

Ballot Rejections and Ballot Curing in Washington State

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Abstract

November 2020 was the first time in US history that a plurality of voters cast absentee or mail ballots. The dramatic rise of mail voting in response to the COVID-19 pandemic has led to increased attention on the potential benefits and limitations of conducting elections by mail. One of the main drawbacks to vote-by-mail policies is that states usually reject a much larger percentage of mail ballots than they do ballots cast in-person. This paper uses 27 ballot “matchback” files from the state of Washington to examine, for the first time, the patterns in a state’s challenged and cured ballots. We find that younger voters, voters of color, inexperienced voters, and male voters all have substantially elevated rates of ballot rejections. These patterns are driven by disparities in signature-based ballot *challenges*, rather than differences in rates of ballot *curing* or any other part of the process. Additionally, we examine the amount of time between ballot challenges and ballot cures, geographic variation in rejection rates, and discuss potential policy interventions to reduce disparities and lower rejection rates overall.

1 Introduction

At the time of this writing, eight states (California, Colorado, Hawaii, Nevada, Oregon, Utah, Vermont, and Washington) will have a full vote by mail system in place for the upcoming federal elections in 2022, where ballots are sent to all eligible and registered citizens on the rolls for every election, and fourteen additional states¹ Twenty-six states plus the District of Columbia no longer require an excuse for requesting an absentee ballot, and sixteen states retain a requirement for some sort of excuse to receive an absentee ballot.² The proportion of voters reporting that they had cast an "absentee" or "by mail" ballot increased over the past quarter-century, from just under 8% in 1996 and rose to over 21% of ballots cast in 2016.

The COVID-19 pandemic upended virtually every aspect of American life, including elections. Voting by mail one of the major issues ahead of the 2020 general election. Because the long lines and crowded buildings that are typical of in-person voting in the US now had the potential to become so-called "superspreader" events, election administrators scrambled to expand access to mail voting. Such changes were widespread: an analysis by the New York Times in August 2020 found that thirty-two states had made changes to their mail and absentee voting systems in response to the pandemic. These changes ranged from allowing voters to cite concerns about COVID-19 as an accepted reason for requesting an absentee ballot³ to sending mail ballots to every voter⁴(Love et al., 2020). These institutional changes in combination with individual voters' concerns about safety in the pandemic bore out in greatly increased rates of voting by mail in November 2020. The percentage of ballots cast by mail doubled from 21% in 2016 to nearly 45% in 2020. **CHECK THESE NUMBERS**

It remains to be seen to what extent, if any, the gains made by vote-by-mail in 2020

¹States with a local option for full vote by mail elections are Idaho, Montana, Wyoming, North Dakota, Minnesota, Nebraska, Kansas, Missouri, Arizona, New Mexico, Alaska, Florida, Maryland, and New Jersey.

²Source: National Conference of State Legislatures' "Voting Outside the Polling Place" report Table 1, <https://www.ncsl.org/research/elections-and-campaigns/vopp-table-1-states-with-no-excuse-absentee-voting.aspx>, accessed May 26, 2023.

³E.g. New Hampshire, West Virginia, and Kentucky.

⁴E.g. Vermont, California, and New Jersey.

will translate into a long-term increase in the proportion of ballots cast by mail. It does appear likely that without the pandemic (and without many of the temporary policies that were implemented in its wake) vote-by-mail rates will return to the previous slow yet steady growth trend established in the past two decades. And it is also clear that many of the charges of fraud and malfeasance that were directed at vote by mail systems were unfounded (Qiu, 2021).

Regardless of the specific trajectory, it is clear that some sort of voting by mail has a permanent place in the American election ecosystem. Our interest in this paper is in the equity and access implications of the voting by mail system. Our specific analytical interest in this paper is whether the signature verification and cure processes show any evidence of a disparate impact on subgroups of eligible voters, particularly among groups with less experience with the vote by mail system and with a shorter history of verifiable signatures in the state system. This may include younger citizens, citizens who only recently moved to Washington state, and citizens whose eligibility was recently established or restored. We also wish to examine whether groups in the population who in the past have been shown to be disadvantaged by administrative procedures which include some level of discretion and leeway by elections officials and their staffs.

Our analysis draws on a unique data set provided by the State of Washington. The data provided track the status of every ballot received by the state over the period from October 21st to November 24th, and for ballots under challenge, the reason for the challenge is given. This period begins four days after ballots were mailed to voters and ends on the day that the state finalized their election results. Ballots that are challenged are listed as such in the file as are ballots that have been accepted. A challenged ballot that is cured moves from being marked 'challenged' to being marked 'accepted', and if the ballot is not accepted before November 24, it is rejected. These data provide a valuable window into equity, accessibility, and administrative decision making for a key link in the chain of mail voting, and it is important to understand how these processes work as voting by mail continues to expand

across states and among voters.

Our research findings demonstrate racial, ethnic, and age disparities in the signature verification and ballot curing processes for the November 2020 election in the State of Washington. We examine Washington not because its processes and procedures are particularly vulnerable to these discriminatory effects, but because as a state with a mature, well-designed, and by all indications well-functioning vote by mail system, it functions as a canary in a coal mine, indicating a potential disenfranchising effect of moving to more voting by mail. We close our paper by suggesting outreach and educational efforts, and changes in procedures, that may overcome these disparities.

2 VBM Ballot Rejections

Previous Research

Absentee balloting emerged during the Civil War as an administrative innovation to provide Union soldiers access to the ballot box (Keyssar, 2000). While the categories of valid excuses to be "absent" from the precinct polling place on Election Day ebbed and flowed over the next century, by 1960 absentee voting remained primarily an excuse-required system taken advantage of by uniformed personnel serving away from home (domestically or overseas). Four events over the next 20 years fundamentally altered and expanded the use of absentee balloting: the 1970 Voting Rights Act which mandated special registration of new residents within 30 days of the election, or the ability to cast an absentee ballot in their former state; the 1971 ratification of the twenty-sixth amendment which dramatically increased the number of 18-20 year olds who were now eligible to vote but were away from home at college; the 1975 passage of the Overseas Citizen Voting Act, which extended the right to cast an absentee ballot to citizens who lived abroad and did not have a legal domicile in the United States; and finally, in 1978, California's adoption of a "no-excuse" system for opting out of precinct place voting and receiving and returning a ballot by mail (Fortier, 2006).

Rates of absentee by-mail voting increased slowly, but inexorably, for the past twenty years when we have high quality information on rates of Election Day, Early In-Person, and Voting by Mail. The United States Census’s Current Population Survey began asking about mode of voting in 1996, and the rate of change between federal elections is shown in Figure 1. From 1996 to 2008, there was a somewhat higher rate of increase between midterm elections and presidential elections; this pattern reversed from 2008-2018. Overall, the rate of change was comparatively low and comparatively regular, averaging **need a percentage change here** rate between each cycle. The dramatic shift in 2020 highlights the enormous impact of COVID-19 on elections and on the rate of by mail voting. This rapid shift in vote by mail rates in states where many administrators and voters had not had previous experience with the procedures required to prepare, deliver, complete, sign, return, and tabulate by-mail ballots raised concerns about equity, access, and integrity. **Do we need a juicy citation or two here?**

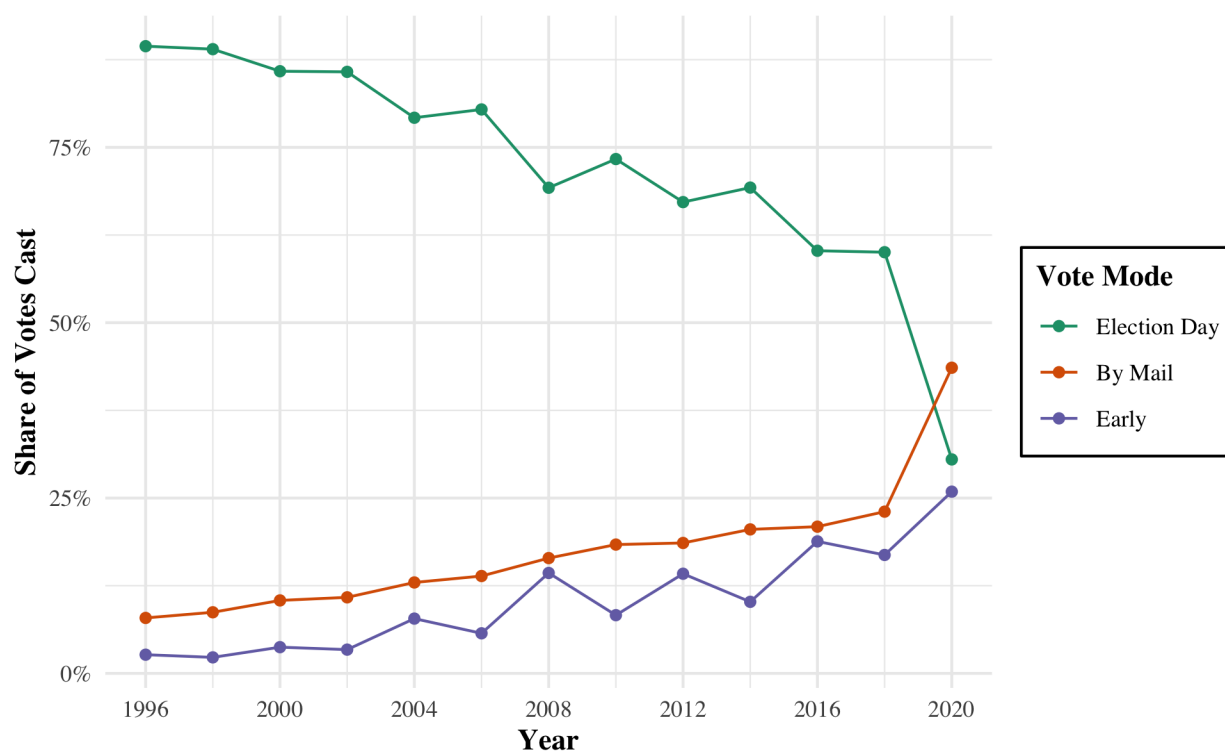


Figure 1: Vote Mode in the United States, 1996 - 2020

Our research focuses on one key link in the chain of voting for a vote by mail ballot—the process of signature verification and curing. This process serves to connect the individual registrant to a validly cast ballot. While the specifics of the process vary, in general, a well-designed process, as summarized in CISA guidelines issued during the run-up to the November 2020 election, has a multi-tiered review system and curing process (Groiup, n.d.):

1. A signature on a ballot envelope is compared (digitally or manually) to one stored in the voter registration system
2. Signatures that **pass the initial review** result in the ballot envelope being separated from the ballot, in order to maintain the secrecy of the vote, the ballot moves through additional processing stages.
3. Ballots that are **rejected at initial review are subjected to additional review**, ideally using different technologies (i.e. computer then human; cursory human review to a more careful human review by more experienced staff; and drawing on where available additional examples of the signature (a history of signatures on previous ballots, on voter registration applications, and in other government databases such as at the DMV).
4. After these reviews, some ballots **remain "challenged"**, and in nineteen states, this initiates a **"cure" process** whereby the voter is notified that their signature did not match and are provided methods to correct or "cure" the mismatch.

There is already a large literature examining the impact vote-by-mail policies have on voter behavior, administrative efficiency, and record keeping. Much less examined, and the focus of this paper, is an aspect of mail voting that is generally not present in in-person voting systems - ballot rejections and the process by which challenged ballots can be fixed. Unlike in-person voting, where (for the most part) any cast ballot with legible selections is counted, mail ballots must satisfy certain conditions in order to be counted.

There is variation between states regarding what is required for a mail vote (or an absentee vote) to be counted, as well as in the process by which improperly marked ballots can be “cured” and ultimately counted. This question took on new importance in 2020 because of concerns that large numbers of ballots might go uncounted as states tried to adapt to hastily implemented vote-by-mail policies and millions of voters cast their ballots by mail for the first time (Baringer et al., 2020; Wines, 2020). For instance, strictly enforced security envelope rules in Pennsylvania were identified as potentially leading to tens of thousands of ballots being thrown out over a minor mistake. Ultimately, this was avoided - in fact, an analysis by FiveThirtyEight found that rejection rates decreased between 2016 and 2020 declined in almost all states (Rakich, 2021).

Concerns about ballot rejection rates go beyond the overall rates of rejection. As with many aspects of electoral policy, there is reason to believe that the voters whose ballots are rejected differ, on average, from those whose ballots are counted (Acevedo et al., 2020). In particular, recent research in Florida and Georgia (using data from the 2016 and 2018 general elections) has found that younger voters, less experienced voters, and voters of color are most likely to have their ballots rejected (Baringer et al., 2020; Cottrell et al., 2020; Shino et al., 2021). Along these lines, a similar analysis on data from eight counties in Washington⁵ by InvestigateWest found that young voters and voters with Hispanic surnames were particularly likely to be rejected (Borkholder, 2021). Measuring these disparities is informative, but to properly understand them, the process that leads to rejections must be studied. To date, there is no published work using data from any state to analysis the process through which ballots are challenged and potentially cured - this paper is intended to change that.

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⁵This is the only analysis of Washington’s rejection data we know of.

VBM in Washington

Washington’s election administration process has several properties that make the state an appealing candidate for studying the ballot rejection and curing process. One advantage is simply that the cure process in Washington is robust and well-established. Unlike Florida (two days) or Georgia (three days), voters in Washington have 21 days to sign and return a cure statement. Having such a long period in which ballots can be cured gives us richer temporal patterns to study, and likely means that rates of ballot curing will be higher. Also helpful is that since Washington is a full vote-by-mail state, all voters are subject to a potential ballot challenge and there is no need to estimate a selection model for the probability that a voter will vote by mail, as Baringer et al. (2020) had to do in their analysis of ballot rejections in Florida.

In addition to these administrative factors, the data provided publicly by Washington is extremely high-quality and particularly conducive to an in-depth analysis of the challenge/cure process. For each ballot, the dates the ballot was received, challenged (if applicable), and cured (if applicable) are available along with the reason for the challenge. This information can be linked to each individual voter with their name, address, gender, and electoral history as provided by the statewide voter file. The richness of this data allows us to examine many questions which would be impossible to answer using data that only listed whether or not ballots were rejected, as previous work in Florida has done. For instance, we investigate the average time between the challenging and curing of ballots, and the degree to which disparities in cure rates affect disparities in rejection rates. Answering these questions and others, we believe, will be an important asset as the need for effective and fair mail voting in the United States is increasingly recognized.

Citation we can use here: "Revised Code of Washington 29A.40.110: Processing incoming ballots." The code says "Personnel shall verify that the voter’s signature on the ballot declaration is the same as the signature of that voter in the registration files of the county. Verification may be conducted by an automated verification system approved by the secretary

of state.”

Mail voting in Washington proceeds through a number of well-defined steps. We give an overview of this process below, using dates from the 2020 general election.

1. Ballots are mailed to all voters at least 18 days before the election. Specific date(s) may vary by county.
2. The voting period begins 18 days before Election Day (October 16th). Any ballots postmarked, that is received and processed by the U.S. Postal Service, by Election Day (November 3rd) and received before the canvassing board meets are considered on-time. Ballots postmarked after Election Day are rejected for being late.
3. Ballots received on time by the state are either accepted or challenged. If accepted, the vote will be counted with no further input from the voter. If challenged for a non-matching or missing signature, the cure process begins.
4. Voters with (signature) challenged ballots must be notified by first-class mail of the challenge on their ballot and be informed of the process to cure the ballot.
5. Voters whose ballots are received within three days of the canvassing board’s meeting (but postmarked by election day) and voters who did not respond to the mail notification of their ballot challenge are contacted by phone, if possible.
6. Three weeks after the election (November 24th), the canvassing board meets and finalizes the election results. All challenged ballots which have not been cured by that date are not counted.

Do we need to close this section?

3 Data Overview: Rejection and Cures

Overview NEED A BETTER TITLE FOR THIS SECTION

Our analysis of the ballot rejection process in Washington is based on two sources of data provided by the state. The first is the state voter file containing each voter’s name, address,

gender, age, and history of electoral participation. The second is a series of 27 “matchback” files which were posted on each weekday (excluding Veterans Day) between October 21st and November 24th - the date at which election results were finalized and ballots could no longer be cured. Each file contains a record of every ballot received up to that date, with information on the status of the ballot (i.e. whether or not it had been challenged) and, where applicable, the reason the ballot was challenged.

Table 1: Final Status of Ballots

Ballot Status	Count	Percent
Accepted upon Reception	3,980,806	97.40%
Challenged and Cured	70,598	1.73%
Challenged, Never Cured	34,608	0.85%
Unresolved	1,249	0.03%

The November 2020 election, of course was unique in its national hyper-focus on mail voting and the U.S. Postal Service. Even in full-vote-by-mail Washington, there were effects that perturbed the usual patterns seen in ballot return data. This salience may have led voters in the state to be extra-vigilant that their mail ballot would be counted correctly. As shown in Table 1, there were 34,608(0.85%) ballots challenged but never cured, and 1,249(0.03%) ballots unresolved.⁶ The 0.88% rate of ballot rejections seen in November 2020 is notably lower than in previous general elections, which never dipped below 1.1%, and only half as much as the 1.6% of ballots rejected in that year’s primary (Wyman, 2021). It is possible that this vigilance led auditors in the state to scrutinize ballot materials more closely, but also likely that auditors, along with the state and other political actors, engaged in extra outreach to eligible voters to maximize ballot curing and minimize unresolved ballots.

Geographically, nine counties had rejection rates higher than state average. These counties include: Franklin (1.54%), Okanogan (1.28%), Clark (1.26%), Adams (1.22%), Kittitas (1.15%), Wahkiakum (1.07%), Snohomish (1.03%), King (0.91%), and Kitsap (0.89%). In Figure 2, we can see the counties with high rejection rates cluster in the south-east and

⁶Among the 1,249 unresolved ballots, 1,221 were received by Clark county on November 24th.

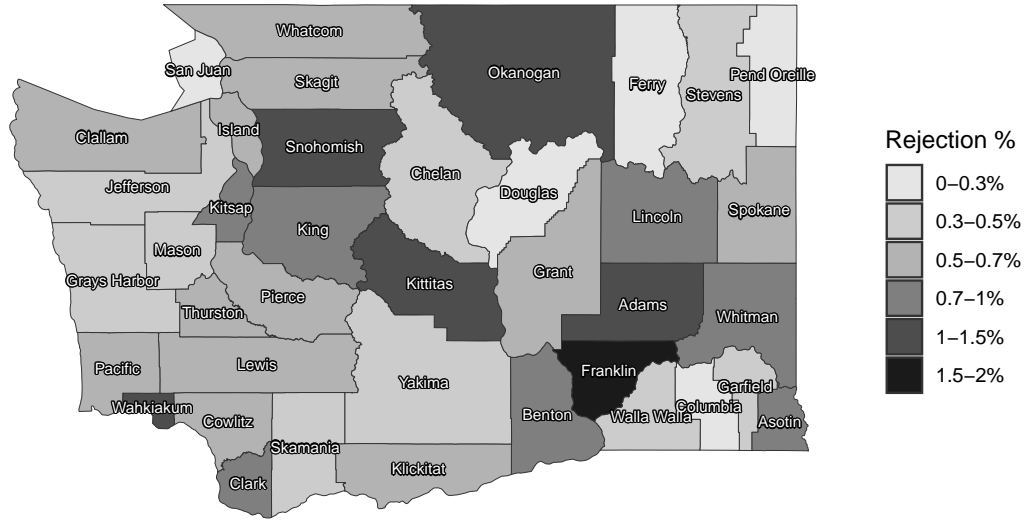


Figure 2: Ballot Rejection Rates, by County

middle-north areas.

The data also provide rich information of the challenge and cure process. As shown in Figure 3, the two signature-related challenge reasons (non-matching signatures and missing signatures) account for 51.87% and 10.58% of challenged ballots. Among the ballots challenged for these two reasons, approximately 57% were cured, which is lower than the overall cure rate of 67.10% across all reasons. The reason “Too Late” accounts for 2.32% of challenged ballots and had a cure rate of only 0.16%. All other reasons account for 8.15% of challenged ballots and had an average cure rate of 73.05%.⁷ The remaining 27.07% of challenged ballots did not have a reason specified, but 94.61% of them were quickly cured and accepted within 2-3 days.

We zoom in to the ballots that were challenged but never cured. The most common challenge reasons for those uncured ballots are shown in Figure 4. The two signature-related challenge reasons (Signature not Match and Unsigned) account for 68.12% and 13.91% of rejected ballots, respectively. The next 7.06% of rejected ballots were challenged for being

⁷The full list of challenge reasons and the counts in each category is provided in Appendix Table 3.

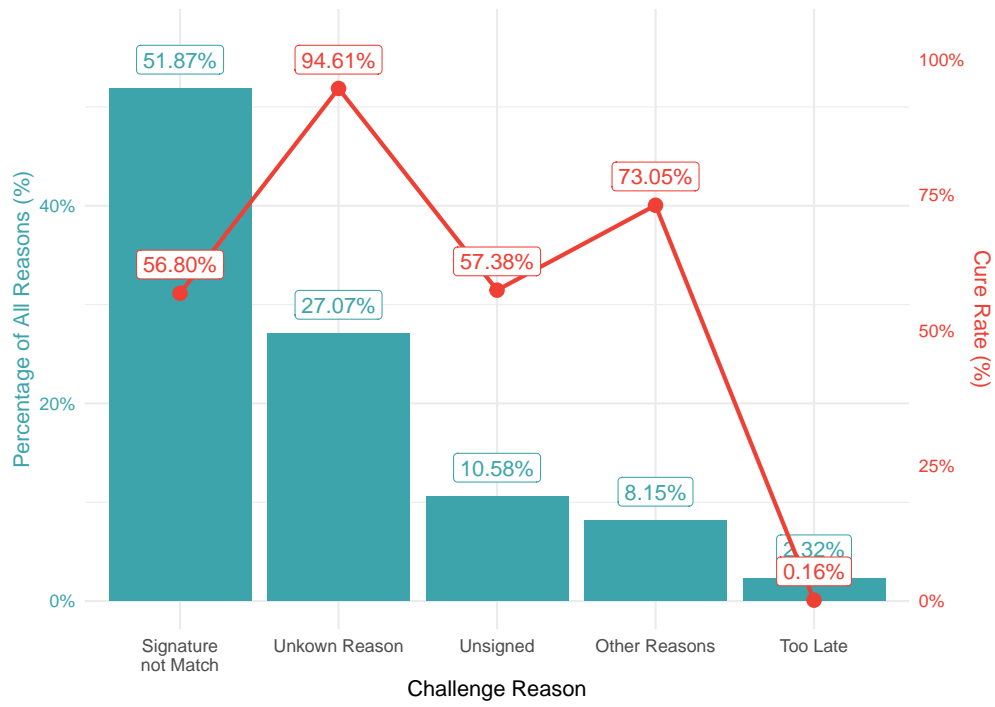


Figure 3: Challenge Reasons and Cure Rates

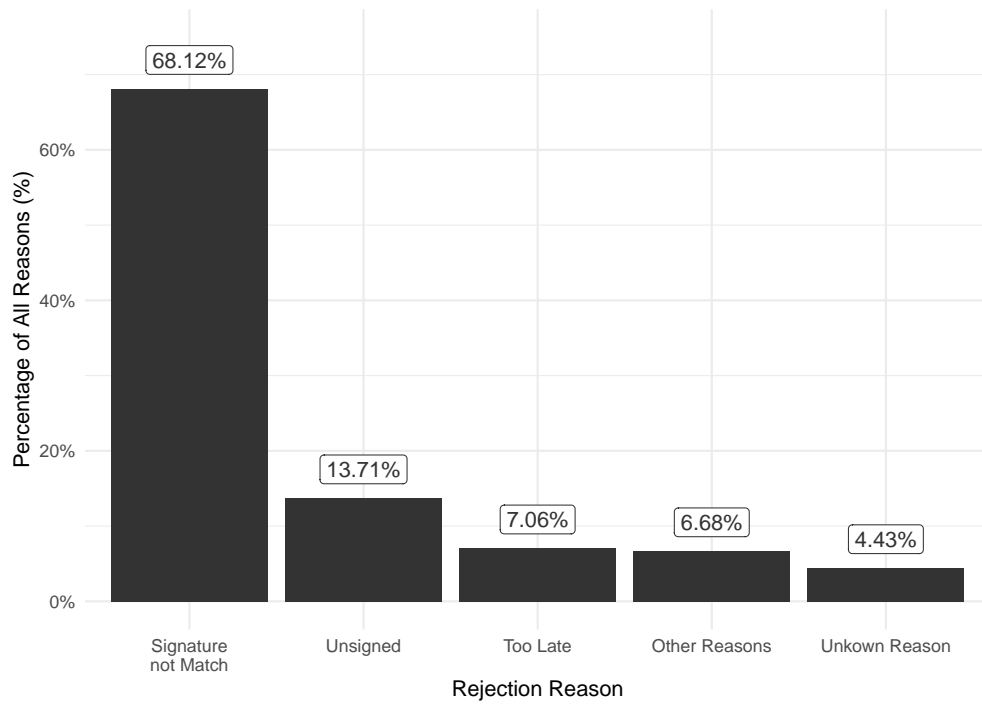


Figure 4: Most Common Reasons for Uncured Ballots

received late, and all other challenge reasons account for the 6.68% of rejected ballots. It is worth noting that this pattern is markedly different from the causes of mail ballot rejections in previous elections, both in Washington and the country overall. Previous state elections saw that between 25% and 60% of all rejections were due to ballots arriving too late, while only 8% of rejections in November were for tardiness (Wyman, 2021). According to data collected after the 2018 midterm election by the U.S. Election Assistance Commission, non-matching and missing signatures accounted for only 15.8% and 13.0% (respectively) of rejected mail ballots, while late ballots represented 26.9% of rejected mail ballots. The most common reason for rejection in the United States, though, was “Other” - which can include missing or incomplete ballot certificates, missing security envelopes, and many other problems [CITATION NEEDED].

These differences are the result of many factors and there is no published work dealing with the varying causes of ballot rejections by state (NEED TO CHECK CLAIM). Seriously addressing this question is beyond the scope of our work, but there are a couple particular aspects of Washington’s electoral system that are very likely to contribute to the over-representation of signature related ballot challenges. First, Washington accepts ballots up to two weeks after the election - far longer than most states - which likely means many fewer ballots are received after the deadline. What’s the second?

Since ballots with non-matching/missing signatures and late ballots make up virtually all rejected ballots in Washington, we will restrict our analysis going forward to ballots rejected for one of these reasons.

4 The Temporal Nature of The Cure Process

Ballot rejections are a natural endpoint for study because they directly reflect which votes are counted and which are not. However, in a state such as Washington that has a robust system whereby challenged ballots can be cured, examining the challenge/cure/rejection

process gives insight into important questions which cannot be adequately addressed through the study of rejection ballots alone. This is for a couple reasons.

First, at a basic level, rejected ballots are ballots that can be described as “challenged uncured” ballots - or ballots which are subject to an initial challenge and then are not cured by the time the results are finalized. The fact that this is a two-step process has implications for studying any disparities (along age or race, say) that emerge in the pattern of rejected ballots. It could be that challenge rates are similar across groups and that differential cure rates are driving the disparities. If this were the case, policies intended to reduce disparities in rejection rates would need to primarily reduce the disparities in cure rates. Of course, if the opposite were true, effective policies would focus on reducing the rate of ballot challenges.

Second, the cure process takes place over multiple weeks, and therefore, it has a temporal component that has to be examined separately from the whether or not particular ballots were rejected or accepted.

Ballot Challenges and Ballot Curing Over Time

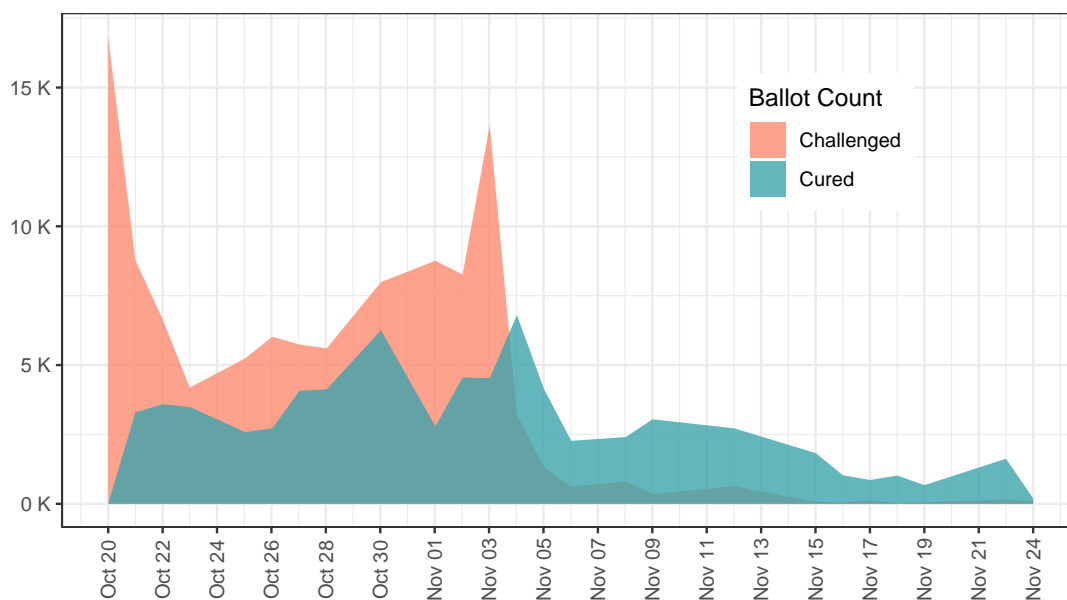


Figure 5: Daily Count of New Challenged & Cured Ballots

In Figure 5, we show the daily count of newly challenged and cured ballots. From the start date of ballot processing on October 20th to Election Day on November 3rd, an average of 7,000 ballots were challenged each day. Peaks in challenged ballots occurred on October 20th and November 3rd because, on October 20th, ballots had accumulated since October 16th, and a large portion of ballots arrived around Election Day. In contrast, the curing process progressed steadily throughout the entire period, with an average of 3,000 ballots cured each day.

Duration of Ballot Processing Stages

We show the average duration of each stage of ballot processing in Figure 6. The bars show on average how many days it took for the subgroup ballots to finish each stage, where black bars indicate days used for receiving ballots, red bars are days to make the first decision (accept/challenge), and the blue bars are days to cure the challenged ballots. Overall, it took on average 10 days to receive the ballots, 1 day to decide whether to accept or challenge a ballot, and 6 days to cure a challenged ballot.

The bars deviating from the averages provide interesting insights. The unresolved ballots were received on November 24th. Further study is needed to determine if they are connected to the "Too Late" rejections, which arrived around November 9th. The "Unknown Reason" challenged ballots took only 2-3 days to cure. The email and fax ballots were received very early, on October 16th, but processing did not begin until October 20th. Even after accounting for that delay, it still took longer than average to accept, challenge, and cure these ballots. A potential explanation is that processing digital ballots is different from physical ballots; the procedure may take longer, and there may be fewer people working on it. Non-standard mail ballots took 4 more days to receive, 1 more day to accept/challenge, and 14 more days to cure, making this method less efficient than other return methods. Lastly, demographic factors did not explicitly affect the duration of processing stages.

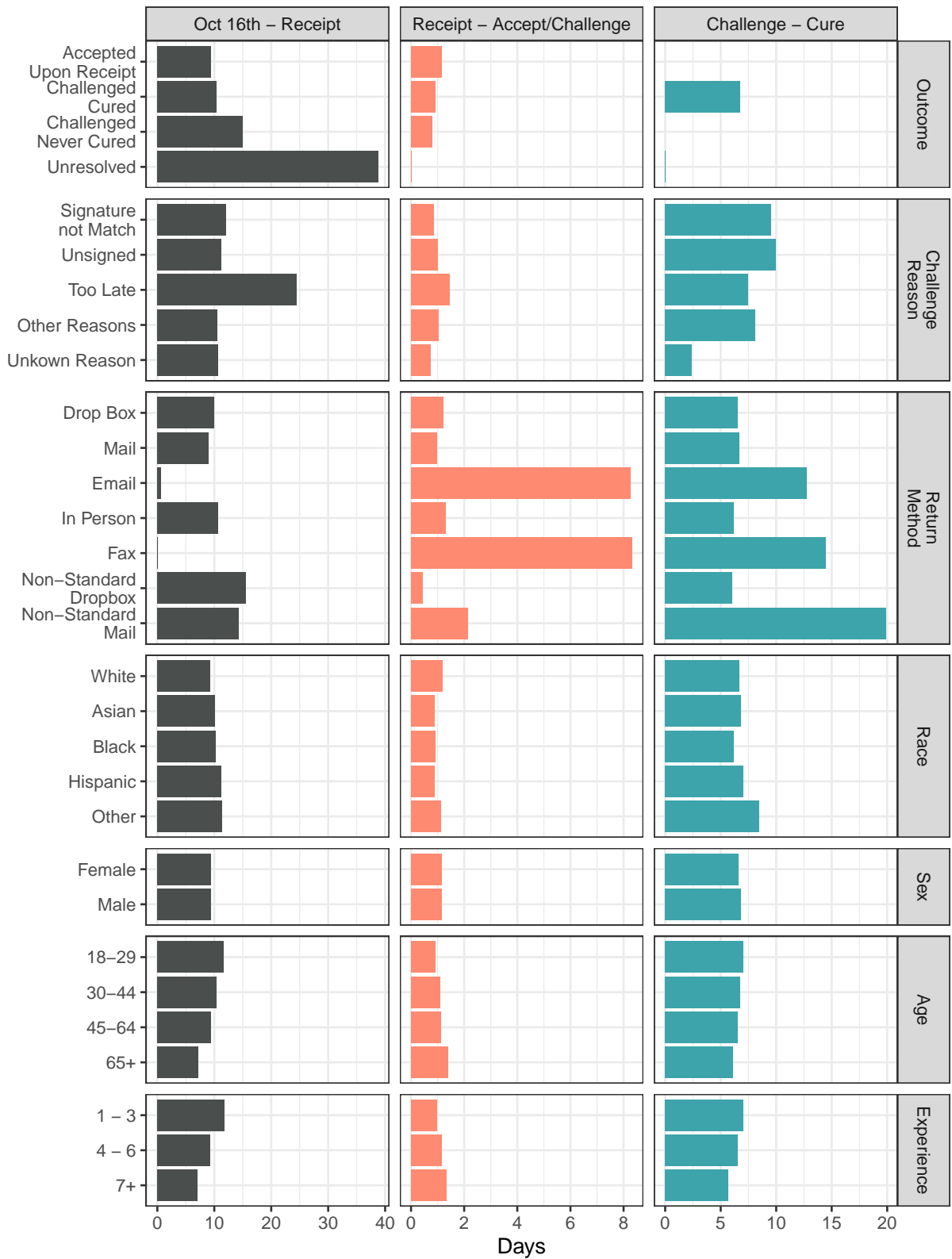


Figure 6: Duration of Ballot Processing Stages

5 Multinomial Logit Study

Voting rights have long been considered at the heart of civil rights in a democratic society [cite]. For this reason, any examination of the ballots which are submitted but not counted must pay particularly close attention to any group-level differences that arise in the rates at which this occurs. Previous research has identified several reasons that rates of ballot rejection may be elevated among inexperienced voters, voters of color, and young voters (Acevedo et al., 2020; Smith, 2018). For this reason, we will focus our initial analysis of rejected ballots on disparities in rejection rates across these categories.

There are a number of theoretical reasons why these groups may experience higher rates of ballot rejection, with signature matching being potentially most problematic.

In this section, we use a multinomial logit model to study the effects of administrative, demographic, and geographic factors on the key outcomes of ballot processing, which include being rejected for *Signature Not Match*, *Unsigned*, *Too Late*, overall uncured, and cured.

The multinomial logit models are defined as:

$$\ln \frac{\Pr(Y_i = \textit{Uncured-Signature Not Match} \mid X_i)}{1 - \Pr(Y_i = \textit{Accepted} \mid X_i)} = \beta_2 X_i \quad (1)$$

$$\ln \frac{\Pr(Y_i = \textit{Uncured-Unsigned} \mid X_i)}{1 - \Pr(Y_i = \textit{Accepted} \mid X_i)} = \beta_3 X_i \quad (2)$$

$$\ln \frac{\Pr(Y_i = \textit{Uncured-Too Late} \mid X_i)}{1 - \Pr(Y_i = \textit{Accepted} \mid X_i)} = \beta_4 X_i \quad (3)$$

The dependent variable Y_i is voter i 's outcome of the curing process, i.e.

$$Y_i \in \{\textit{Accepted}, \textit{Uncured-Signature Not Match}, \textit{Uncured-Unsigned},$$

$$\textit{Uncured-Too Late}, \textit{Uncured-Other Reasons}, \textit{Unresolved}\}.$$

The covariates X_i include three parts: administrative factors such as return methods, receive date; demographic attributes such as race, gender, age, and experience; and regional

group effects.

To be able to better interpret the results of the multinomial logit regression, instead of showing the estimates of the coefficients, we present average marginal effects in Figure 7. The average marginal effect shows that, if a covariate changes from the reference state to a target state, how much would it change the probability of resulting the specified outcome. Formally, average marginal effect for covariate k on outcome j can be written as:

$$AME_{j,k} = \frac{\sum_i ME_{i,j,k}}{N}$$

where N is the number of voter records, and marginal effect $ME_{i,j,k}$ is

$$ME_{i,j,k} = Pr(Y_i = j \mid X_i, X_{i,k} = 1) - Pr(Y_i = j \mid X_i, X_{i,k} = 0)$$

In Figure 7, we show the impacts of administrative, demographic, and geographic factors on ballot rejections. The points and confident interval bars show the marginal effects of factors (rows) on outcomes (columns). The marginal effects are black if they are significant at $P < 0.05$ level, and are gray if they not significant ($P > 0.05$). Visually, the significant effects have their confident intervals away from the zero dash line. For example, the positive black point and confident interval for variable *Male* in the first column indicate that comparing to females, males' ballots have approximately 0.2% higher probability to be rejected due to signature not match.

We first focus on the administrative factors. As observed in Figure 7, ballots received late had a higher likelihood of being rejected for all reasons (signature mismatch, unsigned, or too late). Compared to mail-in ballots, other return methods were less likely to be rejected due to signature mismatches or being late. Non-standard methods and emails had a higher probability of missing signatures, which is uncommon for in-person, fax, and drop-box ballots.

Regarding demographic factors, compared to white voters, voters of color were more

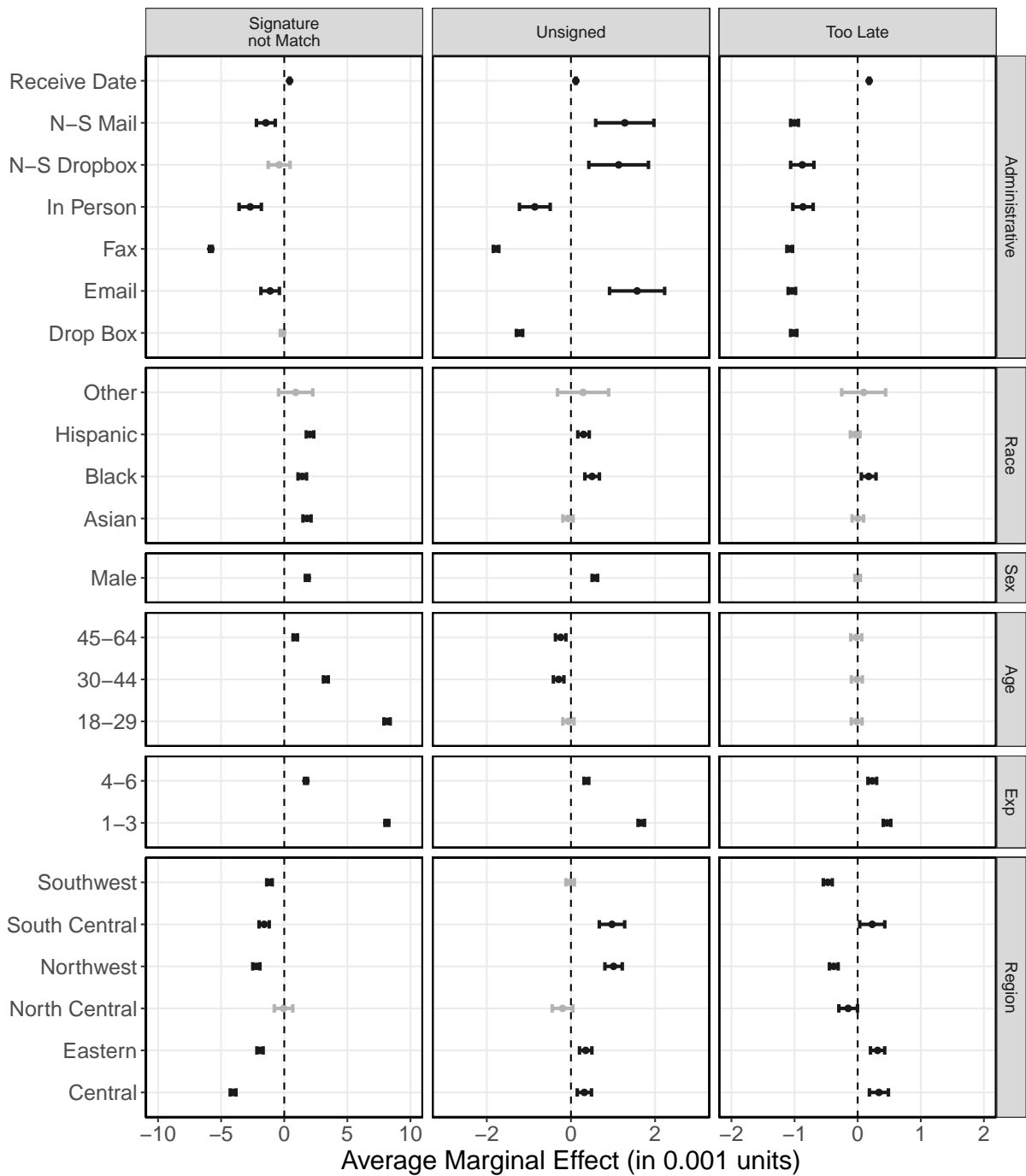


Figure 7: Impacts of Administrative, Demographic, and Geographic Factors on Ballot Rejections

likely to have their ballots rejected due to signature mismatches. Ballots from Black voters had a higher probability of being rejected due to missing signatures or being received late. Similarly, ballots from Hispanic voters were also more likely to be rejected for missing signatures. Male voters had a higher chance than female voters of having their ballots rejected due to signature issues. Among all factors, age groups and experience levels were the most prominent in ballot rejections. The younger and less experienced the voters, the higher the probability their ballots were rejected for signature mismatches. Less experienced voters also had a higher likelihood of forgetting to sign their ballots or sending them late. Compared to voters aged 30–64, voters over 65 were more likely to have "Unsigned" rejection. There were no disparities between age groups in the "Too Late" rejections.

Geographically,⁸ compared to the Puget Sound area, where Seattle is located, most other regions have a lower probability of signature mismatch issues. The South Central, Northwest, Eastern, and Central regions are more likely to have missing signature problems. The South Central, Eastern, and Central regions also have higher rates of ballots returned late, while such issues are less frequent in the Southwest, Northwest, and North Central areas.

6 Conclusion and Discussion

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⁸To avoid multicollinearity, we group counties into 7 regions: Puget Sound region: King, Pierce, Snohomish, Kitsap, Island; Northwest: Whatcom, Skagit, San Juan, Clallam, Jefferson; Southwest: Clark, Cowlitz, Lewis, Pacific, Wahkiakum, Grays Harbor, Thurston, Mason; Central: Chelan, Douglas, Kittitas, Yakima, Grant; Eastern: Spokane, Whitman, Asotin, Garfield, Columbia, Walla Walla, Franklin; North Central: Okanogan, Ferry, Stevens, Pend Oreille; South Central: Benton, Klickitat, Skamania.

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Supplementary Material

Table 2: Ballot Count by Demographic Groups (Row Percentage)

Category	Group	Accepted Upon Receipt	Challenged Cured	Challenged Never Cured	Unresolved
Total		3,980,806 (97.40%)	70,598 (1.73%)	34,608 (0.85%)	1,249 (0.03%)
Race	White	3,416,917 (97.62%)	56,669 (1.62%)	25,603 (0.73%)	1,072 (0.03%)
	Asian	194,756 (96.29%)	4,711 (2.33%)	2,764 (1.37%)	37 (0.02%)
	Black	156,166 (96.21%)	3,717 (2.29%)	2,412 (1.49%)	17 (0.01%)
	Hispanic	203,885 (95.73%)	5,282 (2.48%)	3,690 (1.73%)	120 (0.06%)
	Other	9,082 (96.18%)	219 (2.32%)	139 (1.47%)	3 (0.03%)
Gender	Female	2,071,263 (97.76%)	33,357 (1.57%)	13,396 (0.63%)	609 (0.03%)
	Male	1,909,414 (97.17%)	37,224 (1.89%)	17,823 (0.91%)	623 (0.03%)
Age	18 - 29	592,096 (94.22%)	22,031 (3.51%)	13,801 (2.20%)	467 (0.07%)
	30 - 44	983,713 (96.83%)	22,245 (2.19%)	9,630 (0.95%)	335 (0.03%)
	45 - 64	1,361,833 (98.30%)	17,523 (1.26%)	5,830 (0.42%)	268 (0.02%)
	65+	1,043,035 (98.97%)	8,782 (0.83%)	1,958 (0.19%)	162 (0.02%)
Experience	1 - 3	1,513,135 (95.21%)	44,546 (2.80%)	30,405 (1.91%)	1,133 (0.07%)
	4 - 6	1,014,415 (98.20%)	15,248 (1.48%)	3,252 (0.31%)	81 (0.01%)
	7+	1,453,256 (99.20%)	10,804 (0.74%)	951 (0.06%)	35 (0.00%)
Method	Drop Box	1,991,316 (97.84%)	31,236 (1.53%)	12,695 (0.62%)	2 (0.00%)
	Email	27,400 (96.06%)	826 (2.90%)	296 (1.04%)	3 (0.01%)
	Fax	428 (98.17%)	8 (1.83%)	0 (0.00%)	0 (0.00%)
	In Person	20,308 (98.64%)	195 (0.95%)	85 (0.41%)	0 (0.00%)
	Mail	1,922,476 (97.14%)	37,691 (1.90%)	17,659 (0.89%)	1,227 (0.06%)
	Non-Standard Dropbox	9,518 (93.88%)	389 (3.84%)	231 (2.28%)	0 (0.00%)
	Non-Standard Mail	8,945 (94.94%)	234 (2.48%)	243 (2.58%)	0 (0.00%)

Table 3: Ballot Curing by Challenge Reason

Challenge Reason	Total	Cured	Never Cured	Curing Rate
Signature Does not Match	54573	30998	23575	56.80%
Unsigned	11136	6390	4746	57.38%
Other than Voter	2549	1965	584	77.09%
Too Late	2446	4	2442	0.16%
Ballot Style Change	1949	1408	541	72.24%
ID Required	1120	920	200	82.14%
No Signature on File	1071	952	119	88.89%
Hold	560	226	334	40.36%
Federal Write-in Absentee Ballot	393	365	28	92.88%
Voter Name Change	221	210	11	95.02%
Canvassing Board	202	111	91	54.95%
Empty Envelope	136	11	125	8.09%
Witness Signature Missing	128	58	70	45.31%
Deceased	124	0	124	0.00%
Marked Moved	77	0	77	0.00%
Power of Attorney	39	34	5	87.18%
Invalid	7	5	2	71.43%
Unkown Reason	28475	26941	1534	94.61%

Table 4: Multinomial Logit Models for Ballot Rejection and Challenge Reasons (AMEs)

	Ballot Status (base outcome: Accepted upon Reception)			
	Challenge Never Cured	Non-matching Signature	Unsigned	Late
	(1)	(2)	(3)	(4)
Male	0.002*** (0.0001)	0.002*** (0.0001)	0.001*** (0.00003)	0.00001 (0.00002)
Age: 18-29	0.010*** (0.0001)	0.009*** (0.0001)	0.0002*** (0.0001)	0.0004*** (0.00004)
Age: 30-44	0.004*** (0.0001)	0.004*** (0.0001)	-0.0001* (0.0001)	0.0001** (0.00004)
Age: 45-64	0.001*** (0.0001)	0.001*** (0.0001)	-0.0001** (0.0001)	-0.00001 (0.00004)
Asian	0.003*** (0.0002)	0.002*** (0.0002)	0.0001 (0.0001)	0.00003 (0.00005)
Black	0.003*** (0.0002)	0.002*** (0.0002)	0.001*** (0.0001)	0.0002*** (0.0001)
Hispanic	0.002*** (0.0002)	0.002*** (0.0001)	0.0004*** (0.0001)	0.0001* (0.00005)
Other	0.001 (0.001)	-0.0001 (0.001)	0.0003 (0.0003)	0.0005* (0.0003)
Elections since 2017: 4-6	-0.010*** (0.0001)	-0.008*** (0.0001)	-0.002*** (0.00005)	-0.001*** (0.00003)
Elections since 2017: 7+	-0.013*** (0.0001)	-0.009*** (0.0001)	-0.002*** (0.00004)	-0.001*** (0.00003)
Constant	0.000*** (0.000)	0.000*** (0.000)	0.000*** (0.000)	0.000*** (0.000)
Observations	4,083,716	4,083,716	4,083,716	4,083,716

Note:

*p<0.1; **p<0.05; ***p<0.01