Vote Mirages in the 2020 Election: How Vote-By-Mail Policies Impact the Reporting of Election Results

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Abstract

As Americans went to bed on November 3rd, 2020, it appeared our country was heading towards a second term for President Donald Trump. He was leading in many of the important swing states that Joe Biden would eventually win. Trump's disproportionate lead in these states early in the vote count, also called a red mirage, became the subject of scrutiny in the weeks and months following the election. In this thesis, I aim to understand how vote-by-mail (VBM) policies impacted the reporting of election results and caused vote mirages. To evaluate whether VBM policies had an impact, I analyzed timestamped vote reports in the week following the election as well as states' policies regarding access to and counting of mail ballots. I show that states that began pre-processing ballots on Election Day were likely to have red mirages while states with universal access to mail voting were likely to have blue mirages. These results suggest that the misinformation and claims of fraud that were fueled by the mirages could be addressed by reevaluating the policies governing VBM – especially in swing states – or by better preparing the public for the potential for vote mirages in the future.

Introduction

Most major news networks projected the 2020 presidential election around noon on Saturday, November 7th, four days after Election Day (POLITICO, 2021). In a country accustomed to knowing their next president the night of the election, those four days fueled uncertainty and speculation surrounding the electoral process. While it was clear by Saturday, November 7th that Biden would win enough Electoral College votes to become President of the United States, Americans who were watching vote returns on Election Night may have expected a different outcome. At the time, Trump was leading in most key swing states. In a speech early in the morning on Wednesday, November 4th, Trump even claimed that he had "already" won the election (Rev, 2020). However, in the hours and days following this speech, votes continued to be counted, and Biden overtook Trump in several key swing states. Eventually, Biden prevailed in Pennsylvania, Wisconsin, Georgia, and Michigan; in each of these states, Trump was leading the vote count when he gave his Wednesday speech.

Trump and many other Americans were fooled by the red mirages that occurred in these swing states. A red mirage refers to a time when the current, partial vote count disproportionately favored Trump in a way that the completed vote count did not. The vote mirages and unprecedented time in which it took for the election to be projected were caused by two key vote-by-mail trends in the 2020 election: increased access to VBM and the tendency for Democrats to vote by mail and for Republicans to vote in-person on Election Day. The increased access to VBM occurred largely because state governments and voters considered mail voting to be a safer voting option during the COVID-19 pandemic. The partisan trends in VBM occurred because Trump had attacked voting by mail for months leading up to the election, while

Democrats utilized VBM as a way to get their voters to commit to voting as early as possible (Clinton, Lapinski, Lentz, & Pettigrew, 2020).

That being said, these changes did not result in mirages in all states. The policies governing the counting of mail ballots impacted the presence and partisanship of mirages. Because vote-by-mail ballots involve pre-processing (the slow process of checking signatures, opening envelopes, flattening ballots, etc.), mail ballots take longer to count than in-person Election Day ballots which are automatically tabulated by the machines. States choose when this pre-processing step can occur. While some states pre-process ballots for weeks in advance of the election, minimizing how much work has to be done on Election Day, others wait until Election Day to begin this step. This causes some states to report most mail ballot results immediately when polls close while others slowly release these results for hours or days after Election Day.

In this analysis, I use timestamped election returns from every county in the U.S. as well as state VBM policies to explore a relationship between these policies and vote mirages. I find that states that waited until Election Day to pre-process ballots were the most likely to have red mirages. States that conducted their election entirely by mail were most likely to have blue mirages. I also discuss the different types of mirages in the 2020 election; mirages can be differentiated by their partisanship (Democrat or Republican) and how they influenced the vote margin (tightening the margin, widening the margin, or switching which candidate is leading).

These mirages not only fooled some Americans, especially those who might not have paid close attention to the pre-election coverage of these mirages, they also may have contributed to the widespread distrust in the 2020 election results. Trump and others referred to the results from mail votes that ended the mirage as “cast after polls closed” and “fraudulent.” Neither, of course, are true. Yet, framing these votes and what looked like a Biden “come back” in this way

fueled a distrust in mail votes and 2020 election administration. This distrust in the democratic process is problematic. Therefore, the policies that contributed to vote mirages should be reexamined and potentially changed in order to lessen the impact of vote mirages in future elections.

In this paper, I first explain the policies that govern access to mail-in ballots and contributed to increased adoption of mail voting in the 2020 election within the context of the COVID-19 pandemic. In the following section, I focus on policies surrounding the counting of mail ballots and previous research about how this impacts the reporting of election results. These sections provide context for the section on voters' perception of election results and an explanation of vote mirages. Next, I describe my analysis and key findings related to vote mirages in the 2020 election. I follow with a discussion on how people perceived the mirages, how mirages fueled distrust in the election results, and the problems associated with this trend. I end with a conclusion that includes potential areas of further research on this topic.

Mail Voting in the COVID-19 Pandemic

The 2020 election was an especially important cycle to evaluate the impact of vote-by-mail policies. Due to the COVID-19 pandemic, various states adopted new voting policies pertaining to access to vote-by-mail. These policies resulted in VBM playing a different role in this election than in past elections. In this section, I first share how the COVID-19 pandemic increased access to vote-by-mail in the 2020 election. I then explain past research on partisan splits in mail voting. This is followed by a discussion on how the relationship between partisanship and mail voting in 2020 could deviate from historical trends. Finally, I outline the policies each state had in the 2020 election related to mail voting.

The Impact of the COVID-19 Pandemic

When pandemic lockdowns began in the United States in early March 2020, the Presidential Primaries were ongoing, and the country was beginning to plan for the 2020 general election. Widespread fear of coronavirus and nation-wide lockdown policies led voters and state governments to re-evaluate what voting would look like in a pandemic.

Due to the pandemic, public support for vote-by-mail increased significantly. In April – one of the early months of pandemic lockdown – 65 percent of registered voters said they support vote-by-mail (USA Today, 2020). This same month, a CNN poll found that 41 percent of Americans thought that states should conduct their general election entirely by mail (CNN, 2020). Another study around this time found that 38 percent of registered voters said that the ability to vote by mail would increase their likelihood of voting in the general election (Monmouth University Polling Institute, 2020). These trends continued past the early months of the pandemic. In August 2020, Ipos found that 73 percent of American adults strongly supported

or somewhat supported their state allowing people to vote by mail-in the election (Program for Public Consultation, University of Maryland/Washington Post, 2020).

While support for mail voting increased, it was not consistent across demographic groups. In a recent study looking at the role of gender in support for universal mail voting, Dominguez et. al. found that women were more likely to support these policies than men (Dominguez, Vargas, & Sanchez, 2020). The gap between genders grew when women personally knew someone who had experienced COVID-19 (Dominguez, Vargas, & Sanchez, 2020). This study was based on surveys that were released between March and June 2020, a critical time period for states to determine their primary and general election voting policies. Republicans were also less supportive of VBM than Democrats, as will be further explored in the next section.

Expanding vote-by-mail for the 2020 election did not merely have public support; it was also enacted via legislation. These changes are notable because under normal circumstances election officials tend to be resistant to changing voting policies (Burden, Canon, Mayer, & Moynihan, 2011). This speaks to the severity of the pandemic and people's fear of everyday interactions, including voting, during this period. For some states, these changes in legislation began during the spring 2020 primaries.

The earliest change to voting due to COVID-19 took place on March 12, 2020 when the Democratic Party of Wyoming canceled their presidential caucuses which were meant to take place on April 4, 2020. They replaced this process with an all-mail election (Ballotpedia, 2020). Since the policies governing presidential caucuses are determined by political parties, changes like this took place quickly without the input of state legislatures. In states that hold primaries, state legislatures had more say in expanding vote-by-mail.

A recent study looked at the impact of these policies on how many people voted by mail in the 2020 presidential primaries. This study compared three states that held their primaries before COVID-19 lockdowns began (New Hampshire, South Carolina, and North Carolina) to three states that postponed their primaries due to the pandemic (Maryland, Rhode Island, and Delaware) (Niebler, 2020). The states that held their primaries before lockdowns had similar VBM rates in 2020 as they did in 2016. Meanwhile, the states that had their primaries after lockdowns began had VBM rates in 2020 that were 15 to 20 times higher than in the 2016 primaries (Niebler, 2020). These numbers indicate that the 2020 general election would likely have vastly higher VBM numbers than was present in past elections. This did end up occurring.

Notably, enacting sudden changes to voting in the early weeks of the pandemic was not possible in every state. In response to the pandemic, Wisconsin's Democratic governor Tony Evers issued an executive order pushing back the election (Herndon & Rutenberg, 2020). A few days later, the Supreme Court ruled that Evers could not issue this executive order. This partisan controversy drew attention to the importance of legislation, rather than executive orders, in response to the pandemic.

In many ways, the primaries were an experiment regarding how to vote in a pandemic. These decisions informed many of the additional changes that occurred leading up to the general election. Throughout the spring, summer, and fall, many states enacted laws that permanently or temporarily (only for 2020) changed their policies governing VBM. Leading up to the general election, Delaware and Massachusetts changed their policies so that anyone could vote-by-mail without an excuse (National Conference of State Legislatures, 2020). Additionally, Connecticut, Kentucky, New Hampshire, and New York decided that COVID-19 was an appropriate excuse to

vote-by-mail and Alabama, Arkansas, Mississippi, and Missouri determined that those infected with COVID-19 or who were otherwise ill could vote-by-mail.

States also made the vote-by-mail process easier. Fourteen states[1] plus the District of Columbia automatically sent mail-in ballots to all eligible voters (Ballotpedia, 2020). Illinois implemented a similar policy and sent ballots to eligible voters who had voted in the past two years (Ballotpedia, 2020). For four of these states, these policies only applied for the November 2020 election, highlighting the pandemic's influenced on VBM policies during this specific election (National Conference of State Legislatures, 2020). Additionally, five states eased or suspended the requirement to have a witness when casting a mail-in ballot.[2] The relevant vote-by-mail policies in each state are discussed in detail in the section State-by-State Policies in the 2020 General Election.

Some states made these changes directly through legislation while others were pressured to do so by COVID-related voting rights court cases (Weiser, Sweren-Becker, Erney, & Glatz, 2020). According to a report by the Healthy Elections Project, in the 2020 election cycle over 200 election-related cases were brought to federal and state courts around the country, most of which were focused on mail voting (Clerkin, et al., 2020). This report summarizes various lawsuits focused on eligibility to vote by mail, absentee voting without an excuse, fear of COVID as an excuse, and other VBM-related policies. They found that lawsuits focused on expanding access to absentee voting were "almost universally successful."

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[1] California, Connecticut, Delaware, Iowa, Maryland, Michigan, Montana, Nebraska, Nevada, New Jersey, New Mexico, Rhode Island, Vermont, and Wisconsin
[2] Alaska, Minnesota, North Carolina, Rhode Island, and Virginia

The COVID-19 pandemic has disrupted everyday life in the United States, including elections. Starting in March of 2020, states adjusted how they would conduct elections in the face of the pandemic. This included implementing new vote-by-mail policies, the impact of which needs to be studied.

Partisanship and Mail Voting Historically

The increased access to mail voting in the 2020 election led to increased attention on whether Democrats or Republicans benefit from and/or utilize VBM at different rates. While elections prior to 2020 did not display a partisan skew in VBM, trends in the months leading up to the 2020 election indicated that such partisan splits were likely to occur. One party utilizing mail voting more than another can be a major contributor to vote mirages, as will be further discussed in Vote Mirages and Vote Shifts.

Historically, mail voting has not benefited either party. The first time a state utilized all-mail voting for a federal election was for a senate special election in Oregon in 1996. Oregon has since become the focus of many vote-by-mail studies. A study looking at this first all-mail election found that the electorate is different in all-mail elections than in-person elections (Southwell & Burchett, 2000). However, they found that the partisanship of the electorate was not changed with all-mail voting; neither was the average level of education, political awareness, or political involvement of the individuals voting. Instead, this all-mail election did result in more participation from people do not show up to vote in in-person elections due to family responsibilities, illness, and other emergencies (Southwell & Burchett, 2000). This finding may be relevant when thinking about the 2020 election because COVID-related emergencies may result in some people not wanting to vote in-person on Election Day. People who are ill or are too afraid of COVID to vote in-person might only vote if VBM is an option.

Another study found similar results regarding the lack of impact of VBM on partisan turnout (Berinsky, Burns, & Traugott, 2001). These researchers concur with Southwell and Burchett's finding that VBM in Oregon did not have different impacts on Democrat turnout and Republican turnout. Beyond studying partisanship, they found that non-voters are unlikely to start voting under VBM; however, VBM does help voters develop a habit of voting. This creates a more stable electorate. While these two Oregon studies focus on elections entirely by mail, which was present in some but not all states in the 2020 election, these findings are useful because they display that increasing the percentage of the electorate that votes by mail has not benefited one party electorally.

To further this point, we can look at California, a state that has had a combination of extensive VBM and extensive Election Day voting. In a study focused on which types of absentee ballots do and do not get counted, Alvarez, Hall, and Sinclair (2008) found that there were no partisan effects of who returned their mail-in ballot after receiving a ballot. This is important because mail voting in many states involves voters taking initiative in two ways: requesting their mail-in ballot and returning their completed ballot. Alvarez, Hall, and Sinclair found that this second step is not influenced by partisanship.

A more recent study looked at data from 1996 to 2018 to understand partisan impacts of VBM policies. This study also concluded that Republicans and Democrats voted by mail at equal rates (Thompson, Wu, Yoder, & Hall, 2020). More specifically, VBM does not increase either party's turnout or vote share. This study was even more extensive than the other studies mentioned because it encompassed multiple elections and multiple states. This included analyzing differences within states for states that rolled out VBM on a county-by-county basis.

Partisanship and Mail Voting in 2020

While past studies indicate that there is no relationship between partisanship and vote-by-mail, other evidence published before the 2020 election pointed to a potential partisan divide over mail-in voting in this election cycle. This was first evident when states initally began to adapt to voting during a pandemic. Niebler (2020) found partisan differences in who voted by mail during the 2020 presidential primaries. While there was a small difference in Maryland (97.3 percent of Democrats and 96.3 percent of Republicans voted by mail), there were significant differences in partisan adoption of mail voting in Rhode Island and Delaware. Out of all Rhode Island Democrats who voted, 85.9 percent voted by mail while 69.3 percent of Rhode Island Republicans voted by mail. In Delaware, Democrats voted 50.5 percent by mail and Republicans voted 29.7 percent by mail. Niebler predicted that these trends would hold or would be intensified during the general election. Interestingly, Dominguez, Vargas, and Sanchez (2020) claim that the partisan divide is driven largely by Democratic women, rather than Democratic men. They also found that Democratic women are twice as likely as non-Democratic women to support absentee ballot voting for the 2020 election.

Data from the U.S. Elections Project (2020) also supports the idea that Democrats and Republicans voted by mail at different rates in the 2020 election. Of the approximately 57 million mail-in ballots requested in states that report party registration, 44.1 percent were requested by registered Democrats compare to the 26.2 percent that were requested by registered Republicans (McDonald, 2020). While these numbers are potentially skewed by California, a large Democratic-leaning state with high VBM numbers, the trend remains when we look at states that had a close vote margin. For example, in Pennsylvania and North Carolina, Democrats made up 62.9 percent and 46.0 percent, respectively, of mail-in ballots requested compared to

Republicans who made up 25.4 percent and 19.8 percent, respectively (McDonald, 2020). Not only were Democrats more likely to request mail-in ballots, they were also more likely to return them in the 2020 election. In states across the country that report partisanship, Democrats had a slightly higher mail-in ballot return rate of 71.8 percent compared to 68.2 percent among Republicans (McDonald, 2020). While this difference is only a few percentage points, it represents a large number of ballots given how many people vote. Based on these statistics, Democrats were more willing to vote by mail than Republicans in the 2020 election, breaking with past understanding about partisanship and vote choice.

The partisan differences in views of COVID and different messaging from party leaders likely explain why Democrats were more likely than Republicans to vote by mail in 2020. Public support for VBM fell between April and May 2020, a change that was largely driven by Republicans (Clinton, Lapinski, Lentz, & Pettigrew, 2020). Notably, not all Republicans became less supportive of VBM at this time; this change in public opinion was driven by an increased number of Republicans reporting that they weren't concerned about contracting COVID-19. Republicans who were still worried about COVID-19 remained supportive of VBM. This shift among Republicans is one reason Republicans might be less inclined to vote by mail in the 2020 election. They are less worried about the pandemic, the driving force behind why people want to vote by mail.

Another key reason for the partisan divide in opinion of VBM is the messaging from partisan leaders. Clinton, Lapinski, Lentz, and Pettigrew find evidence of the impact of Trump's rhetoric on Republicans' views of COVID and vote-by-mail. This supports Zaller's research about how political elites can influence partisans' opinions (Zaller, 1992). Trump's discrediting

of vote-by-mail had the potential to result in fewer Republicans supporting (and potentially using) this voting method.

While prior research doesn't show evidence of a partisan difference in mail voting, the circumstances around the 2020 election seemed to change this trend. While we do not know if this trend will continue in future elections, many Republican-majority state legislatures around the country are pushing legislation to limit mail voting while Democrats are pushing for increased access to VBM (Wines, 2020). This indicates that politicans believe these trends will continue past 2020.

State-by-State Policies in the 2020 General Election

Given the context of changes to vote-by-mail policies in the 2020 election and the new focus on partisan usage of mail voting, this section explains the different policies in each state regarding access to mail voting. Each election, while millions of Americans vote at their assigned polling place on Election Day, many opt for alternative forms of voting including vote-by-mail and early in-person voting. Since states have the power to run elections, the policies that govern an individual's access to these different voting options vary from state to state. This is especially true for the policies surrounding mail voting.

States' mail voting policies fall within four categories: absentee voting, election-specific-vote-by-mail, permanent vote-by-mail, and postal voting (also called universal mail voting). The definitions of these options come from Christopher Mann's (2014) categories of mail voting systems and are documented in Table 1. This is an excerpt of Table 5-1 in The Measure of American Elections.

Table 1: Mail Ballot Systems

Term	Definition
Absentee Voting	Mail ballots are only available to voters who meet statutorily defined reasons for being unable to appear at their assigned polling places on Election Day.
Vote-by-Mail (Election-Specific-Vote-by-Mail)	Any registered voter can request a mail ballot without providing a reason or excuse. Requests for ballots can be valid for an election cycle, an election year, or a specific election, depending on state law.
Permanent Vote-by-Mail	Any registered voter may request a mail ballot for all future elections, without providing a reason or excuse. Permanent mail voter status is a voluntary choice, and layered on top of the election-specific-vote-by-mail system.
Postal Voting	All registered voters are sent a ballot by mail. In-person voting with voting machines/polling booths is not available to the general public.

Source: Table 5-1. Definitions of Systems for Administering Mail Ballots from Mail Ballots in the United States: Policy Choice and Administrative Challenges by Christopher Mann in The Measure of American Elections by Barry C. Burden and Charles Stewart, III

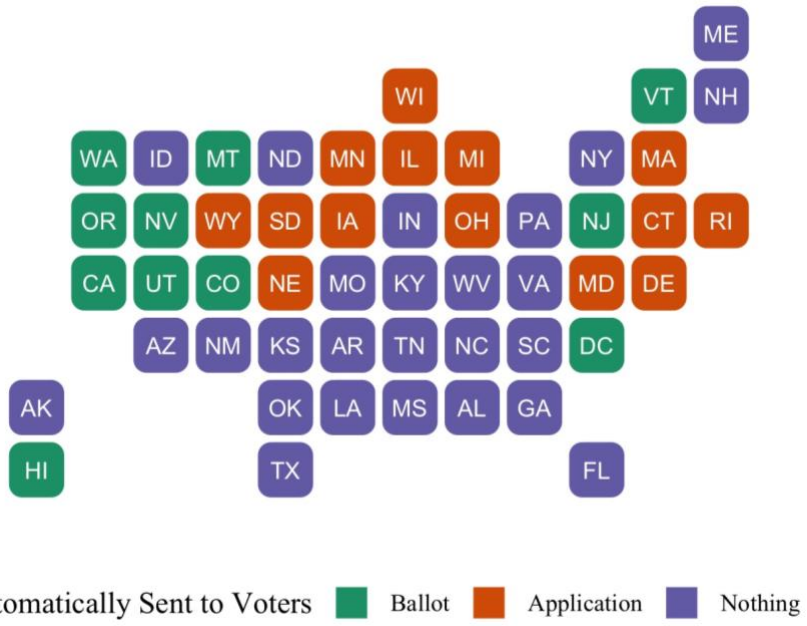
The first of these policies, absentee voting, typically requires that an individual physically cannot go to their polling place on Election Day. For example, a college student who goes to school out of state may vote in their home state using an absentee ballot. Under the Uniformed and Overseas Citizens Absentee Voting Act, all states are required to send absentee ballots to voters who are members of the Uniformed Services or otherwise residing outside of the United States (The United States Department of Justice). While this policy stemmed from a push to allow Union soldiers to vote during the Civil War, it has now expanded beyond just members of the military to include people who are working the polls, pursing education elsewhere, or have limited mobility due to health or disability (Mann, 2014).

The second category outlined by Mann is election-specific-vote-by-mail. Under this system, voters do not need a reason to want to vote by mail. Typically, under this system voters request a mail-in ballot either through a paper application or online. This system results in more

extensive mail voting than does the absentee voting system. Pennsylvania was one state that moved from absentee voting to election-specific-vote-by-mail in 2019 when the state legislature enacted a law allowing anyone to vote without an excuse within 50 days of an election (Governor Tom Wolf, 2019). During the COVID-19 pandemic, some states determined voters could use fear of COVID as excuse when applying for a mail-in ballot, essentially creating an election-specific-vote-by-mail system in states that would otherwise be absentee voting systems.

Permanent vote-by-mail is increasingly common, as well. This system is similar to election-specific-vote-by-mail except that voters apply once and are sent a mail-in ballot every election cycle. This system tends to increase participation in smaller elections and – like election-specific-vote-by-mail – diversifies and expands the voting population (Mann, 2014). Arizona's use of permanent vote-by-mail is important to highlight for this analysis.

Figure 1: Automatic Application and Ballot Policies

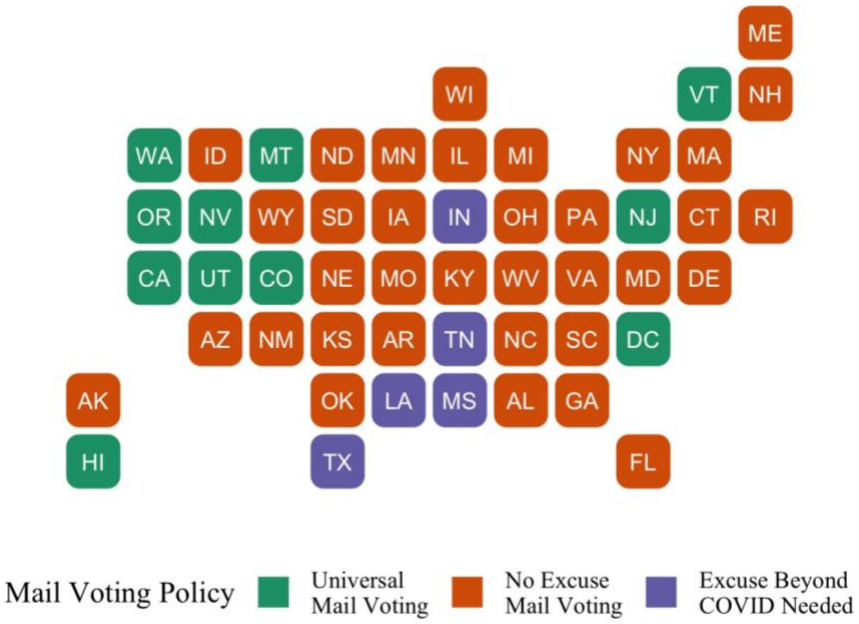


Finally, prior to the pandemic, five states – Colorado, Hawaii, Oregon, Utah, and Washington – planned to conduct their 2020 election entirely by mail (Ballotpedia). These states

automatically mail out ballots to all voters and have very limited in-person voting options. A few other states adopted a policy of automatically mailing out ballots to all voters in response to the pandemic. Others decided to mail ballot applications to all voters instead. Figure 1 above summarizes these policies in the 2020 election. This information is also available in the form of a table in Appendix 1. Notably, contrary to Mann's definition of postal voting, many of the states that adopted automatic ballot mailing in this election due to COVID *did* have polling places open on Election Day.

This policy information came primarily from the National Conference of State Legislatures (NCSL), a bipartisan organization focused on representing and supporting state legislatures around the country (National Conference of State Legislatures). They provide information on how states conduct their election, as well as how these policies changed in response to the 2020 election.

Figure 2: Mail Voting Policy Groups



Since my hypothesis is based on the impact of vote-by-mail policies, I divided states based on the policies that govern access to mail ballots. The first category – states that sent mail-in ballots to all eligible voters – has the most widespread access to mail ballots. Other states that either allowed for no excuse VBM or allowed COVID to be anyone's excuse to VBM are the second category. These policies are grouped together because both allow for all voters to vote by mail while requiring voters to take initiative in seeking out mail voting. Finally, the remaining states had relatively slim access to mail ballots since a voter needed an excuse beyond fear of COVID to vote by mail. These categories are displayed in Figure 2.

On a separate but related note, in many states, early-in-person voting is counted as vote-by-mail. In these states, individuals can go in-person to their county Board of Elections or other satellite locations to request and submit their mail-in ballot. For example, in Pennsylvania, for weeks leading up to the election, voters could visit various locations in their county to request a mail-in ballot, vote, and submit their ballot in one visit. These ballots were then treated by election officials like other mail-in ballots that arrived through the mail or through ballot drop boxes. Other types of early in-person voting are distinct from vote-by-mail and are therefore not relevant to this analysis.

These different categories of vote-by-mail policies determined how accessible mail voting was in each state. The accessibility of VBM also impacted how prevalent mail voting was within each state. The three categories I defined above – absentee voting where an excuse is required beyond COVID, no-excuse or COVID as an excuse mail voting (both election specific or permanent), and universal mail voting where ballots were sent to all votes – are central to my analysis of vote mirages.

Ballot Counting and Voting Method

Widespread mail voting and partisan divides over voting method alone do not create mirages. In order for a mirage to occur, Democratic-leaning mail ballots must be counted at a different pace than Republican-leaning Election Day ballots. Just as the availability of mail voting differs state-to-state, states have different policies that impact the speed at which ballots are counted. Extensive mail voting and partisan divides in vote method would not impact the reporting of election results if mail ballots were counted at the same pace as in-person Election Day ballots. However, state policies and research display that this is not the case. In some places, mail-in ballots are counted first; in others Election Day ballots are counted first. This depends on the mail voting policies.

I focus on vote-by-mail policies because in-person Election Day votes are counted similarly in all states. Since these votes are cast on Election Day, they cannot be counted earlier than Election Day. Absentee, mail-in, and early ballots are different. The counting of these ballots is governed by varying policies in each state. While, like Election Day ballots, the results of these votes are not released until polls are closed, some states allow the pre-processing and tabulation of mail ballots to start before Election Day. Additionally, some states accept mail-in ballots for days or weeks following Election Day, which also extends the timeline for counting these ballots. The timeline for these processes is different in different states throughout the country. These dates and deadlines impact which votes are counted first – Election Day or mail-in – and are especially important in determined the presence and partisanship of a vote mirage in a state.

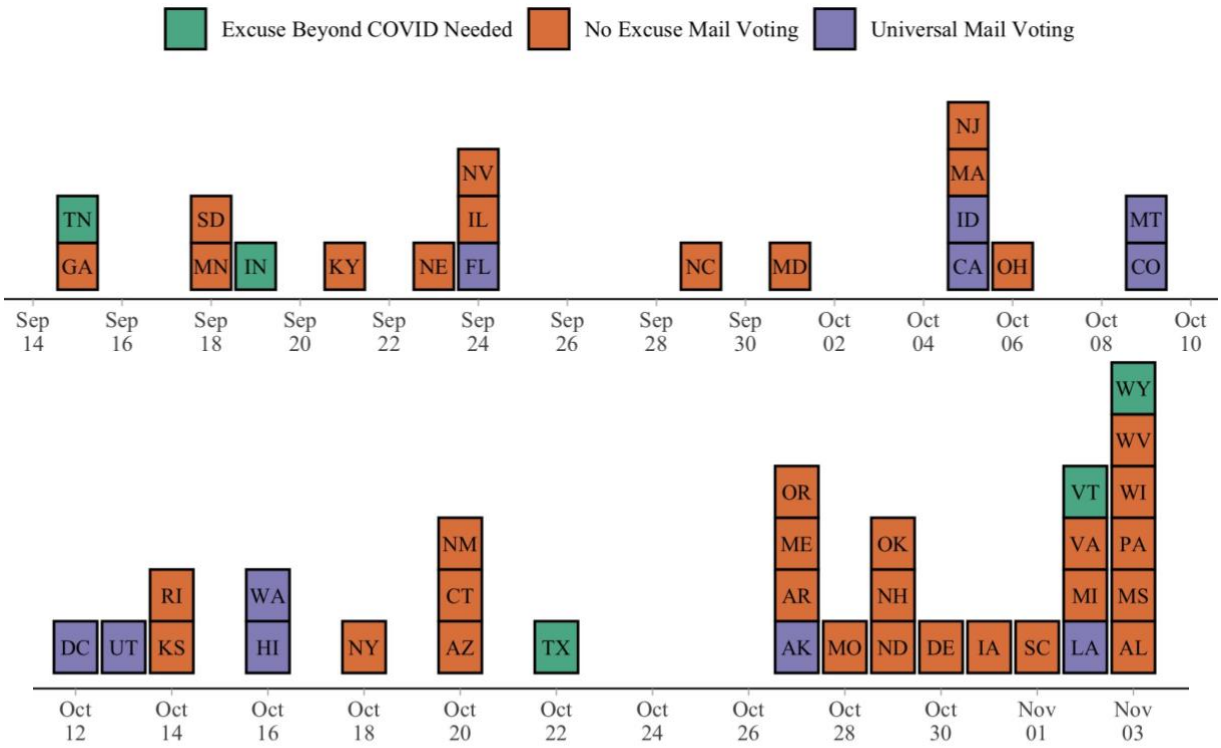
Like the policy information in the previous section, most of the policy information in this section comes from the National Conference of State Legislatures. The NCSL indicates that some states begin pre-processing upon a ballot's receipt rather than a specific day. For these states, the New York Times provides estimates of when pre-processing begins based on when each state began mailing out absentee ballots (Corasaniti & Lu, 2020). These two sources contribute to the dates in the three figures in this section – Figure 3, Figure 4, and Figure 5. The dates in this section are also available as a table in Appendix 1.

Processing Ballots

Mail ballots must be pre-processed in advance of being counted. Pre-processing a mail-in ballot involves different steps in each state. For the many states that require a signature on a mail-in ballot, this step involves comparing the signature on the ballot to the voter's signature on file. Some states require a witness signature or an affidavit; checking these are a part of the pre-processing process in those states (Scanlan, 2020). Additionally, pre-processing tends to involve opening the ballot's envelope(s) and unfolding the ballot in preparation for it to be run through a high-speed counting machine. This process can be time-consuming since each ballot must be inspected individually.

While a small number of states wait until Election Day to pre-process ballots, most states begin pre-processing a set number of hours, days, or weeks before Election Day. Some even start pre-processing ballots as soon as the ballot is received by the county Board of Elections. Figure 3 below indicates when each state begins pre-processing. The states that begin pre-processing upon receipt are placed on the date they began to give out or send out mail-in ballots. The different colors in Figure 3 display the states' rules about access to mail ballots.

Figure 3: When Ballot Pre-Processing Begins



My analysis focuses most on the pre-processing deadline. This is because processing mail-in ballots is more time consuming than counting them, so leaving pre-processing until Election Day has the potential to slow down the reporting of mail ballot results relative to the reporting Election Day results. Plus, there is more variety among states' pre-processing dates; the majority of states begin counting mail-in ballots on Election Day, as I detail in the next section.

To analyze the impact of when states begin pre-processing, I separate states into three groups based on when they begin this process: on Election Day, within one week prior to Election Day, and over one week before Election Day. The first and smallest category for this metric includes the set of states that begin processing mail-in ballots on Election Day. These states only have a few hours to process as many votes as possible before results can begin to be

published. States in this category are meaningfully different than states that allow pre-processing on the day before the election because pre-processing and other Election Day election administration task need to happen simultaneously. This can put a strain on resources being allocated to mail ballot processing, slowing down the process.

The next category of states is defined as those that begin pre-processing within a week of Election Day. These states have days to process ballots ahead of when results were published. No states began pre-processing between October 22nd and October 27th (one week before the election), as you can see in Figure 3. The final group of states are the ones that began preprocessing on or before October 22nd. These states had ample time to pre-process ballots. Changing the cutoffs between these groups would not have changed my analysis since only pre-processing dates on or very close to Election Day appeared to have a significant impact on my analysis.

Tabulating Ballots

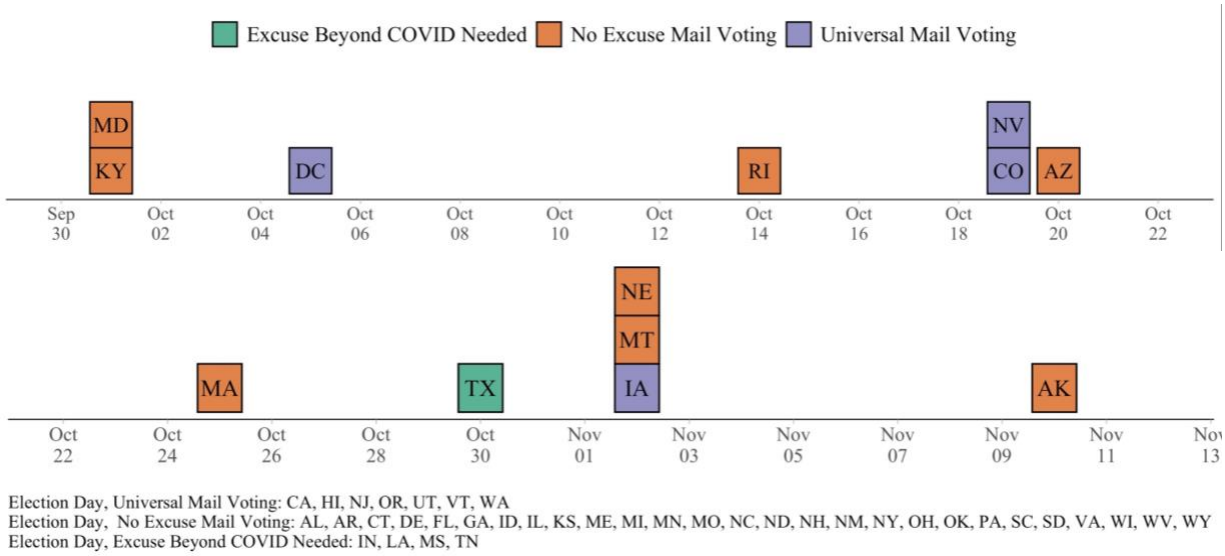
States also determine which day they start counting the pre-processed mail ballots. In some states, this occurs when pre-processing beings; in others, it occurs days or weeks later. Even if this process begins weeks before Election Day, states and counties do not release any results until polls close on Election Day.

There is very little academic research about the speed at which votes are counted or the policies governing vote counting. However, it has been established that while the counting process is not instantaneous, it is faster than pre-processing. Votes are generally counted using a high-speed ballot scanner that tabulates the votes for each candidate (Turner, 2020).

Some mathematical models of the vote counting process assume a random distribution of votes during the counting process. One study found that counting a small fraction of the total

votes cast can be used to predict the winner if the votes being counted are randomly distributed (Stępniak, 2015). However, this model is not relevant to this analysis which relies on real-world trends. The 2020 vote counting process was not random because of partisan differences by vote method and different counting speeds by vote method. Perhaps, individuals assume a random distribution like in the academic literature on this topic, explaining why many were not prepared for the vote mirages in 2020. The lack of research on vote counting in a non-random setting is one reason that it is important to study how vote counting policies influenced the 2020 election.

Figure 4: When Ballot Tabulation Begins (In States That Begin Before Election Day)



The majority of states begin tabulating mail-in ballots on Election Day. Figure 4 displays the exact date the remaining twelve states and the District of Columbia begin tabulating ballots. Eleven of these states begin counting before Election Day. Only Alaska begins counting after Election Day. In this state, election officials wait a full week after Election Day to begin tabulating mail and absentee ballots (Alaska Division of Elections).

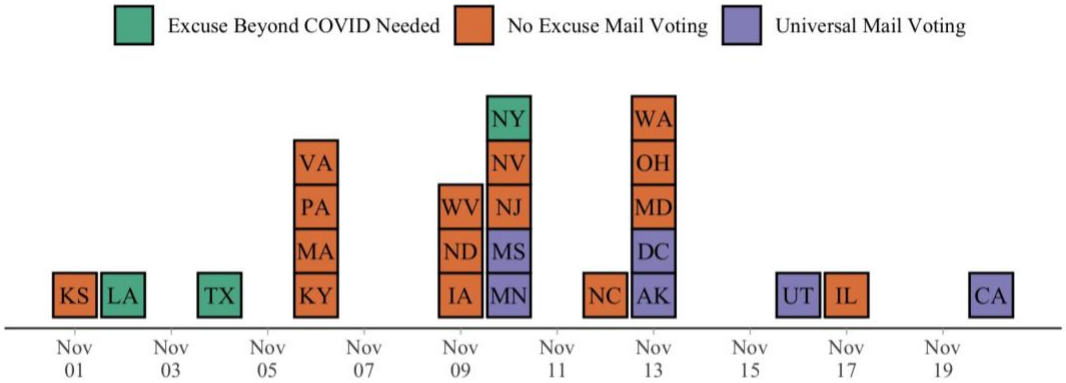
While the date that a state begins tabulating mail-in ballots can impact when results are available, this was not an important metric in my analysis. Since most states begin counting on

Election Day, there was not enough variation to understand the impacts of these policies. Plus, as was previously, mentioned tabulating mail ballots is less time consuming than pre-processing and is therefore less consequential in the overall speed of reporting VBM results.

Ballot Arrival

The final policy governing the counting of mail ballots is the deadline by which these ballots must be received by the county Board of Elections. An article in September 2020 by FiveThirtyEight predicted that the election would not be called on Election Night due to late ballot deadlines in key states. This article focuses on the fact that Pennsylvania, Michigan, and North Carolina, all of which were important in deciding the 2020 election, allow for mail-in ballots to arrive after Election Day (Rakich, 2020). The article explains that the deadlines for these states to receive mail ballots in the 2020 election were November 6, November 17, and November 12, respectively (Rakich, 2020).[3]

Figure 5: Ballot Receipt Deadlines (Other Than Election Day)



[3] When this article was published Wisconsin's deadline to receive ballots was November 9th. The Supreme Court moved this deadline to November 3rd, Election Day (Liptak, 2020).

The states with a ballot deadline other than Election Day are displayed in Figure 5. Twenty-seven states require that mail ballots are received by or on Election Day (National Conference of State Legislatures, 2020). Of the remaining states, Kansas and Louisiana require ballots to arrive before Election Day. The rest require that all mail ballots are postmarked by Election Day but allow for these ballots to arrive to the county Board of Elections after Election Day. These states allow for anywhere from one to seventeen extra days. The exact days are in Figure 5. Throughout the country there are dozens of variations in how states delineate the three deadlines for mail voting that have been discussed in this section.

While one might expect the date ballots must be received by to impact the reporting of election results, I found that this is not the case. The vast majority of ballots seem to arrive on or before Election Day, regardless of deadline (Lai, 2020). This might be in part because of the ongoing litigation about the validity of ballots arriving past Election Day. Regardless of the reason, because these policies did not have a major impact on how long it took for votes to be counted or the presence of mirages, they are not central to this analysis.

The combination of these policies – preprocessing dates, tabulation dates, and receipt deadlines – result in a system where vote-by-mail ballots are not counted at the same rate as Election Day ballots. In some states, mail ballots will be tabulated first. In others, they will be tabulated last.

Vote Mirages and Vote Shifts

Heading into the 2020, there was increased access to mail voting, evidence of a potential partisan divide over vote method, and varying policies governing how mail ballots would be counted around the country. These trends created an environment where vote mirages were likely to occur. In this section I define vote mirages and vote shifts, discuss historical mirages, and explain how mirages can influence how people perceive election results.

Terminology

The winner of an election is the candidate who receives the most votes after all votes are counted. However, as those who have followed election returns during a close election know, the candidate who wins the election does not always appear to be ahead during the entire process of votes being reported. Rather, as votes are counted in a county, state, or country, the candidate with the most votes at any given time may fluctuate, eventually settling on the side of the candidate who got the most total votes in the election.

This occurs because ballots are not counted in a random order. While academic studies and public opinion surveys are able to make conclusions about universal findings by studying a small *random* sample of the population, this is not possible when counting election results. The first ballots counted can be unrepresentative of the final results; the first batch of ballots may lean disproportionately towards one candidate due to geography, voting method, or another factor that correlates with partisanship. For example, if all Democratic leaning cities in a state count and reported their votes more slowly than the state's Republican-leaning rural areas, then early results are likely to look more favorable towards Republicans than the final result. In the case of the 2020 election, the Democratic-leaning mail ballots were counted at a different pace –

either slower or faster depending on state policies – than Republican-leaning in-person ballots. As a result, in close elections, we cannot always predict the winner by using a sample of the first votes counted.

This can result in a vote mirage. Just as a mirage is defined as "something illusory and unattainable," a vote mirage occurs when a candidate's vote percentage based on the partial, incomplete count of the votes gives an illusion of a dramatically different outcome than the final results based on the full vote tally (Merriam-Webster Dictionary).

Figure 6: Example Vote Mirage

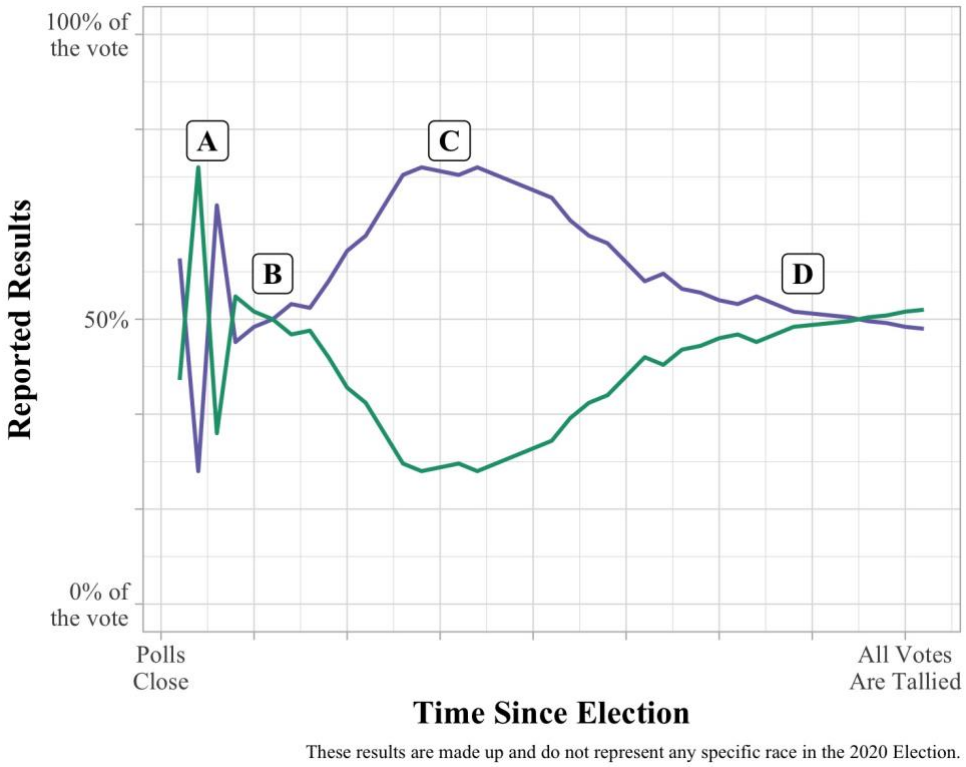


Figure 6 above displays what a mirage might look like. The purple and green lines represent the two candidates in this election. Their total votes at any given time add up to 100 percent of the votes counted. The graph displays how the distribution of votes between the two

candidates changes from when polls close to when all of the votes are tallied. The four labels – A, B, C, and D – indicate different processes in a typical vote mirage.

The section labeled "A" represents when only a few precincts report data. During this first window of time, each candidates' percent of the vote fluctuates greatly and is normally not representative of the final vote count. This occurs because there is a small number of total votes at this time (a small denominator to determine the vote percentages) and the release of votes from one precinct, city, or county can have a major impact on the overall percentages. This pattern occurs in most states' and counties' election returns even if the vote does not display a mirage.

If this back and forth occurs, it only occurs during the first few batches of votes. Then, at some point the vote count stabilizes and only changes in small increments. This begins around the "B" label above. This is also the start of the mirage in Figure 6. Starting around label "B," even though votes are being counted for both candidates, the newly counted votes heavily favor the purple candidate. As the counting approaches label "C", the purple candidate's lead continues to grow.

At point "C," the purple candidate appears to have a comfortable lead in the election. This is the peak of the vote mirage. The purple candidate leads by around 40 percentage points in this hypothetical example. Due to the order in which votes were counted in this example election, there is an illusion that the purple candidate is likely to win the election. In other words, this is the vote mirage.

This mirage is still present as the vote count transitions from point "C" to point "D." However, the votes being counted during this section lean heavily towards the green candidate. There is no definitive end to a vote mirage. Rather, in this example, the mirage fades and

disappears when it becomes clear that the race was going to be extremely close. Label “D” represents when the election has tightened and the purple candidate’s lead at point “C” is no longer salient. This would no longer be considered a mirage.

As all of the outstanding votes are counted in the section following “D,” the green candidate regains the lead and wins by a slim margin. The section from the mirage’s peak (at point “C”) to the final vote count is referred to as the “shift.” The vote shift is the section of time where the vote tallies increasingly reflect the final vote count. A vote shift is also characterized by a period of time where the votes reported disproportionately support one candidate, the candidate that received a disproportionately small portion of the vote as the mirage formed.

Most real-world vote mirages are less straight forward than the example in Figure 6. Vote mirages are often less dramatic than the example above. At point “C” in Figure 6, the purple candidate has a huge lead on the green candidate. In real life, mirages are unlikely to result in vote percentages that are this skewed from the final vote count. Additionally, the shift from the mirage to the final vote count does not always result in a switch in which candidate is leading. A mirage occurs whenever the results are skewed for a significant period of time. It does not necessarily mean an illusion that one candidate is ahead and that that candidate will ultimately lose. This is the first type of mirage in Table 2 on the following page.

Table 2: Types of Vote Mirages

	Situation at Mirage Peak	**Situation When All Votes Are Counted**	**Perception and Importance**
1	Candidate 1 leads by a considerable margin.	Candidate 2 wins.	Candidate 2's win is potentially surprising to those who saw the results at the peak of the mirage.
2	Candidate 1 leads by a considerable margin.	Candidate 1 wins by a thinner margin.	The final election results are much closer than people might have expected at the peak of the mirage.
3	Election is extremely close between the two candidates.	Candidate 2 wins by a considerable margin.	The election initially seemed like a tight race where either candidate could win but ended up not being close.

The two candidates in this election are referred to as Candidate 1 and Candidate 2. The first type of mirage is displayed in Figure 1.

Mirages also refer to situations where a candidate's lead is lessened but not erased by the shift or when a candidate's lead increases significantly because of the shift. If the purple candidate in Figure 6 had won by a tighter margin than what occurred at the peak of the mirage, this would have been the second type of mirage in the table above. If the race between the purple and green candidates had been relatively close but one candidate one by a large margin, the election would have been the third type of mirage in Table 2. The three different types of mirages are further detailed in the table above.

Finally, the terms "mirage" and "shift" can also specify which party receives a disproportionately high percentage of the vote during that period. The example election in Figure 6 represents a purple mirage (the purple candidate receives a disproportionate number of votes during the initial section of the vote count) and a green shift (the green candidate receives a disproportionate number of votes as the vote count reaches completion). In Table 2, all of the scenarios are examples of a mirage for candidate 1 and a shift in favor of candidate 2. When

referring to the 2020 election, a red mirage or shift indicates a mirage or shift that favors Trump and a blue mirage or shift indicates a mirage or shift that favors Biden.

Historical Precedent

Past elections display that vote mirages are possible and have happened in some capacity. The vote count in Florida in the 2000 presidential election is one example of this. Before the controversial vote mirages began, many of Florida's voting laws were already under scrutiny. Some thought that purging the voter lists of ex-felons would result in African American voters being mistakenly removed, there were fewer polling places than in previous elections, the voting technology was old, and voters had to register twice – to vote and to record their vote (Martin & Lynch, 2009).

What made these policies and the close vote margin even more controversial was how the networks covered this election. Between 7:50pm and 8:02pm on Election Night 2000, ABC, CBS, NBC, CNN, MSNBC, and FOX all called Florida for Democratic candidate Al Gore, which they all retracted within around 2 hours (Wardle, Kenski, Orr, & Jamieson, 2001). Then between 2:16am and 2:20am, these networks projected Republican candidate George W. Bush as the winner in Florida, giving him the electoral votes needed to win the presidency. This was again retracted around 4am. Why did this "disaster" (as a CNN internal report referred to what happened) occur (Konner, Risser, & Wattenberg, 2001)? According to this report, CNN and other networks relied too heavily on exit polling and reports from certain precincts – the ones that closed first in the part of the state in the Eastern Time Zone. The panhandle, which is in the Central Time Zone and therefore closes its polls an hour after the rest of the state, is highly Republican; therefore, when CNN, and other networks, projected a Florida win relying on the first precincts to close, their calculations were skewed.

What happened in Florida is an example of a vote mirage. The ballots that were initially counted leaned disproportionately towards one candidate – Gore. When the entire vote was counted, the margin was much closer. In this specific instance, the mirage occurred because the different time zones of the state had different partisan make ups. While the networks who project elections have adjusted for this (they now wait until the entire state has finished voting before projecting winners), it is possible that other processes could cause vote mirages in the 2020 election. Unlike the 2000 election in Florida, partisan preferences in different vote methods along with different counting rates for different vote methods are likely to play a large role in creating vote mirages in 2020.

Perception of Elections

Prior research on confidence in the election system overall suggests that vote mirages may have important consequences for how voters perceive the election's results. Perception of election results are important because they influence people's trust in electoral systems; distrust in electoral systems is a problem for our democracy. Therefore, it is important to understand if election misinformation and distrust in election administration can be tied to vote mirages.

Some scholars indicate that individuals whose preferred candidate appear to be leading during the mirage portion of the vote count but then lose in that state will not trust the election results. This is likely because partisans who lose an election often trust the results less than winners, regardless of the presence of a vote mirage (Sances & Stewart III, 2015). Compared to pre-election responses, post-election partisan winners are more likely to believe their vote and the country's vote was counted correctly; however, compared to pre-election responses, post-election losers are less confident their vote and the country's vote was counted correctly. Therefore, in situations when there is a vote mirage and one party appears to be ahead but the

other party ultimately triumphs, those whose party benefited from the vote mirage are likely to have lower confidence in the vote count.

Does this distrust in election results only occur within members of one party? Studies indicate that historically this is not the case. One study found that neither party (out of Democrats and Republicans) was more likely to believe that voter fraud was common (Beaulieu, 2014). However, whether the candidate who benefitted from potential voter fraud was of the same party as the respondent had a large impact; when the candidate was a co-partisan (of the same party) around 47 percent of respondents found voter fraud to be likely while around 82 percent of respondents said voter fraud was likely when it benefited non-co-partisans (Beaulieu, 2014). This study indicates that in the 2020 election, the party who loses is more likely to believe in potential voter fraud and question the results. Again, this may be amplified if that party received a disproportionately high number of votes during a vote mirage.

Other studies have looked at *why* losers distrust the election results more than winners. One theory states that voters who lose an election experience cognitive dissonance, meaning they experience discrepancies between what they hold to be true and what they experience and attempt to handle the discomfort this causes (Holbert, LaMarre, & Landreville, 2009). Similar to what I intend to do in this analysis, they hypothesized that losers of the 2004 election (people who did not vote for Bush) would question the election results more than those who supported the winning candidate. They did find evidence for a relationship between vote choice and perception of the validity of the election. They claim that this is caused by cognitive dissonance.

Vote mirages, where one's party appears to be ahead for a portion of the vote count, seem likely to be a source of the cognitive dissonance Holbert, LaMarre, and Landreville describe. Many news organanizations noticed this and tried to warn their readers against reacting to the

early vote count. In MIT News, Peter Dizikes (2020) wrote “when you watch election returns on Nov. 3, keep this in mind: In some U.S. states, it will take days to count all the ballots, and the winner might only be clear later, rather than sooner.” Similarly, NBC (2020) published an article entitled “Beware the ‘Blue Mirage’ and the ‘Red Mirage’ on Election Night”. This article warns readers that pundits who claim a “fantastic” lead for any candidate early on Election Night are likely falling for a vote mirage (Wasserman, 2020).

Given the various articles prior to the November 2020 presidential election that warned the public about vote mirages, this analysis focuses on how the different factors detailed above – increased access to mail ballots, partisan skew in vote-by-mail, and policies that influenced the speed of mail ballot counting – led to mirages as the election results were reported. I also study how the public reacted to these mirages.

Findings and Analysis

The literature on voting clearly indicates that there was a possibility for unprecedented vote mirages in the 2020 election. This is due to vote-by-mail playing an increased role in the 2020 election compared to past years because of the pandemic, vote-by-mail ballots being counted at a different pace than Election Day ballots, and large partisan skew in the 2020 mail-in votes. Given this information, I hypothesize that in states with widespread VBM, those that took a long time to count mail ballots due to late preprocessing deadlines would experience red mirages. I also evaluate the policy circumstances under which blue mirages occurred.

This analysis utilizes a dataset of timestamped 2020 presidential election results from each county in the United States. The data was collected from Edison Research and was used by the National Election Pool – ABC, CBS, CNN, and NBC – in their election coverage. It includes each candidates' vote count in each county at fifteen-minute increment from 6pm EST on November 3rd (Election Day) to the end of the day on Tuesday, November 10th.[4]

Presence of A Mirage

In order to understand whether vote-by-mail policies influenced the presence of vote mirages, we must first evaluate whether vote mirages occurred in the 2020 election.

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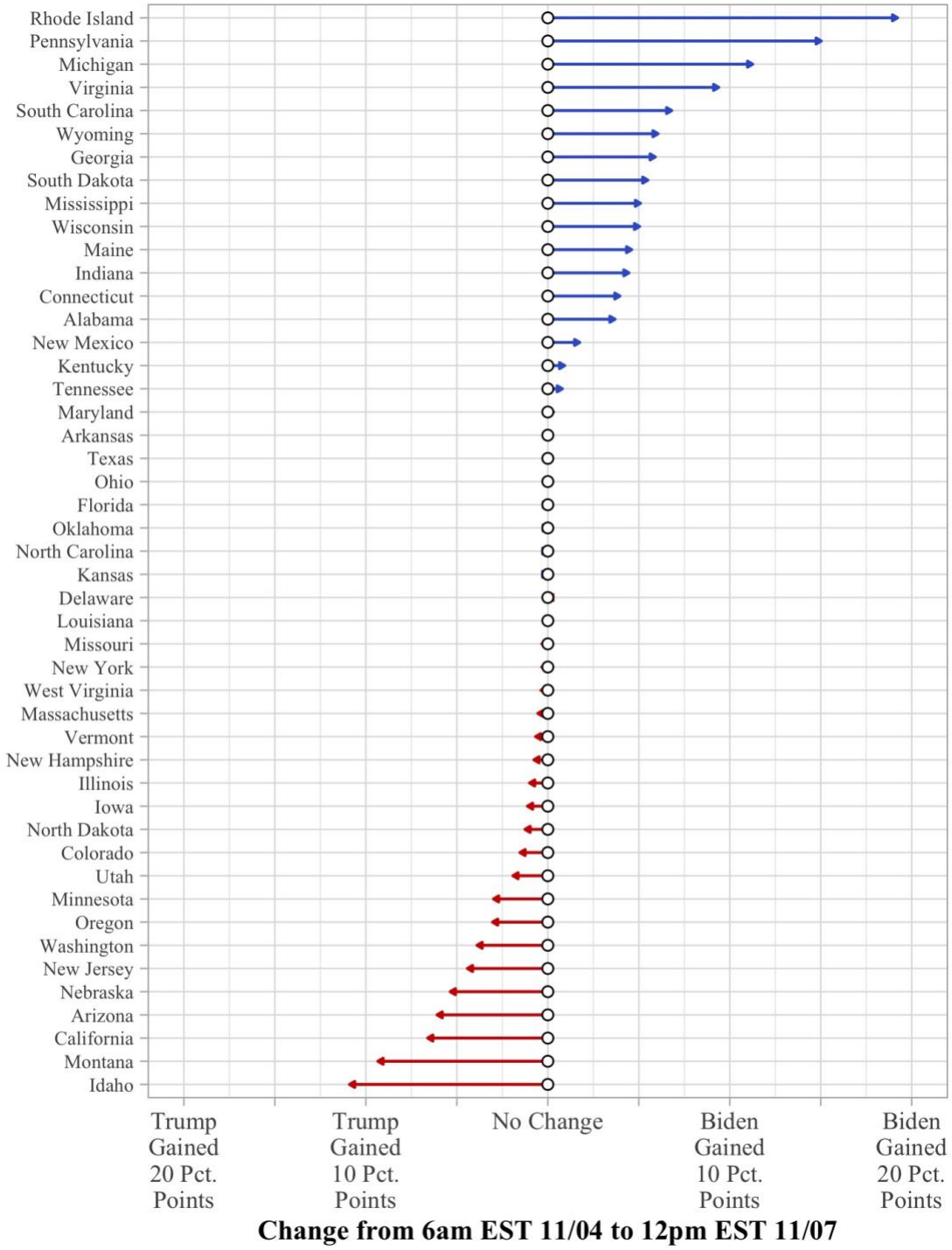
[4] While there are no gaps in the data during this period, there are a few points where a state's or county's vote count goes down. This is visible in New York and West Virginia in Figure 10 on page 45. This does not mean that the state or candidate's votes were removed or deleted. These inconsistencies are an expected function of the vote reporting process. They are likely caused by human error in the data entry process (Pettigrew & Stewart III, 2020). The errors in this dataset are in states that I did not focus on in my analysis so they do not impact my findings. The data for this analysis included third party candidates, not just Joe Biden and Donald Trump.

One way to evaluate a mirage is to look at the change in vote count in between two key points during the election. More specifically, I look at the change in the vote between Election Night and when Biden was projected as the winner of the election by the major news organizations on Saturday, November 7th.

Election Night is an important time to capture the election results because most presidential elections of the past few decades have been projected on Election Night. In 2020, Election Night does not just refer to November 3rd. It also refers to the early hours of November 4th, the day following the election, when some Americans have gone to bed after watching the election coverage but people haven't woken up to new results yet. Since the 2016 presidential election was called at 2:29am EST the day after the election and the 2012 president election was called at 11:38pm EST on Election Day, presumably in 2020 individuals took account of which candidate was ahead when they went to bed on Election Night (Easton, 2016) (Colford & Madigan White, 2012). At this time, the electoral map looked favorable to President Trump. He was leading in the key swing states of Pennsylvania, Georgia, Wisconsin, and Michigan. However, by the time the election was projected by the major news networks on Saturday, the election looked drastically different than it did when people went to bed on Election Night and Trump was behind in those four swing states.

Figure 7 below displays the percentage point change in the margin between Trump and Biden from Wednesday at 6am EST (marking the end of Election Night) to Saturday November 7th at noon EST, a time representing when the networks projected the election. This margin was calculated by subtracting Trump's percent of the vote from Biden's percent of the vote at each time. The difference in this margin from Election Night to Saturday is displayed.

Figure 7: Policies and Percentage Point Changes in Margin – 6am EST Wed. to 12pm EST Sat.



Alaska, District of Columbia, Hawaii, and Nevada removed due to small number of ballots counted on Wednesday.

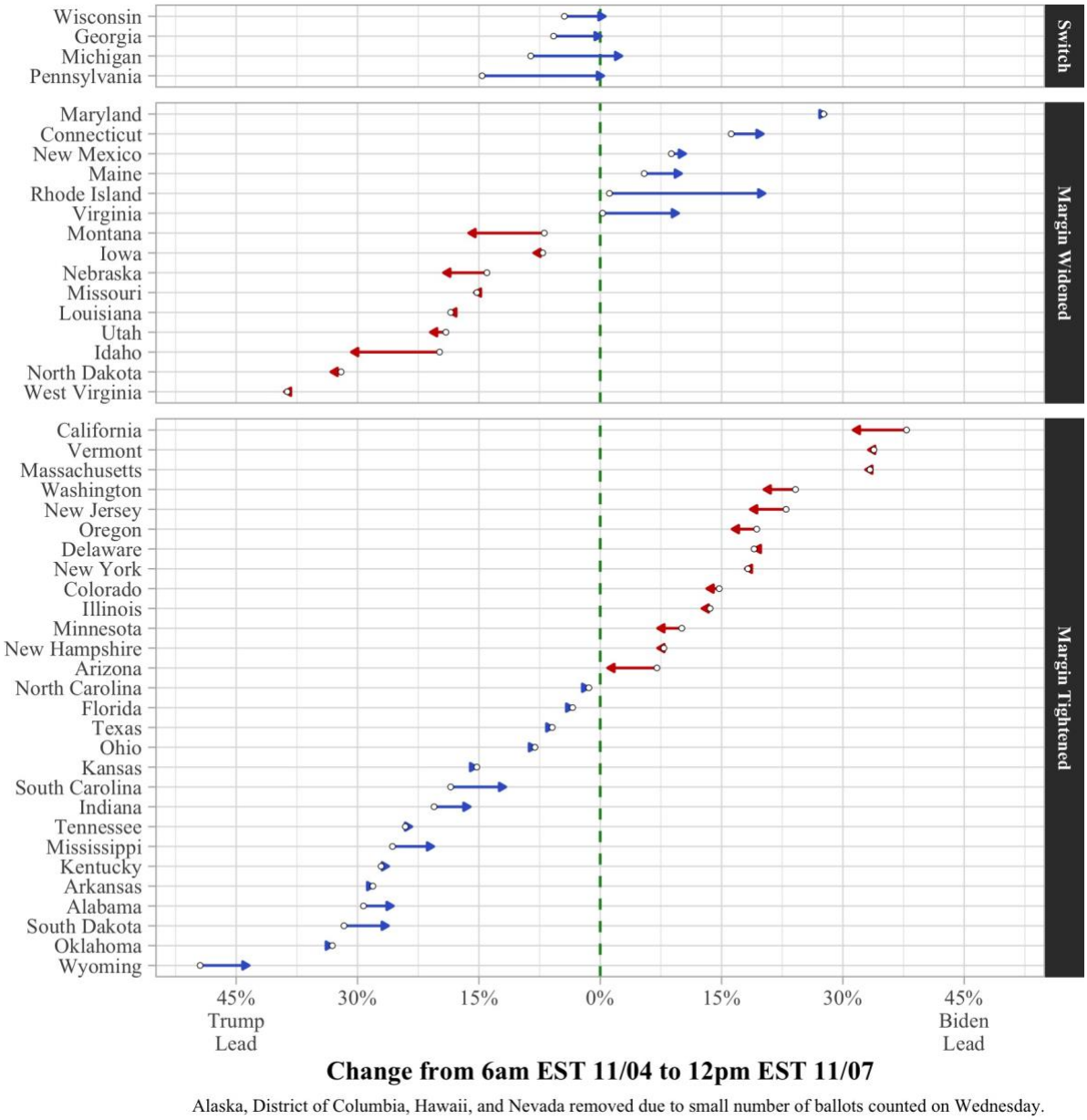
In Figure 7, the hollow black circles represent the margin between Biden and Trump at 6am EST on Wednesday November 4th. The arrow represents the direction and size of the shift from that margin to the margin at 12pm EST on Saturday November 7th. The colors represent the direction of the shift between these two times. If Biden gained on Trump (either increasing his lead in a state or decreasing Trump's lead), the arrows are blue. If Trump gained on Biden, the arrows are red for that state. While Figure 7 displays the shifts centered at the Election Night vote, Appendix 2 displays the exact size of the margin at these times.

While some states – those in the middle of Figure 7 – displayed roughly similar margins at the end of Election Night and when the election was called, many experienced dramatic shifts in favor of one candidate or the other. Notably, three states – Alaska, Hawaii, and Nevada – and the District of Columbia are excluded from Figure 7. These four locations had each reported less than 10 percent of their votes. When such a small portion of the vote is counted, the results often look dramatically different than the final results, even if the state does not experience a mirage. We saw this in the example mirage in Figure 6 on page 28. The shifts in Alaska, Hawaii, Nevada, and the District of Columbia would obscure the shifts from the other states. After these four states, Massachusetts had released the next fewest votes but had still released over 50 percent of their total votes. The percentage of the total vote that was counted at 6am EST on Wednesday November 4th in each state is displayed in Appendix 3.

Not only does the direction and the magnitude of the shift matter, one must also look at how the shift impacted the status of the election. For example, the states at the far extremes of the graph – Rhode Island and Idaho – swung 19.2 percentage points towards Biden and 10.9 percentage points toward Trump, respectively. While these swings are quite large, they went unnoticed by the media and the electorate because these states traditionally lean towards one

political party and therefore weren't considered toss-up swing states that were worth scrutinizing over. Plus, the shifts did not change which candidate was in the lead.

Figure 8: How the Margin Changed – 6am EST Wed. to 12pm EST Sat.

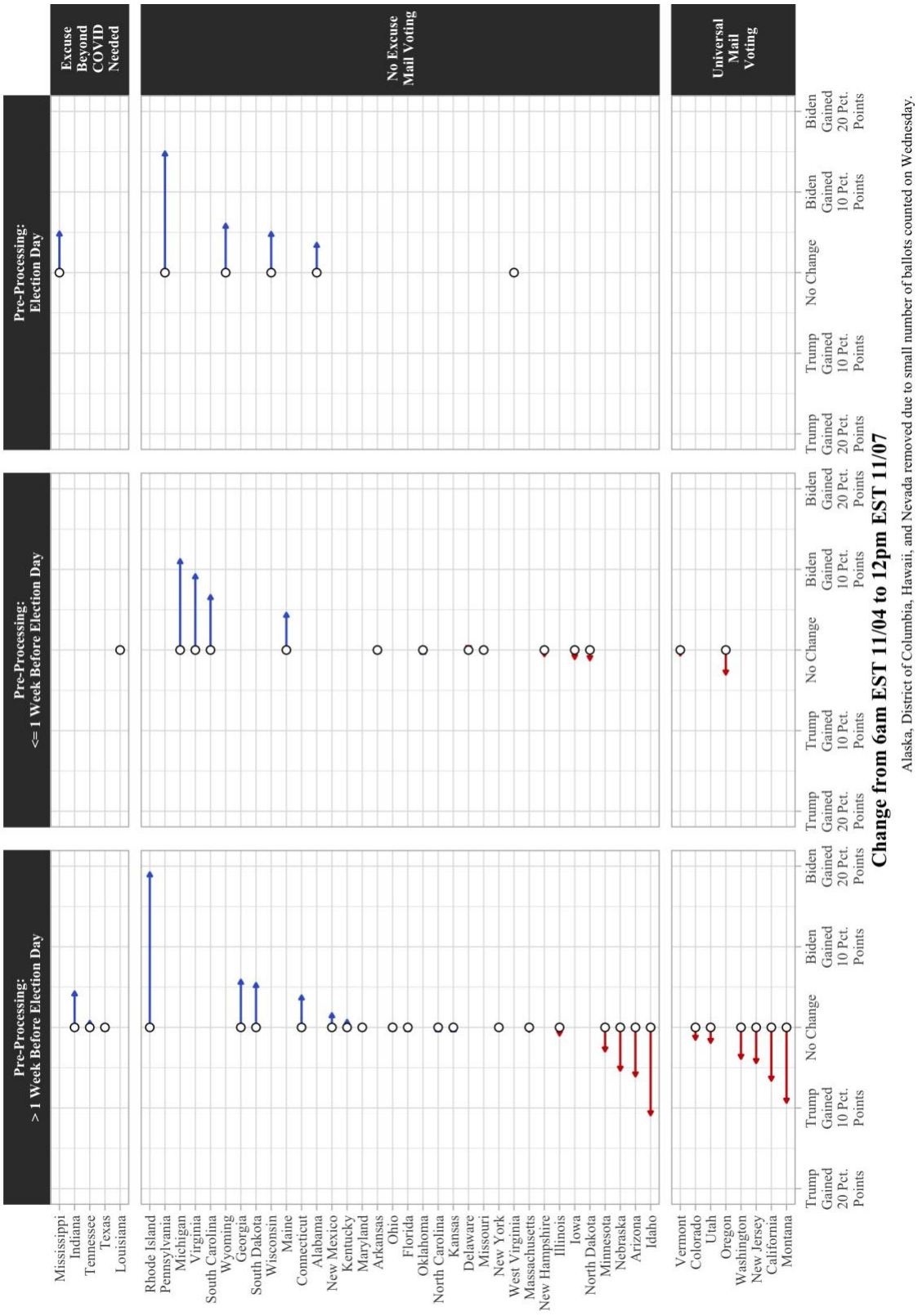


Not only did Biden's and Trump's percent of the vote change significantly in many states, in four states these shifts resulted in a different candidate having the lead within the state.

This occurred in Georgia, Michigan, Pennsylvania, and Wisconsin. In these four states, which were all ultimately won by Biden, Trump was leading in the raw count early Wednesday morning but Biden was leading by noon on Saturday. For example, in Pennsylvania, Trump was ahead by 14.6 percentage points on Wednesday morning. By noon on Saturday, the lead had shifted 15 percentage points and Biden was leading in Pennsylvania by 0.4 percentage points. This shift represents the first type of mirage in Table 2 on page 31.

As we saw in Table 2, the shift from Election Night to when the election was called can impact the leader of the election in three ways, each of which is displayed in Figure 8 on the previous page. The person in the lead can switch (as was just described), the leader's margin can widen, or the leader's margin can tighten. In addition to the four states where the lead switched, the margin widened in fifteen states (Biden's lead increased in six, Trump's lead increased in nine) and tightened in twenty-eight states (Biden's lead decreased in thirteen, Trump's lead decreased in fifteen). While the media focused primarily on mirages where a candidate appeared to be winning and ultimately lost, Figure 8 displays that this was not the case for the majority of mirages.

Figure 9: Policy Breakdown of Vote Shifts



These different types of shifts occurred in states regardless of their vote-by-mail policies. However, as we can see in Figure 9, the policies impacted the direction of the mirages.[5] All of the states that began pre-processing ballots on Election Day exhibited a red mirage and a blue shift. In two of these states – Pennsylvania and Wisconsin – Trump was leading on Election Night and Biden was leading when Biden was projected as the winner of the election, as Figure 8 displayed.

Figure 9 shows that all of the states with universal mail voting exhibited a red shift. While I did not set out to study this trend, these blue mirages are an interesting and relevant finding. In these states, since nearly everyone votes by mail, the blue mirages cannot be caused by partisan differences by vote method. Rather, these blue mirages likely occurred because Republicans were more likely than Democrats to return their mail-in ballots within a week of Election Day (Pew Research Center, 2020). Ballots that arrived later are also likely to be counted later. This trend also supports what happened in Arizona, a swing state that got a lot of attention during election week because Fox News projected Biden as the winner at 11:20pm EST (Karni & Haberman, 2020). Other news organizations waited for days to project this race because Biden's lead continued to tighten as the mail-in ballots being counted leaned disproportionately toward Trump. Arizona has widely adopted permanent vote-by-mail that is popular among both

[5] Rhode Island's large red mirage and blue shift may seem uncharacteristic for a state that began pre-processing weeks before the election. However, according to a Rhode Island Board of Elections Press Release, they expected to count vote-by-mail ballots primarily after November 3rd (Hunter, 2020).

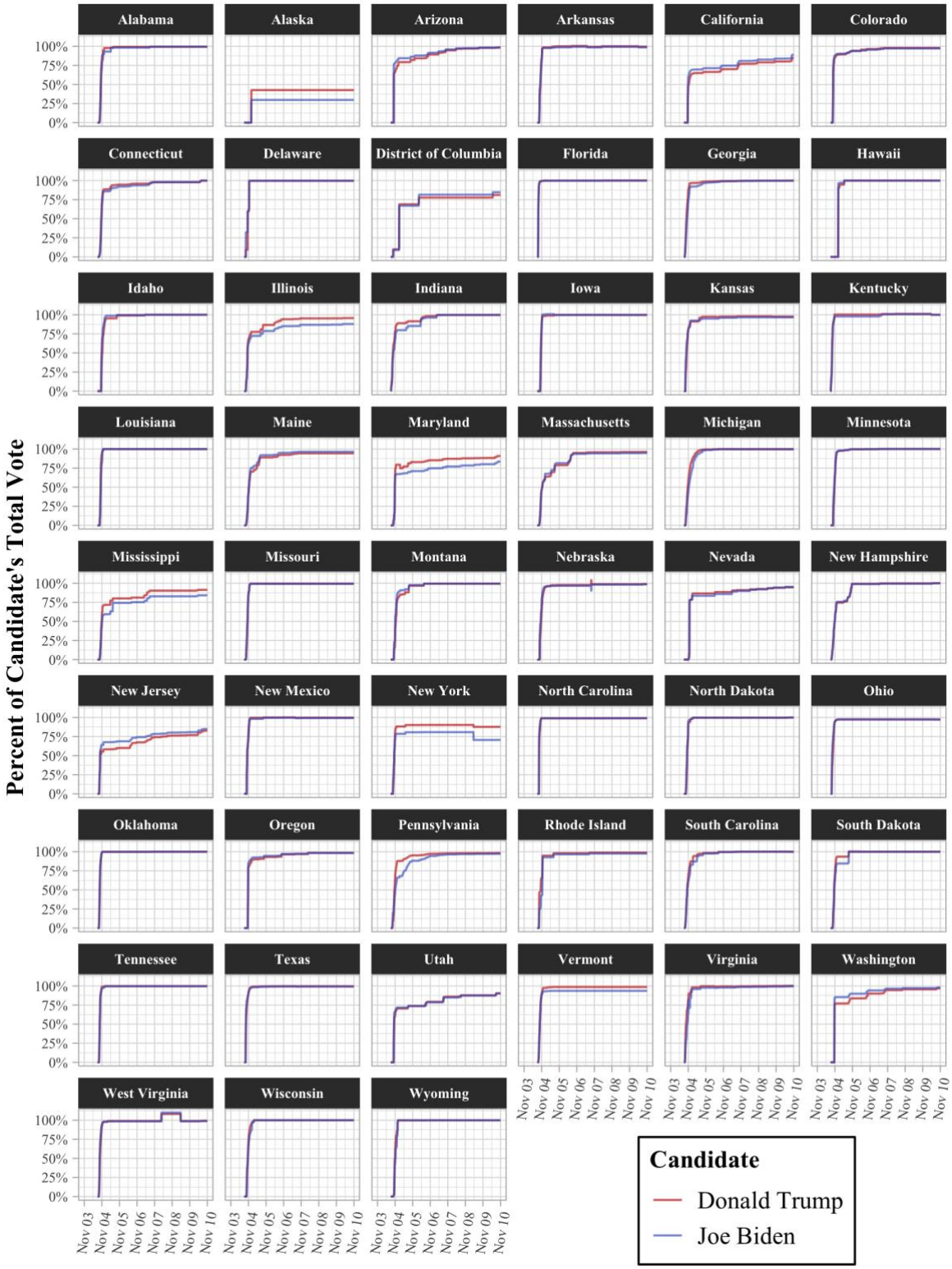
Democrats and Republicans (McDonald, 2020). In Arizona and the universal mail voting states, the blue mirage was likely caused by the early-arriving mail ballots.

Vote Counting Patterns

Figure 7, Figure 8, and Figure 9 represent what voters witnessed. The American public saw, and potentially internalized, the vote count when they went to bed on Election Night. Then a few days later when the election was called, the electoral map looked drastically different. According to my analysis, these changes did not occur randomly. Rather, we can look at the order in which votes were counted to understand why these mirages and shifts occurred.

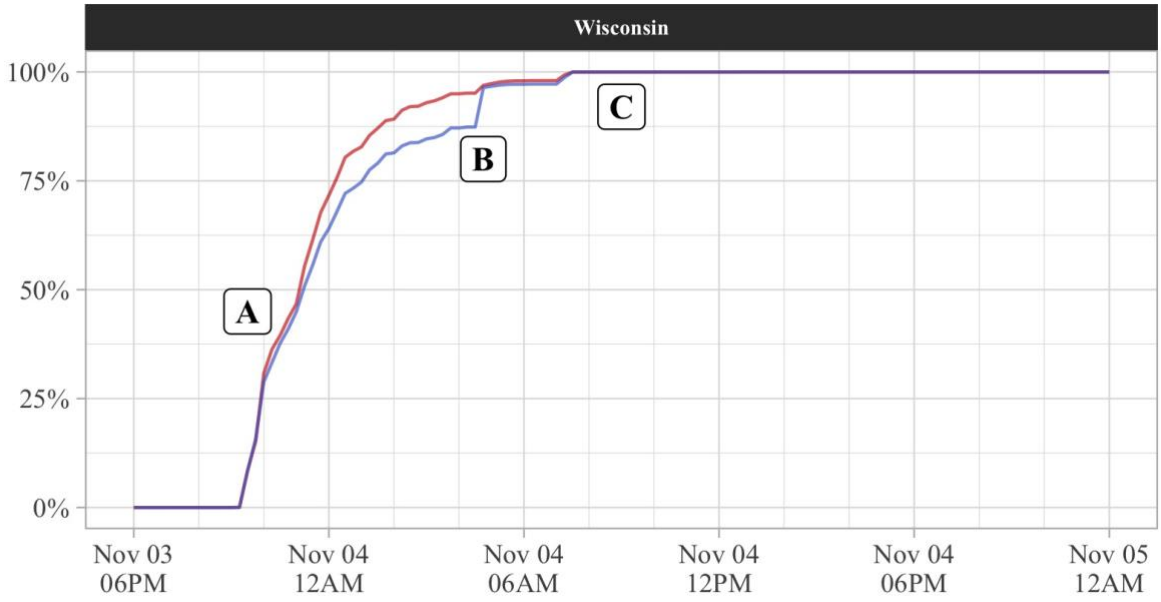
Figure 10 below displays what was happening in the vote counts to produce the patterns in the figures above. Figure 10 displays that there were differences in the speed at which votes for Trump and Biden were counted in each state. The 100 percent mark indicates that all votes for a candidate were counted in a particular state. The x-axis represents when over the course of the week following the election the vote count reached various different levels of completion. The two candidates are represented by the red (Trump) and blue (Biden) lines. If the red and blue lines overlap for the entire graph, that state counted Trump and Biden ballots at the exact same pace, regardless of the overall state outcome. Most states began reporting votes late on Tuesday November 3rd and all states began reporting votes by 9:45am EST on Wednesday November 4th.

Figure 10: State Vote Counting by Candidate



In Figure 10 we can see the process that creates a mirage – when the votes being counted skew disproportionately towards one candidate. When there is a large gap between the red and blue lines, the votes for Trump and Biden are not being counted at the same pace. We can see this pattern in Pennsylvania, a state with Election Day pre-processing. In Pennsylvania, the initial vote count leaned heavily towards Trump, creating a red mirage, as we can see in Figure 10. In Washington, a state with universal mail voting, we see a blue mirage where the initial vote disproportionately favored Biden. Figure 11 allows us to take a closer look at how these trends played out in one state, Wisconsin.

Figure 11: Wisconsin Vote Counting by Candidate



This figure is a subset of Figure 10.

Voters did not need an excuse to vote by mail in Wisconsin in the 2020 election (Wisconsin Elections Commission). Additionally, all voters in Wisconsin were automatically mailed a mail ballot application but they were not automatically sent ballots. These policies led to two thirds of Wisconsin voters voting by mail (McDonald, 2020). Additionally, Wisconsin

began pre-processing and counting mail ballots at 7am on Election Day (WI Stat § 6.88, 2019). Finally, mail ballots had to be received by Election Day in Wisconsin. These policies resulted in an environment where individuals had a choice as to whether to vote by mail or to vote in person on Election Day. Plus, any ballots that were not preprocessed between 7am on Election Day and when polls closed had to be preprocessed after polls closed, resulting in a slow trickle of results.

Figure 11 displays how these vote-by-mail policies impact the reporting of election results. Results from Wisconsin were first released around 9pm EST on November 3rd. The three points labeled on the graph display different patterns in the vote mirage from that point to the end of Wednesday November 4th. At point "A" the mirage begins to form. At this point votes for Trump were being counted at a faster rate than were votes for Biden. This likely included a lot of Election Day ballots which do not require pre-processing and can be counted quickly. This mirage continues and grows more rapidly on the way to point "B." Point "B" indicates a late-night (around 4:30AM EST) batch of votes from Milwaukee. This late-night batch of mail votes was anticipated by Milwaukee County Clerk George Christenson who announced earlier in the night that the Milwaukee votes would be released around 3am (WTMJ-TV, 2020). These votes leaned heavily towards Biden and decreased Trump's margin significantly. A Milwaukee newspaper explained that these ballots that were counted late into the night were mail ballots (Radcliffe, 2020). At this point, the mirage was over because the margin was tight. From point "B" to point "C" Biden picked up the majority of votes, developing a slim lead. By point "C" – around 8am EST on November 4th – almost all votes were counted in Wisconsin, and Biden was in the lead.

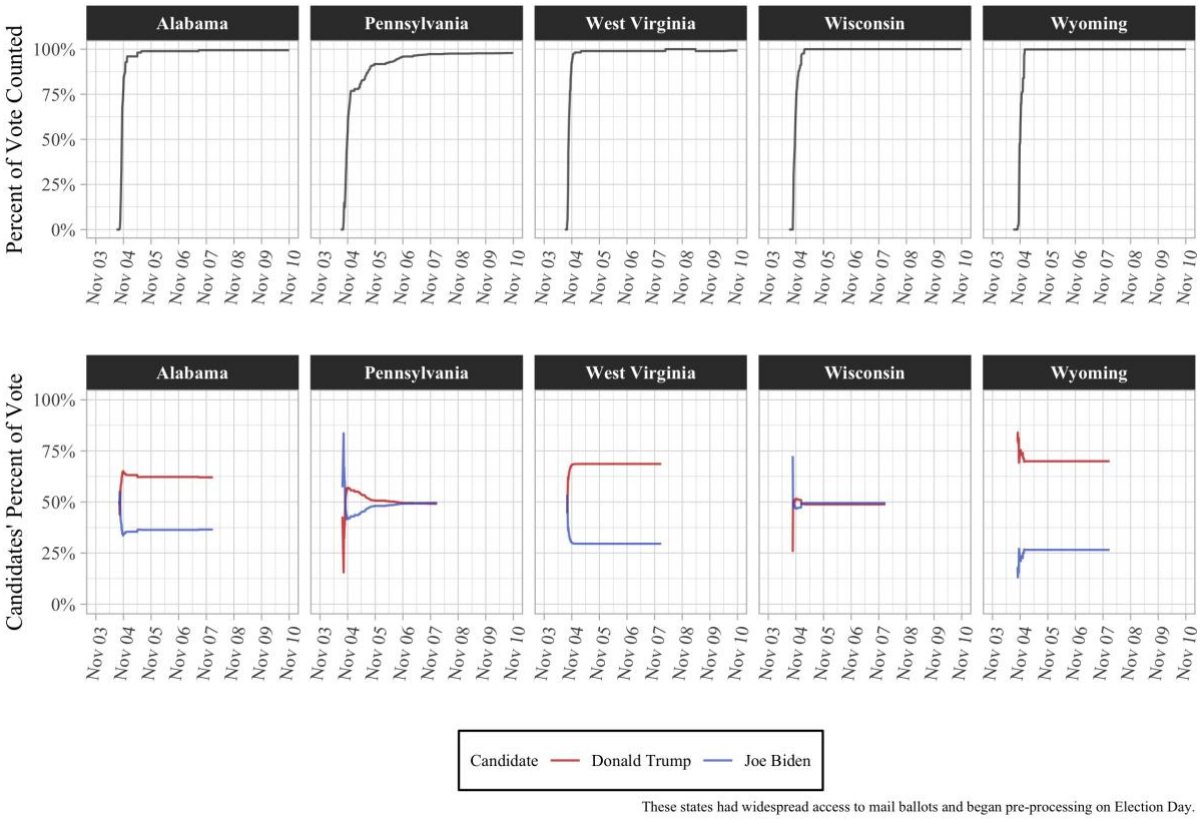
A difference in partisanship between Election Day ballots and mail ballots contributed to the Wisconsin vote mirage displayed in Figure 11. The initial ballots counted were Election Day

ballots which leaned Republican. These votes created a mirage where it seemed like Trump would win Wisconsin by a considerable margin. Then, the remaining mail ballots were processed, counted, and reported. These newly counted ballots leaned disproportionately towards Biden who ended up with more votes in the state.

Mirages are not just caused by the partisanship of vote-by-mail combined with specific vote-by-mail policies. Larger jurisdictions can also be slow to count their many votes. If these areas have a partisan skew, the absence of the full vote count from these locations can contribute to a vote mirage. This can occur with cities which have many votes and lean Democratic. While it is possible that this contributed to the mirage in Wisconsin and in other states, a county-by-county look at the speed of vote counting displays that mirages occurred even within counties with a strong overall partisan lean. This is evident in Appendix 4, a county-by-county break down of how quickly Biden and Trump votes were counted in Wisconsin. Clearly, geography is not the only contributor to a vote mirage.

Wisconsin provides an example of how a late pre-processing deadline can impact the flow of election results. This trend is also present in other states that began pre-processing on Election Day. Wisconsin and Pennsylvania were the two swing states that began preprocessing on Election Day. Both of these states had red mirages but Pennsylvania's mail votes took longer to count than did Wisconsin's so the mirage lasted longer in that state. These two states represent the first type of mirage outlined in Table 2. There were also red mirages in two of the three other states that started preprocessing on Election Day and had widespread access to mail ballots either through no-excuse VBM or through allowing COVID to be an excuse.

Figure 12: Counting Speed and Election Results in Election Day Pre-Processing States



This is evident in Figure 12. In this figure above, we can compare Trump and Biden's percent of the vote over time to the percent of votes counted over time. This helps us see when a mirage was developing and when the vote count reached completion. They also display examples of the different types of vote mirages. In both Alabama and Wyoming, a red mirage inflated Trumps lead. As the remaining blue-leaning mail votes were counted, Trump's lead decreased a few percentage points. In Figure 12, we can see where these red mirages form and how they disappeared over time (in the bottom panel) as the vote count (in the top panel) reaches 100 percent. While the shifts appear small in the figure above, in reality changes in a few percentage points represent hundreds of thousands of votes differences in the final tally.

Avoiding A Vote Mirage

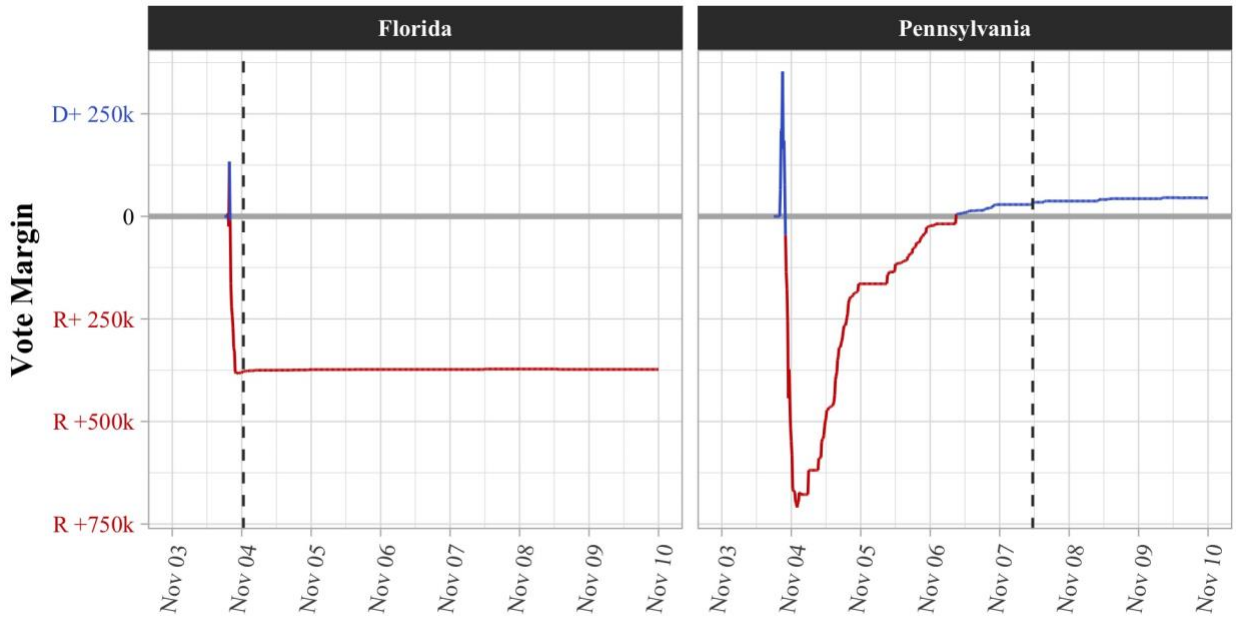
While some states had vote mirages, others had policies in place that helped prevent a mirage from forming even with a large number of mail-in ballots being cast. States that began pre-processing ballots upon arrival or a set number of weeks before the election were able to tabulate the vast majority of mail ballots at a more rapid pace than states that waited to pre-process ballots. As we can see in Figure 9, the states that began preprocessing more than one week before the election and allowed people to choose to vote by mail (through no excuse VBM or COVID as an excuse), did have shifts from the Election Night margin to the Saturday November 7th margin. However, the magnitude and partisanship of these shifts is more random, unlike the red mirages for all states with Election Day pre-processing and the blue mirages for all of the states with universal VBM.

The state of Florida is a good example of how early pre-processing can play out. In Florida, all eligible voters could vote by mail (Florida Department of State). While this could result in a mirage as we have seen with other states, mail ballots in Florida can be pre-processed and counted beginning 22 days before Election Day (National Conference of State Legislatures, 2020). This gave state officials ample time to process and tabulate the vast majority of mail ballots prior to November 3rd. When polls closed in all of the Florida counties, news organizations began reporting these results to the public.

Figure 13 below displays how the vote margin fluctuated in Pennsylvania compared to Florida. This graph displays the absolute number of ballots that either candidate led by at various points in the week after Election Day. A blue line indicates when the margin favored Biden and red indicates when the margin favored Trump. The dotted lines represent when each race was projected by the Associated Press (Maks, 2020). When the Florida election was projected at

12:35am EST on November 4th, the state had counted over 99.5 percent of their votes. At this time, Pennsylvania had counted less than two-thirds of its state's votes.

Figure 13: Vote Margin Over Time – Florida and Pennsylvania



Immediately after polls closed, both of these states exhibited a very quick surge of Biden-leaning votes. This may have come from the mail votes that had already been tabulated or from Election Day votes in Biden-leaning counties. As was displayed in Figure 6 on page 28, this initial section of the vote count does not constitute a mirage because it is extremely rapid and only includes a very small proportion of the vote. Pretty soon after this initial surge, both states develop a decent margin for Trump. In Florida, fairly quickly after polls closed in this state, the margin reflected what the final margin would be. On the other hand, the shift towards Trump in Pennsylvania constituted the beginning of a multi-day vote mirage. The third of votes that remained to be counted in Pennsylvania after Florida was called included mainly vote-by-mail ballots. These votes leaned towards Biden. As these votes were slowly processed and counted

over the course of days, the margin tightened. Had Pennsylvania counted 99.5 percent of the vote within the first few hours of polls being closed – as we saw in Florida – the mirage would have lasted minutes or hours rather than days and would likely have been less influential in how people perceived the election results.

While some might argue that these states are not comparable because Trump won in Florida and Biden won in Pennsylvania, a red mirage and blue shift is still possible in states where Trump ended up winning. As was outlined in Table 2, a period of time where a candidate is winning by a large margin and then end up winning by a slimmer margin can also count as a vote mirage. This could have happened in Florida if a red mirage occurred.

The outcome in Florida displays that it is possible to have widespread access to vote-by-mail while producing election results rapidly and without a vote mirage. As I discuss in the following section, outcomes like Florida are desirable compared to outcomes like Pennsylvania.

Discussion

These mirages had a major impact on how Americans perceived the election results and the integrity of the election. More specifically, because many Americans were not prepared for the election to take days to call and for major shifts to happen in key states from Election Night to the final vote count, many voters – especially Republicans – called the results into question.

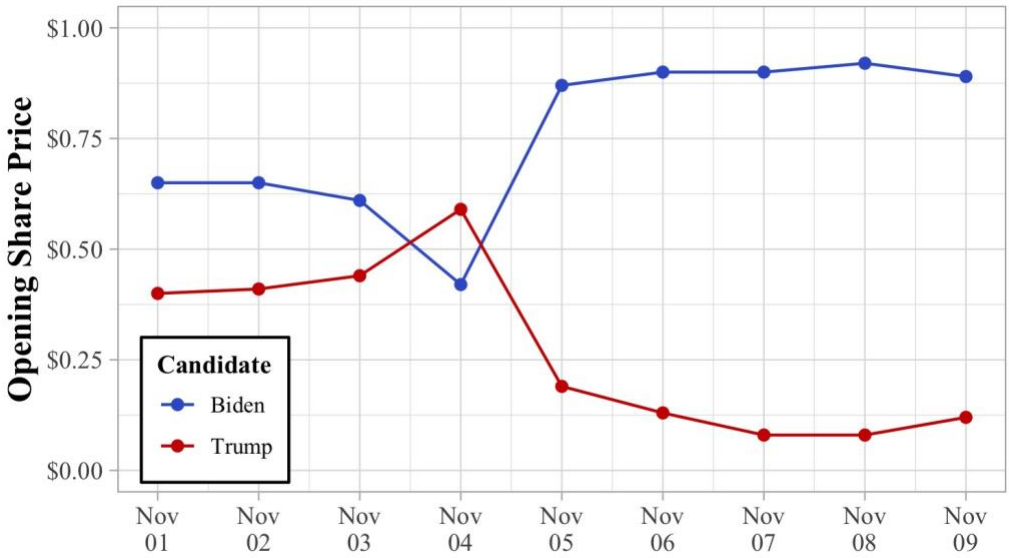
Research from previous elections has shown that the partisans whose candidate loses in an election are more likely to believe that the results were not counted correctly than voters whose candidate won (Sances & Stewart III, 2015). This trend played out in the 2020 election; after the election Republicans – both politicians and voters – were more likely to believe that voter fraud had occurred in the presidential election (Laughlin & Shelburne, 2021). Vote mirages played a major role in accelerating and amplifying the denial of the election results and the misinformation surrounding the election results.

It might seem as though vote mirages would not have an impact since a roughly equal number of states shifted towards Republicans and shifted towards Democrats from Election Night to when the election was called. The exact states that shifted in each direction are visible in Appendix 2. However, all four of the states where the leader switched during this time period flipped from Trump leading to Biden leading. These four states – Pennsylvania, Wisconsin, Georgia, and Michigan – received some of the most scrutiny from Republicans following the election.

How do we know that vote mirages caused by specific vote-by-mail policies played a role in creating the lack of confidence in the 2020 election results? First and foremost, we must evaluate if the mirages themselves impacted people's perception of the election results. One way

to evaluate how the perception of the election changed over time is to look at betting markets. I focused on PredictIt, a site that allows people to bet on political events such as election outcomes, cabinet nominations, and control of Congress. The opening price, closing price, maximum price, and minimum prices for their shares each day is publicly available and can be downloaded on their website. The data used below comes from the page titled "Who will win the 2020 U.S. presidential election?"

Figure 14: PredictIt – Who Will Win the 2020 Presidential Election



PredictIt had Biden more likely to win for the weeks leading up to the election. However, as we can see in Figure 14, bettors on PredictIt collectively thought that Trump was more likely to win than Biden for a short period during Election week. Trump's share price rose to a high of $0.85 per share on November 3rd and $0.76 per share on November 4th (PredictIt). Biden's share price on November 3rd and 4th reached lows of $0.15 and $0.30 respectively. Plus, from September to November, November 4th had the highest trade volume for this race of any day with over one million people betting on Trump and around 750,000 people betting on Biden.

This displays that public confidence that Trump would win aligned with the vote mirages that formed late on November 3rd and developed into November 4th. By the end of the 4th, Biden had been projected to win in both Wisconsin and Michigan (Maks, 2020). At this point, though other states were still experiencing a mirage, there was a general sense that Biden would win among bettors, the media, and members of the public.

The data from PredictIt shows that people's perception that Trump would win the election correlated with when the vote mirages occurred. We can also see a relationship between mirages and perception of the results by looking at how political figures – especially Trump – discussed the mirages and early vote returns. More specifically, Trump and other Republicans pointed to the vote during the mirage compared to the completed vote count to justify claims of a fraudulent or stolen election.

Trump's tweets during the month of November 2020 displayed how the vote mirages could influence one's perception of the results. This information comes from the Trump Twitter Archive, a website that has documented all of Trump's tweets since 2016 (Brown). Trump Twitter Archive is a reputable alternative to Twitter and is used by many news organizations to discuss Trump's tweets. Since Trump's twitter account was suspended in January 2021, his tweets are no longer available on Twitter.

Trump's (@realDonaldTrump) most liked tweet in the month of November and third most liked tweet of all time was "I WON THIS ELECTION, BY A LOT!" at 10:36am EST on Saturday November 7th. This was less than an hour before the major networks projected that Biden would win the election. At the time, it seemed clear that the lead would not switch in favor of Trump in the states that remained uncalled. Trump's misconception that he won was driven by mirages, as we can see in some of his other tweets such as, "They are finding Biden votes all

over the place — in Pennsylvania, Wisconsin, and Michigan. So bad for our Country! [sic]" around noon on November 4th and "I had such a big lead in all of these states late into Election Night, only to see the leads miraculously disappear as the days went by. Perhaps these leads will return as our legal proceedings move forward!" around 6pm on November 6th.

In these tweets, Trump directly addresses the red mirages, the points of time he was ahead in a few swing states. He claims that those moments reflected the true vote count and that the votes counted after those points that helped Biden were fraudulent. In reality, the votes for Biden were not "found" or cast after polls closed, as Trump claimed; rather, the votes had simply not been counted yet. This is because the first votes counted were in-person Election Day votes, which leaned heavily Republican, while the last votes counted were mail ballots that leaned heavily Democratic. Some news organizations warned their audiences about the potential for these mirages. However, it makes sense that people were more likely to take cues from their partisan leaders about these mirages (Zaller, 1992). This is especially true when the cues from partisan leaders aligned with the belief that the election was fraudulent since election losers are more likely to think an election was fraudulent, as was previously discussed (Beaulieu, 2014).

This all resulted in an environment where only roughly a third of Republicans said they trusted the U.S. Election results "somewhat" or "a lot" in the weeks following the election (Laughlin & Shelburne, 2021). Potentially unsurprisingly, of the Republicans who believed there was widespread voter fraud in the election, a majority said Trump was one of the sources that led them to believe this claim. Widespread distrust in the electoral system is a problem. And while Trump's rhetoric fueled the distrust in the election results, the red mirages gave skeptics around the country a moment to point to as the "correct" results.

The analysis here shows that one strategy state legislatures and election administrators could use to prevent this phenomenon would be to enact processing and reporting policies that prevent or lessen vote mirages, assuming future trends in vote-by-mail ballots remain similar to 2020. As we saw in Florida, pre-processing weeks before Election Day can prevent the process of counting VBM ballots from being drawn out for days. Addressing these policies is especially important in swing states which receive extra scrutiny during the election. In Pennsylvania, efforts to allow for ballots to be processed ahead of Election Day failed in 2020 since a bipartisan compromise could not be made (Fernandez & Lai, 2020). Revitalizing these efforts to reform mail ballot counting rules could help to avoid large vote mirages in the future, thereby preventing widespread election misconceptions from developing.

Conclusion

Since the vote mirages during the 2020 election helped bolster the widespread distrust in the election results – especially among Republicans – it is important to understand what processes contributed to these mirages. While various factors can influence the flow of election results, my analysis indicates that when states had a late pre-processing start date, they were likely to have a red mirage in the 2020 election. This finding relies on the key vote-by-mail trends of the 2020 election: increased VBM compared to previous elections and higher numbers of Democrats voting by mail despite no evidence of such a trend in past elections.

Furthermore, according to this analysis, states with universal vote-by-mail elections were likely to exhibit blue mirages. This appears to be caused by the tendency for Republicans to return their mail ballots closer to the election. While this is supported by survey research from November 2020, the relationship between all-mail elections and blue mirages should be further explored with more concrete evidence (Pew Research Center, 2020). While the blue mirages in universal vote-by-mail states did not receive a lot of media attention since none of these states were swing states in the presidential election, this trend did have an impact on smaller scale elections including congressional elections.

Future research into vote mirages could also compare this trend across different years. This analysis assumed that wide-spread VBM due to the COVID-19 pandemic played a large role in creating an environment where mirages would occur. While I did not have access to timestamped data from previous elections, it would be interesting to see whether an election during the COVID-19 pandemic is truly different from previous or future elections.

With the pandemic hopefully coming to an end, vote-by-mail trends may revert to pre-2020 levels in upcoming elections. However, current legislation related to VBM indicates this topic will remain politically salient. In Georgia, Republican lawmakers are pushing for legislation that would eliminate no-excuse VBM and would require a photo ID for absentee voting (Nadler & Yoganathan, 2021). The Democratic controlled U.S. House of Representatives recently passed H.R. 1, an extensive bill focused on increasing access to voting (117th Congress, 2021). Each party is focused on vote-by-mail legislation that would aid their party's voters based on the voting trends we saw in the 2020 election. As this continues, legislators seem to be focusing more on electoral outcomes than the common good, which could create major voting related issues going forward.

As we look towards future elections, Americans must keep in mind the vote mirages that occurred during the 2020 election. The widespread claims of fraud that accompanied the red mirages in Pennsylvania, Wisconsin, Michigan, and Georgia serve as warnings of how unprepared Americans might react to mirages in future elections. Going forward, states have an opportunity to focus on processing and counting mail-in ballots as quickly as possible to minimize the skepticism surrounding the election results. Hopefully, in addition, future major political figures learned from the 2020 mirages and are able to articulate to their supporters how vote-by-mail policies are at fault for these patterns, rather than voter fraud.

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Appendix

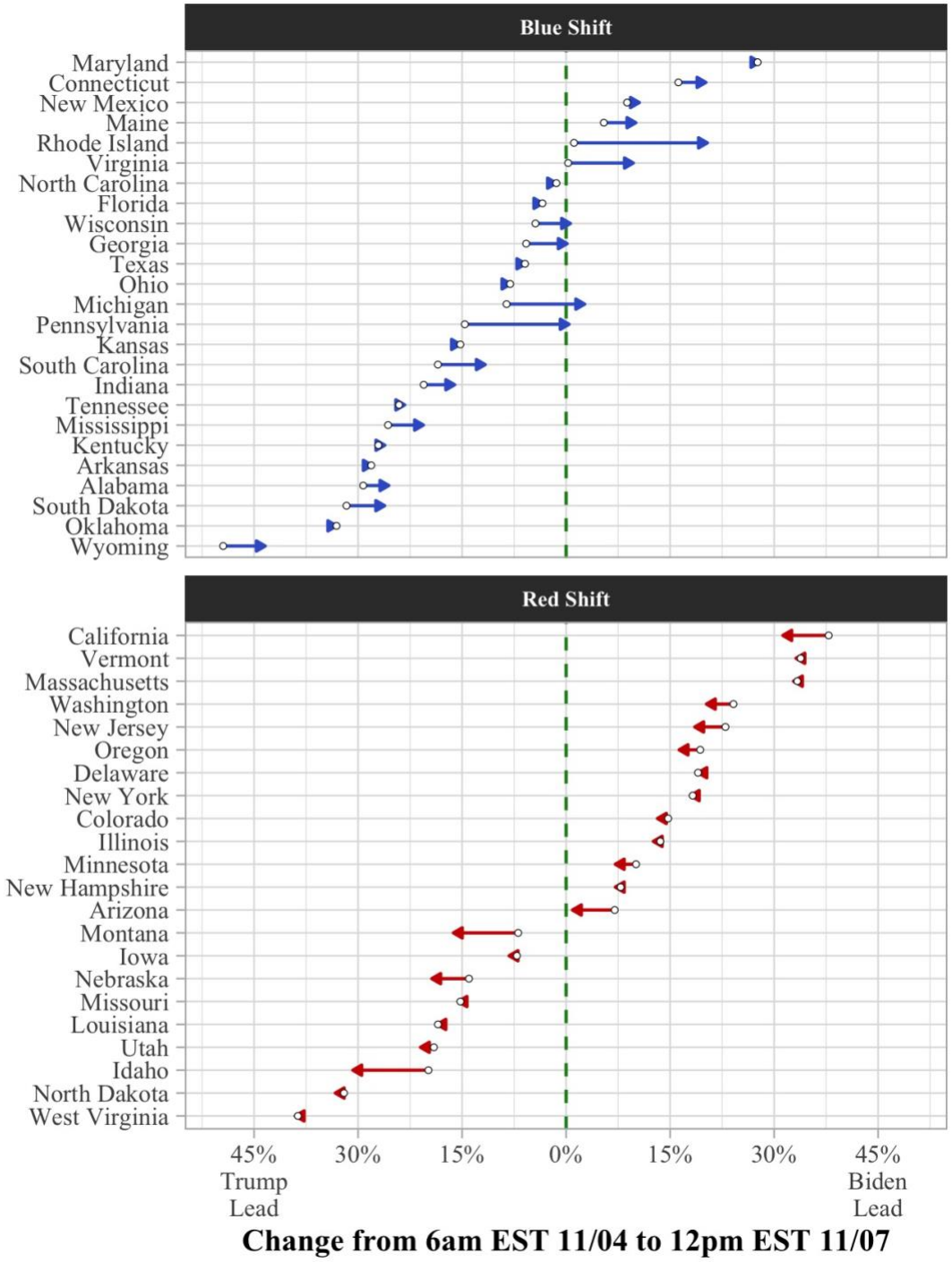
Appendix 1: State-by-State Vote-by-Mail Policies in the 2020 Election

State	VBM Excuse	Automatically Sent to Voters	Pre-Processing	Tabulation	Ballot Deadline
Alabama	none/COVID		11/3/20	11/3/20	11/3/20
Alaska	none/COVID		10/27/20	11/10/20	11/13/20
Arizona	none/COVID		10/20/20	10/20/20	11/3/20
Arkansas	none/COVID		10/27/20	11/3/20	11/3/20
California		ballot	10/5/20	11/3/20	11/20/20
Colorado		ballot	10/9/20	10/19/20	11/3/20
Connecticut	none/COVID	application	10/20/20	11/3/20	11/3/20
Delaware	none/COVID	application	10/30/20	11/3/20	11/3/20
District of Columbia		ballot	10/12/20	10/5/20	11/13/20
Florida	none/COVID		9/24/20	11/3/20	11/3/20
Georgia	none/COVID		9/15/20	11/3/20	11/3/20
Hawaii		ballot	10/16/20	11/3/20	11/3/20
Idaho	none/COVID		10/5/20	11/3/20	11/3/20
Illinois	none/COVID	application	9/24/20	11/3/20	11/17/20
Indiana	excuse needed		9/19/20	11/3/20	11/3/20
Iowa	none/COVID	application	10/31/20	11/2/20	11/9/20
Kansas	none/COVID		10/14/20	11/3/20	11/1/20
Kentucky	none/COVID		9/21/20	10/1/20	11/6/20
Louisiana	excuse needed		11/2/20	11/3/20	11/2/20
Maine	none/COVID		10/27/20	11/3/20	11/3/20
Maryland	none/COVID	application	10/1/20	10/1/20	11/13/20
Massachusetts	none/COVID	application	10/5/20	10/25/20	11/6/20
Michigan	none/COVID	application	11/2/20	11/3/20	11/3/20
Minnesota	none/COVID	application	9/18/20	11/3/20	11/10/20
Mississippi	excuse needed		11/3/20	11/3/20	11/10/20
Missouri	none/COVID		10/28/20	11/3/20	11/3/20

Montana	none/COVID	ballot	10/9/20	11/2/20	11/3/20
Nebraska	none/COVID	application	9/23/20	11/2/20	11/3/20
Nevada		ballot	9/24/20	10/19/20	11/10/20
New Hampshire	none/COVID		10/29/20	11/3/20	11/3/20
New Jersey		ballot	10/5/20	11/3/20	11/10/20
New Mexico	none/COVID		10/20/20	11/3/20	11/3/20
New York	none/COVID		10/18/20	11/3/20	11/10/20
North Carolina	none/COVID		9/29/20	11/3/20	11/12/20
North Dakota	none/COVID		10/29/20	11/3/20	11/9/20
Ohio	none/COVID	application	10/6/20	11/3/20	11/13/20
Oklahoma	none/COVID		10/29/20	11/3/20	11/3/20
Oregon		ballot	10/27/20	11/3/20	11/3/20
Pennsylvania	none/COVID		11/3/20	11/3/20	11/6/20
Rhode Island	none/COVID	application	10/14/20	10/14/20	11/3/20
South Carolina	none/COVID		11/1/20	11/3/20	11/3/20
South Dakota	none/COVID	application	9/18/20	11/3/20	11/3/20
Tennessee	excuse needed		9/15/20	11/3/20	11/3/20
Texas	excuse needed		10/22/20	10/30/20	11/4/20
Utah		ballot	10/13/20	11/3/20	11/16/20
Vermont		ballot	11/2/20	11/3/20	11/3/20
Virginia	none/COVID		11/2/20	11/3/20	11/6/20
Washington		ballot	10/16/20	11/3/20	11/13/20
West Virginia	none/COVID		11/3/20	11/3/20	11/9/20
Wisconsin	none/COVID	application	11/3/20	11/3/20	11/3/20
Wyoming	none/COVID	application	11/3/20	11/3/20	11/3/20

In the second column, "none/COVID" refers to states where voters could vote by mail without an excuse or could use COVID-19 as an excuse. The states with "excuse needed" required voters to have an excuse beyond COVID to vote by mail. The third column indicates whether voters were automatically mailed either a ballot application or a mail ballot. This information comes from the National Conference of State Legislatures and the New York Times.

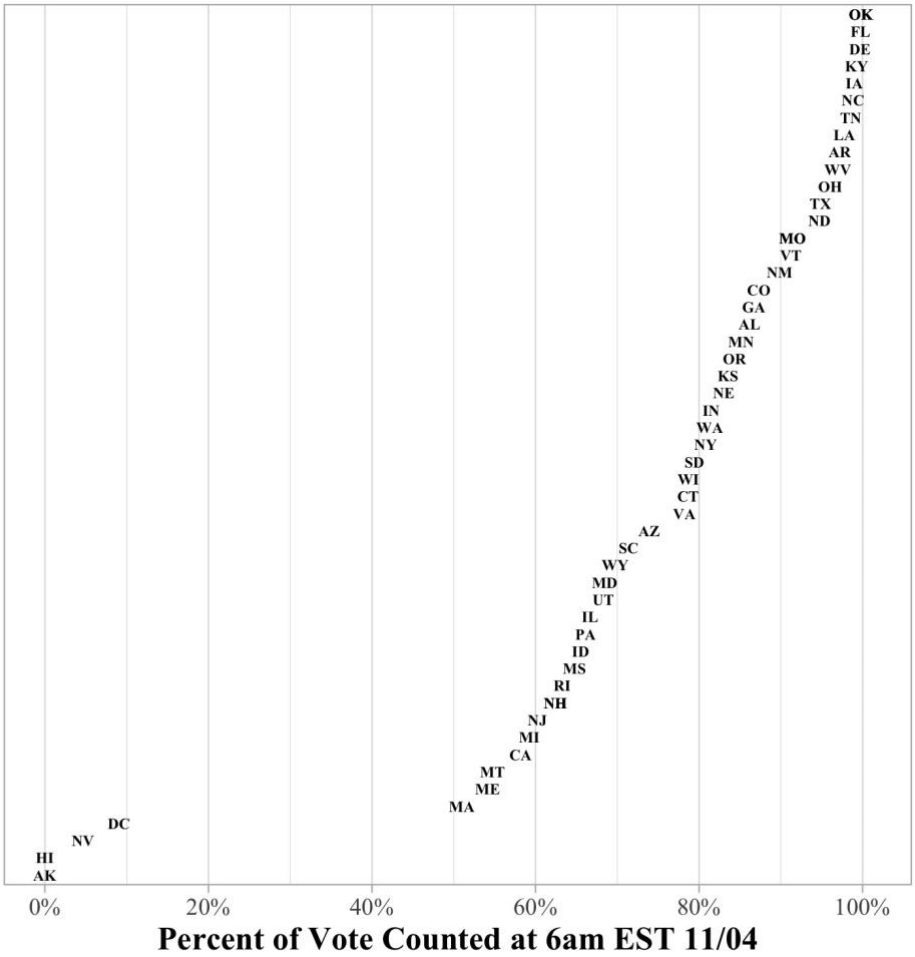
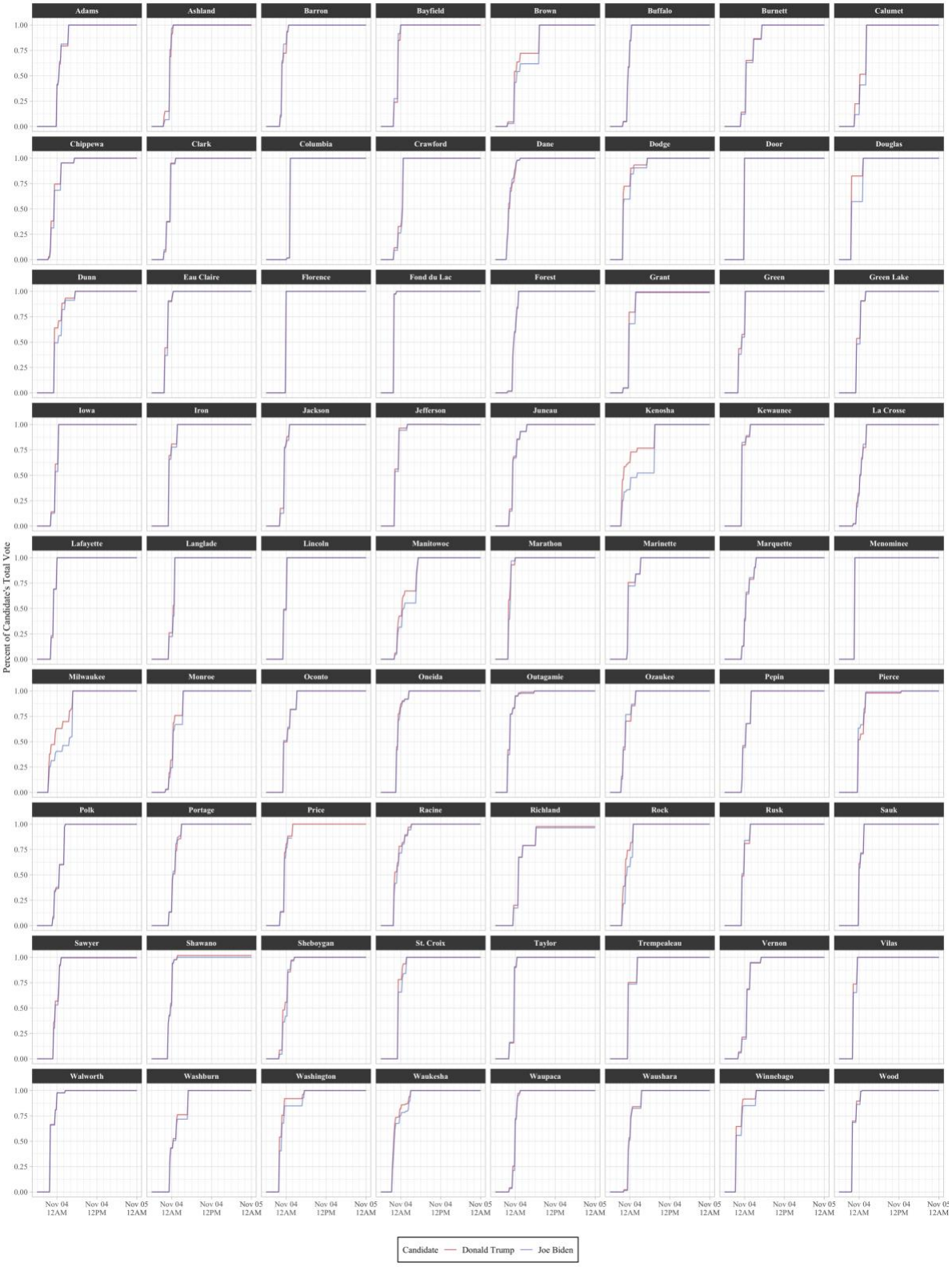
Appendix 2: Change in Election Margin – 6am EST Wed. to 12pm EST Sat



Change from 6am EST 11/04 to 12pm EST 11/07

Alaska, District of Columbia, Hawaii, and Nevada removed due to small number of ballots counted on Wednesday.

Appendix 3: Vote Counted Within Each State at 6am EST Wednesday



Appendix 4: Wisconsin County-by-County Vote Counting