 2020). The orders-of-magnitude differences in the fatality rate were largely because of difficulties in measuring the denominator, that is, the number of people infected (Azizi, Esmaeili, and Fakhari 2020).

Attributing deaths to COVID, rather than other causes, also was challenging. However, attributing a death to COVID, which could be based on a combination of clinical observation and higher quality of testing to which those hospitalized were subjected, was significantly less likely to be fraught with error than measuring the number of cases in the population (Azizi, Esmaeili, and Fakhari 2020). Therefore, of the two measures, the epidemiological research indicated that the death rate (i.e., number of COVID deaths divided by population) was the preferred measure of COVID prevalence and severity than the case rate (i.e., number of COVID cases reported divided by population).

An established strategy for dealing with measurement error is to combine measures that are believed to be generated by the same underlying process. However, this strategy is only useful when the measures are highly correlated with each other. In the case of COVID death and case rates, this is not the case. For cumulative deaths and cases as of September 1, 2020, the correlation coefficient is only .499. In Figure C-1, we illustrate the correlation coefficients measured at different times, both before and after the 2020 election. From April to July, the two measure were highly correlated—ranging from .784 in April to .881 in May—but that is because most counties had had zero deaths and cases, and thus the correlations were driven by the comparison of a relatively small number of counties with a relatively large number of cases and deaths against a large number of counties with no (or very few) cases and deaths. As the pandemic's reach spread

across the entire nature, the correlation fell steadily throughout the rest of 2020, rebounding somewhat in 2021.

Figure C-1. Correlation between Cumulative Deaths and Cases at One-Month Intervals.

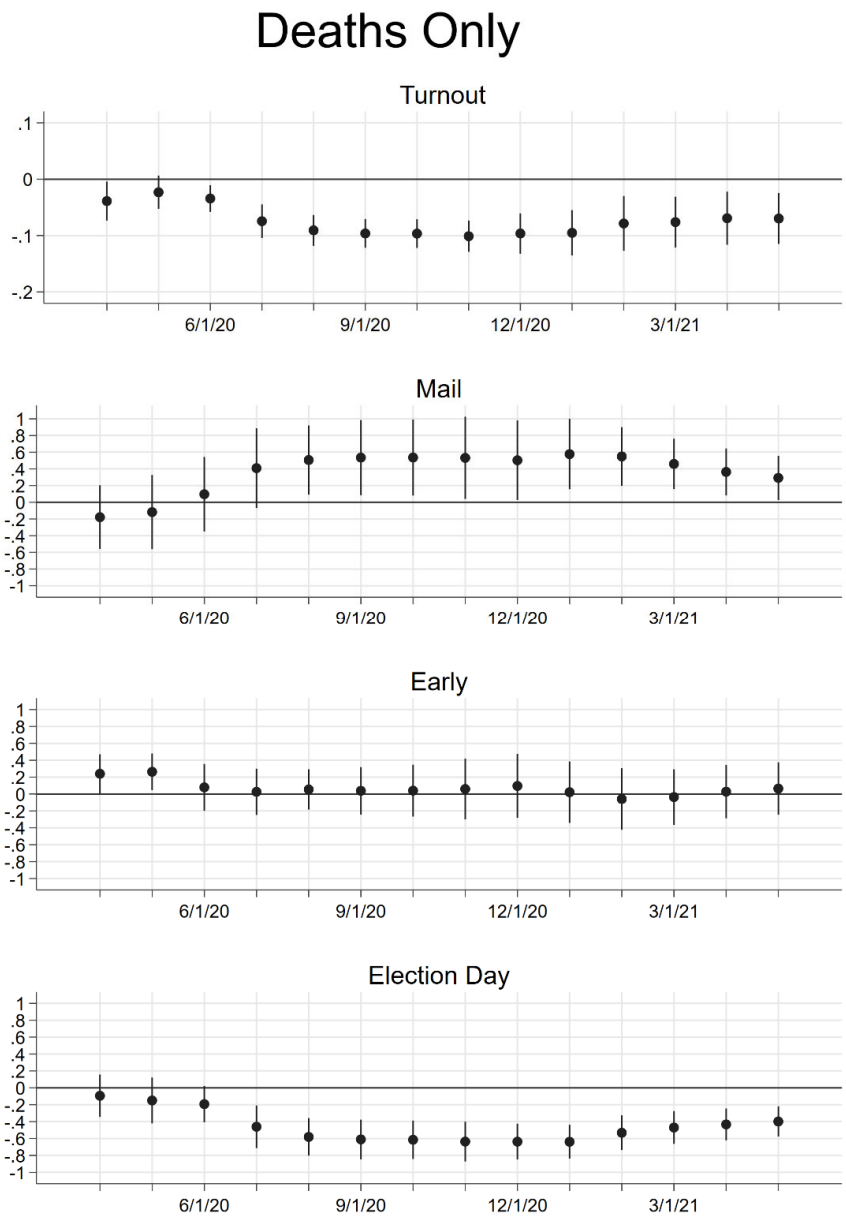


Having settled on the death rate as the preferable measure of COVID incidence and severity, the question arose about when the death rate should be measured. Under an assumption that voters would make decisions about whether to vote and by which method using the best information they had at the time, it made sense to consider the period from roughly Labor Day through Election Day. This window begins at roughly the time when states began making absentee ballots available to voters.

The question arises about how the choice of date for measuring COVID death rates influences the results reported in this paper. To answer this question, we re-ran the fixed-effects analyses reported in Appendix E, substituting in the COVID death rate as of the first of the month for each month from April 2020 to May 2021.

Figure C-2 reports the results of this sensitivity analysis. This analysis shows that the findings related to the COVID death rate are robust to the choice of date when COVID deaths are measured. The coefficient in the turnout equation varies very little, regardless of the date chosen. The coefficients for the three equations for voting methods tend to drift over time toward the estimate using the September 1, 2020 data. However, if we had chosen any date starting in mid-summer, the substantive results would have been essentially the same.

Figure C-2. COVID Death Rate Coefficient Measured at Different Points in the Calendar (April 1, 2020 to May 1, 2021).

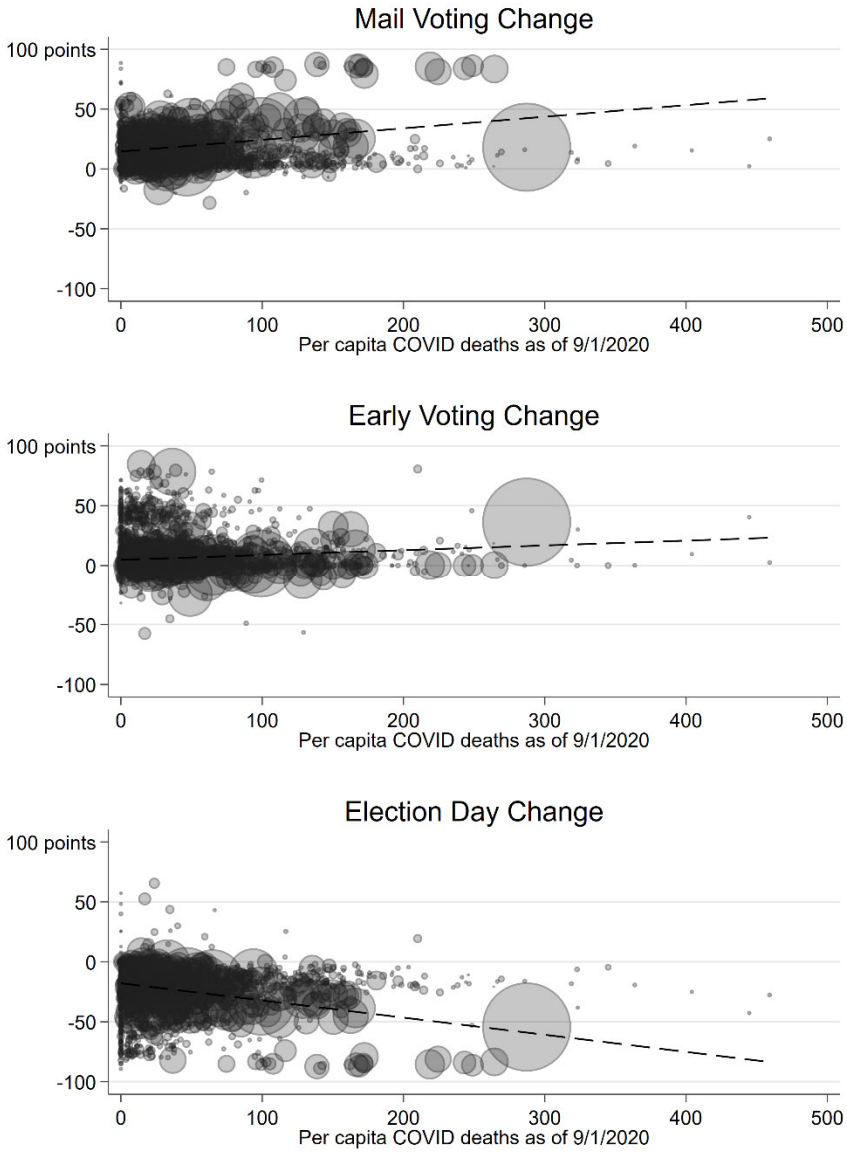


The stability of these results has substantive as well as methodological implications. They suggest that the effect of COVID deaths was "hard wired" into voter decisions well before the general election season began. Decisions—or, at least, predispositions—to vote and to use particular modes were in place well before the general election campaign season began. This is consistent with research into social distancing, which has shown that early in the pandemic, variation in the degree to which people practiced social distancing could be explained in terms of contemporaneous COVID rates and partisanship, but as time progressed, behavior became much less influenced by changes in rates (Bisbee and Lee 2022).

Appendix D

COVID Deaths, Policy Change, and Change in Voting Method

Figure D-1. Bivariate relationships between change in voting methods and COVID death rates.



Note: The slopes of the regression lines are 0.0966 (s.e. = .0054) for mail, 0.0401 (s.e. = 0.0051) for early in-person, and -0.143 (s.e. = 0.0053) for Election Day voting.

Figure D-2 Bivariate relationships between change in mail-ballot policies and voting method usage.

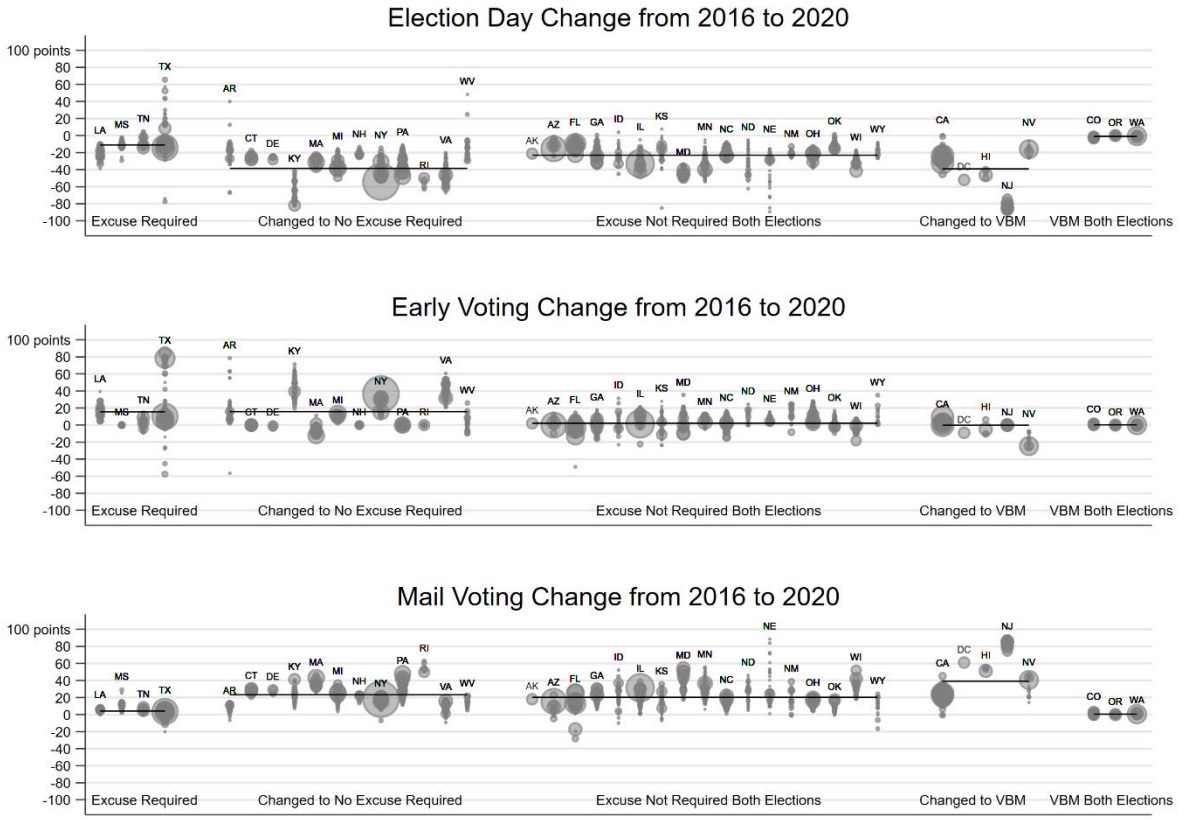


Table D-1. Average change in vote-mode usage and mail-ballot policies (percentage points).

	Mail Voting	Early Voting	Election Day Voting
Excuse required 2016 & 2020	4.07	15.5	-11.1
Changed to no excuse in 2020	23.2	15.7	-38.5
No excuse in 2016 & 2020	20.2	2.21	-23.0
Changed to universal VBM in 2020	39.1	-0.146	-39.0
VBM in 2016 & 2020	0.589	0.302	-0.891
Total	20.4	7.19	-26.5
$F_{4,2377}$	385.0	152.1	418.2
P	<.00005	<.00005	<.00005

Figure D-3 Bivariate relationships between change in early voting policies and voting method usage.

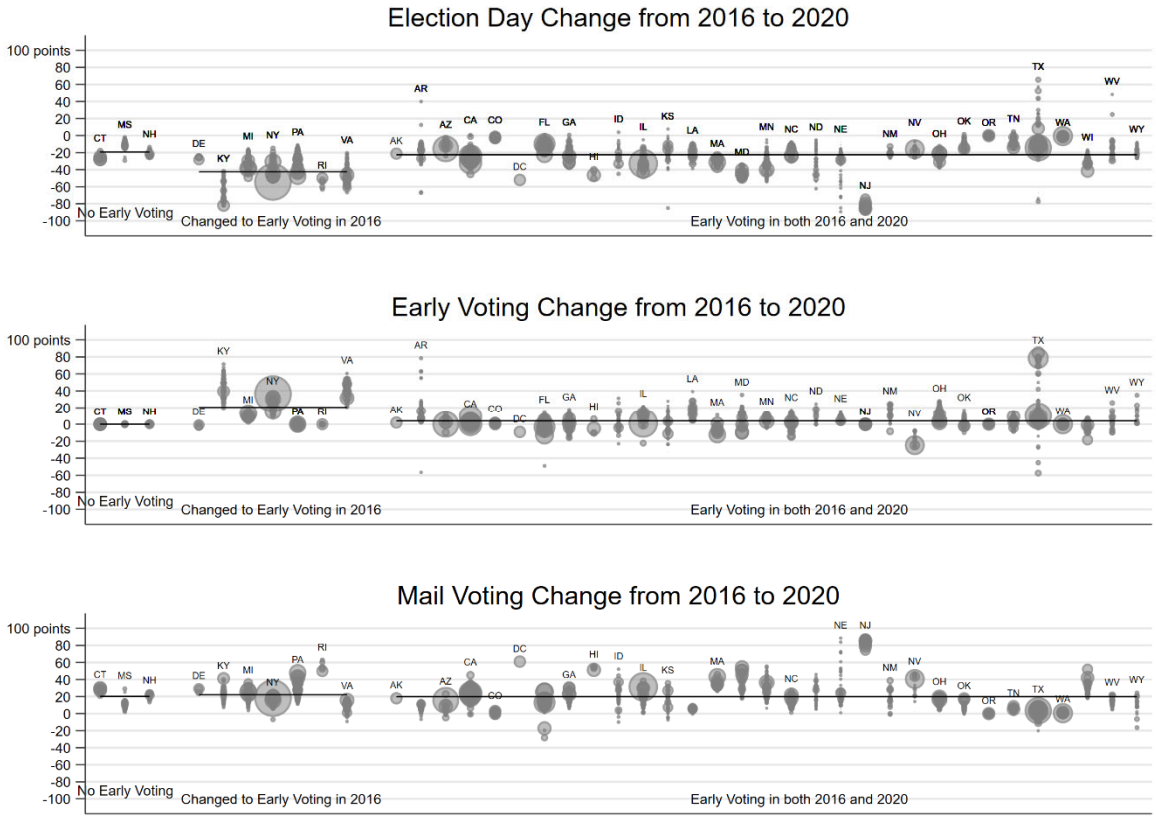


Table D-2. Average change in vote-mode usage and mail-ballot policies.

	Mail Voting	Early Voting	Election Day Voting
No early voting in 2016 or 2020	20.2	0.0	-19.2
Changed to early voting in 2020	22.1	20.6	-42.4
Early voting in 2016 and 2020	20.0	3.94	-22.5
Total	20.4	7.19	-26.5
$F_{2,2379}$	2.89	275.2	278.4
P	0.06	<.00005	<.00005

Appendix E

Multivariate Analysis of Turnout and Vote-Mode Choice

Table E-1. Multivariate Analysis of Turnout and Vote-Mode Choice with and without Fixed Effects

	Fixed Effects				No Fixed Effects			
	Turnout	Mail	Early	Election Day	Turnout	Mail	Early	Election Day
COVID deaths	-0.0802***	0.394*	0.0736	-0.484***	-0.0322	0.163	-0.0925	-0.0438
	(0.00853)	(0.177)	(0.107)	(0.0870)	(0.0229)	(0.0951)	(0.102)	(0.0525)
No excuse required	-0.0173***	0.0858**	-0.0665**	-0.0243	0.0220***	0.181***	-0.223***	0.0506**
	(0.00433)	(0.0261)	(0.0228)	(0.0147)	(0.00650)	(0.0182)	(0.0229)	(0.0166)
Universal VBM	0.00397	0.323***	-0.123***	-0.221***	0.0711***	0.687***	-0.382***	-0.266***
	(0.00703)	(0.0428)	(0.0367)	(0.0312)	(0.0135)	(0.0307)	(0.0281)	(0.0252)
Excuse required (ref. cat.)	0	0	0	0	0	0	0	0
	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)
Early voting	0.0163***	-0.0503	0.211***	-0.169***	-0.0419***	-0.0228	0.393***	-0.390***
	(0.00419)	(0.0370)	(0.0284)	(0.0186)	(0.0107)	(0.0137)	(0.0211)	(0.0160)
No early voting (ref. cat.)	0	0	0	0	0	0	0	0
	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)
Year = 2020	0.0699***	0.104***	0.0461**	-0.131***	0.0588***	0.0615***	0.0950***	-0.139***
	(0.00206)	(0.0185)	(0.0171)	(0.0106)	(0.00354)	(0.0144)	(0.0142)	(0.0115)
Dem. %t-1	—	—	—	—	0.0270	0.347***	-0.174**	-0.223***
					(0.0334)	(0.0436)	(0.0537)	(0.0527)
Density	—	—	—	—	-0.0633***	-0.251***	0.0711*	0.225***
					(0.0121)	(0.0328)	(0.0324)	(0.0355)
% black	—	—	—	—	0.0264	-0.444***	0.581***	-0.104
					(0.0204)	(0.0722)	(0.0654)	(0.0541)
% high school graduates	—	—	—	—	0.678***	0.203*	-0.283*	0.278*
					(0.0566)	(0.0939)	(0.127)	(0.117)
% married	—	—	—	—	0.187***	-0.213*	0.486***	-0.289***
					(0.0314)	(0.0954)	(0.0983)	(0.0745)
Mean age	—	—	—	—	0.264***	0.0759	-0.284***	0.274***
					(0.0225)	(0.0759)	(0.0777)	(0.0697)

	Fixed Effects				No Fixed Effects			
	Turnout	Mail	Early	Election Day	Turnout	Mail	Early	Election Day
Red state	—	—	—	—	-0.0231	-0.0610**	-0.0775***	0.153***
					(0.0127)	(0.0211)	(0.0216)	(0.0166)
Blue state	—	—	—	—	-0.0369*	-0.00679	-0.0939***	0.0937***
					(0.0163)	(0.0265)	(0.0233)	(0.0175)
Battleground state (ref. cat.)	—	—	—	—	0	0	0	0
					(.)	(.)	(.)	(.)
EPI score	—	—	—	—	0.0382	-0.176***	0.00473	0.215***
					(0.0383)	(0.0369)	(0.0391)	(0.0313)
Constant	0.548***	0.204***	0.0856***	0.699***	-0.244***	0.0108	0.225	0.550***
	(0.00221)	(0.0203)	(0.0166)	(0.0130)	(0.0348)	(0.109)	(0.116)	(0.109)
Observations	5382	5431	5431	5431	5382	5431	5431	5431
R^2	0.815	0.725	0.348	0.824	0.656	0.757	0.568	0.699

Appendix F

Results for Analysis of COVID Surges using the Week with Peak COVID Deaths

Table F-1. Fixed Effects Results, Adding Weeks from Peak

	Turnout	Mail	Early	Election Day
COVID deaths	-0.0759***	0.284	0.146	-0.437***
	(0.00841)	(0.178)	(0.107)	(0.0873)
Peak week	-0.000140	0.00361***	-0.00237***	-0.00155
	(0.000146)	(0.00108)	(0.000672)	(0.000908)
No excuse required	-0.0168***	0.0731**	-0.0582**	-0.0189
	(0.00443)	(0.0233)	(0.0207)	(0.0151)
Universal VBM	0.00408	0.320***	-0.122***	-0.220***
	(0.00702)	(0.0399)	(0.0354)	(0.0305)
Excuse required (ref. cat.)	0	0	0	0
	(.)	(.)	(.)	(.)
Early voting	0.0163***	-0.0496	0.211***	-0.169***
	(0.00422)	(0.0337)	(0.0263)	(0.0178)
No early voting (ref. cat.)	0	0	0	0
	(.)	(.)	(.)	(.)
Year = 2020	0.0716***	0.0590***	0.0752***	-0.111***
	(0.00263)	(0.0145)	(0.0183)	(0.0122)
Constant	0.548***	0.210***	0.0814***	0.697***
	(0.00224)	(0.0198)	(0.0159)	(0.0136)
Observations	5380	5429	5429	5429
R^2	0.815	0.735	0.358	0.825

Appendix G

Results for Analysis with the Timing a Voting Method was Introduced

Table G-1. Fixed Effects Results, Adding Information about Timing of Mail and Early Voting Reforms

	Mail	Early	Election Day
COVID deaths	0.174	-0.00228	-0.158**
	(0.116)	(0.135)	(0.0570)
Peak week	0.252***	-0.347***	0.0825
	(0.0701)	(0.0793)	(0.0716)
No excuse, old	0.213***	-0.266***	0.0868***
	(0.0228)	(0.0275)	(0.0161)
No excuse, new	0.0924***	-0.0620*	-0.0259
	(0.0213)	(0.0273)	(0.0203)
Universal VBM, old	0.812***	-0.407***	-0.376***
	(0.0216)	(0.0282)	(0.0199)
Universal VBM, new	0.564***	-0.456***	-0.0824***
	(0.0333)	(0.0387)	(0.0215)
Early voting, old	-0.0656***	0.481***	-0.450***
	(0.0180)	(0.0262)	(0.0161)
Early voting, new	-0.0101	0.205***	-0.207***
	(0.0290)	(0.0371)	(0.0222)
Year = 2020	0.0608***	0.135***	-0.181***
	(0.0118)	(0.0170)	(0.0109)
Democratic% $_{t-1}$	0.358***	-0.147**	-0.183***
	(0.0516)	(0.0530)	(0.0361)
Density	-0.286***	0.123***	0.156***
	(0.0372)	(0.0306)	(0.0254)
% black	-0.456***	0.560***	-0.137**
	(0.0811)	(0.0688)	(0.0443)
% high school graduates	0.0889	-0.173	0.0939
	(0.0984)	(0.126)	(0.0733)
% married	-0.264*	0.493***	-0.261***
	(0.104)	(0.102)	(0.0733)
Mean age	0.128	-0.244**	0.164**
	(0.0769)	(0.0758)	(0.0632)
Red state	-0.0706**	-0.130***	0.231***
	(0.0225)	(0.0248)	(0.0188)
Blue state	0.00307	-0.0963***	0.102***
	(0.0239)	(0.0238)	(0.0160)

	Mail	Early	Election Day
Battleground state (ref. cat.)	0	0	0
	(.)	(.)	(.)
EPI score	-0.266***	-0.0348	0.319***
	(0.0445)	(0.0483)	(0.0310)
Constant	0.160	0.0812	0.710***
	(0.116)	(0.114)	(0.0720)
Observations	4811	4811	4811
R^2	0.784	0.623	0.768

Appendix H

Results for Analysis that Includes Interactions Between Party and Surges in COVID Deaths and Party and the Timing of the Introduction of a Voting Method

Table H-1. Fixed Effects Analysis with Interactions for County Partisanship.

	Mail	Early	Election Day
COVID deaths	0.725*	-0.894***	-0.191
	(0.280)	(0.220)	(0.164)
COVID deaths × Dem. $\%_{t-1}$	-0.926*	1.31***	-0.392
	(0.397)	(0.352)	(0.239)
Peak week	-0.350*	-0.0265	0.422**
	(0.164)	(0.150)	(0.153)
Peak week × Dem. $\%_{t-1}$	1.09***	-0.501	-0.653*
	(0.363)	(0.301)	(0.316)
No excuse, old	0.0761*	-0.267***	0.230***
	(0.0386)	(0.0499)	(0.0338)
No excuse, old × Dem. $\%_{t-1}$	0.292***	-0.0104	-0.294***
	(0.0748)	(0.125)	(0.0709)
No excuse, new	-0.151***	0.142*	0.0173
	(0.0409)	(0.0597)	(0.0381)
No excuse, new × Dem. $\%_{t-1}$	0.461***	-0.376**	-0.0923
	(0.0948)	(0.126)	(0.0835)
Universal VBM, old	0.971***	-0.542***	-0.387***
	(0.0411)	(0.0531)	(0.0330)
Universal VBM, old × Dem. $\%_{t-1}$	-0.225**	0.212	-0.0120
	(0.0786)	(0.118)	(0.0612)
Universal VBM, new	0.499***	-0.407***	-0.0509
	(0.0663)	(0.0784)	(0.0591)
Universal VBM, new × Dem. $\%_{t-1}$	0.159	-0.0886	-0.0978
	(0.0913)	(0.131)	(0.0950)
Early voting, old	-0.0894	0.433***	-0.562***
	(0.0460)	(0.0555)	(0.0371)
Early voting, old × Dem. $\%_{t-1}$	-0.319**	0.0819	0.250**
	(0.106)	(0.140)	(0.0826)
Early voting, new	0.286***	-0.0790	-0.229***
	(0.0593)	(0.0790)	(0.0486)
Early voting, new × Dem. $\%_{t-1}$	-0.531***	0.481**	0.0687
	(0.124)	(0.167)	(0.0899)
Year = 2020	0.0596***	0.147***	-0.193***
	(0.0120)	(0.0168)	(0.0109)

	Mail	Early	Election Day
Dem. $\%_{t-1}$	0.465***	-0.238**	-0.191**
	(0.102)	(0.0936)	(0.0716)
Density	-0.279***	0.123***	0.192***
	(0.0547)	(0.0467)	(0.0390)
% black	-0.495***	0.569	-0.107*
	(0.0807)	(0.0692)	(0.0462)
% high school graduates	0.0376	-0.157	0.132
	(0.0906)	(0.122)	(0.0698)
% married	-0.236*	0.468***	-0.263***
	(0.100)	(0.0988)	(0.0701)
Mean age	0.116	-0.225**	0.155*
	(0.0791)	(0.0751)	(0.0646)
Red state	-0.0619**	-0.140***	0.232***
	(0.0225)	(0.0246)	(0.0189)
Blue state	0.00830	-0.0895***	0.106***
	(0.0238)	(0.0231)	(0.0151)
Battleground state (ref. cat.)	0	0	0
	(.)	(.)	(.)
EPI score	-0.273***	-0.0317	0.322***
	(0.0443)	(0.0477)	(0.0288)
Constant	0.146	0.127	0.670***
	(0.106)	(0.114)	(0.0723)
Observations	4811	4811	4811
R^2	0.791	0.632	0.776