

Introduction and Literature Review

Can vote-by-mail mitigate the error problems associated with ranked-choice voting? Implementation of ranked-choice voting across the United States has been applied in various states like Maine and Alaska and municipalities such as San Francisco, New York City, and more. Many of these places also permit vote-by-mail, which in combination with ranked-choice voting could ameliorate many of the problems voters have in errors. Various studies have found that error rates when voters rank preferences is substantially higher than plurality voting (Pettigrew & Radley 2023), that voters tend to vote in specific patterns even when ballot order is randomized (Atsusaka 2023), that voters tend to be “confused” when following ranked-choice voting (Atkeson et. al. 2024) and that local election officials themselves are skeptical of its benefits (Anthony et. al. 2021). However, is it possible that vote-by-mail could mitigate the problems raised in the literature? I expect that it could because when voters vote absentee, they typically have more time to consider the candidates, electoral rules, and ballot than when they vote in-person.

In the comparative literature, preference voting systems are also shown to make strategic voting more difficult (Dellis & Kroger 2024). This is because it is more difficult for voters to know who has the highest probability of winning when they must rank their preferences since they have imperfect information on how their votes will be counted. However, they find that voters still employ heuristics when ranking preferences such as burying and lifting based on which candidates they prefer. Burying a candidate in preference voting is a heuristic used that assigns a candidate a lower ranking when that candidate has less of a chance of winning while

lifting is a heuristic that raises a candidate that voters perceive as having a better chance of winning. For example, during RCV implementation, Republicans in Maine often emphasized marking just one preference while Democrats stressed spreading preferences (Anthony, et. al 2021). Democrats preferred complete ballots because reshuffling of votes give incentives to campaign for non-first preference votes to get votes at different levels. Therefore, candidates running in preference vote systems seek both first preference votes, and also seek lower preference rankings because voting usually extends beyond the first ranking. This is usually an optimal strategy to pursue which is augmented even more in multi-member districts because candidates often do win because of lower preferences.

Most of the literature considers ranked-choice voting in isolation separate from vote-by-mail, but the implications of both together have been understudied. The vote-by-mail literature focuses on how age and partisanship differences determine proclivities to vote by mail (Atkeson et. al. 2023), how Donald Trump's skepticism likely decreases support among Republicans (Clinton et. al. 2020), and how vote-by-mail increases turnout (Alvarez & Li 2024). Vote-by-mail's impact on voter turnout would be another reason to expect that it could offset many of the drawbacks of ranked-choice voting such as the increased numbers of errors, partisan bias in its adoption, and the difficulties associated with strategic voting. In elections that do not use ranked-choice voting, global vote-by-mail (henceforth, VBM) is shown to increase voter turnout roughly 3-4% compared to those who do not receive a ballot (Alvarez and Li 2024). Alvarez and Li (2024) looked at turnout rates at the extreme end of VBM – when every voter is sent a mail-in ballot – called “global vote-by-mail” and found that it increased voter turnout by roughly 3-4% on average. It accomplished this by lowering the cost of voting in terms of the time required to drive to a polling location, but none of the literature has looked at how the

benefits of VBM interact with RCV. Alaska, which permits vote-by-mail, has a much lower rate of voting by mail than in-person voting. It is especially more pronounced among those who are registered partisans than those who lack a partisan affiliation. However, this increase in turnout is also not partisan in nature, as some have found no partisan increase in turnout or vote share (Thompson, et. al. 2020). While voter turnout and error rates are two separate issues entirely, the literature does not examine the RCV and VBM together to see if there is a mitigating effect on the drawbacks of RCV (error rates) or if RCV could deter the positive impact of VBM. In other words, I am interested in if there is a symbiotic relationship between VBM and RCV – if the two mutually reinforce each other and correct the flaws of the other – or if their relationship is more parasitic – one hinders the positive impact of the other.

What is missing in this literature is if there is any mitigating effect of VBM on the error rates of ranked-choice voting and how voters interact with their VBM ballot. Individuals who rank preferences have a substantially higher rate of errors – defined in my research as those who overvote and those who skip a rank – than non-ranked choice elections. An overvote is when the same candidate is marked for more than one preference or two candidates are given one preference (i.e., candidate A is picked in the first preference and second preference, or some combination of that). Meanwhile, a skip is when a preference gets skipped over for other preferences (1, 2, 4) or (2, 3, 4). I seek to answer the question of if errors are more common when voting by-mail as opposed to voting in person. The literature to this point addresses both topics separate from each other, but I seek to bridge these two literatures together. In my analysis I compare elections in Alaska – where both vote-by-mail and ranked-choice voting are used, and the data is available. I also examine how salience, measured by what level an electoral contest –

whether national, state-wide, or locality – is and how that influences skip rates and ballot rejection rates.

I expect that voters who vote by mail will be more likely to complete their ballot with fewer errors when ranking their preferences because they have more time to think about the electoral rules and who the candidates are. Voters have more time to spend learning the electoral rules and to do research both on how ranked-choice voting works and into the candidates and are therefore less likely to make mistakes. I also expect that there will be differences at higher salience elections (i.e., federal elections vs state-level) because the candidates are more recognizable and have a larger profile at higher levels. Therefore, voters will be more likely to be informed and more likely to vote successfully with fewer errors. Overall, I test two main hypotheses in my analysis:

H1: Individuals who vote-by-mail are *less* likely to make errors when casting their ballots than individuals who vote in-person early or on election day

H2: The error rate should be *higher* in lower salience elections than in higher salience elections

I would expect to find results supportive of both hypotheses for multiple reasons. For hypothesis one, I would expect voters who vote-by-mail to make fewer errors because they have more time to consider their responses. Meanwhile, I would expect to find more errors for lower salience races when compared to higher salience races because of a knowledge deficit at the lower level when compared to the higher level. Voters are likely to be more familiar with who is running for president or US House than they are to be about who is running in their own locality for state house. I attempt to tease this out in two ways: first, by looking at the overvote and skips at the rank level. Not knowing who the candidates are would show up through how often the first rank is skipped as voters who do that are either ignorant of their options, submit a blank ballot

for protest, or accidentally skip the first rank. The second way I test these relationships is through looking at the rejection rates of ballots as the rank level is limited because partial ballots are still acceptable forms of voting in Alaska. I would expect voters in lower salience races to have their ballots rejected more often because of ignorance of the candidates or indifference about the race. I would also expect rejection rate to differ across method because it is usually committed voters who fill out a mail-in ballot (Alvarez & Li 2024), so mail-in votes I would expect to be rejected at lower rates since more committed voters tend to vote-by-mail.

Data and Methods

The data I use to test my hypotheses came from the constituent voting records (CVRs) in the state of Alaska. I chose Alaska because it had the most comprehensive data of all places that use RCV as it and Maine are the only states that use it at all levels of elections. I ended up using the CVR data from Alaska for two reasons: first, it was the only data that included vote method (VBM vs. early and election day) and second, it is used at multiple salience levels from the 2020 Democratic presidential primary to all state house elections. Other CVR data is either at the locality level (like New York City, San Francisco, Berkeley, and more) or lacks the necessary information about if VBM or in-person voting methods were used (Maine). The Alaska dataset will allow me to get leverage over both the rank level errors as well as a separate calculation over the rejection of specific ballots.

I look at five elections in Alaska at varying salience levels. I assume that information is free and much more available for top of the ballot statewide contests including the presidential primary, the US House race and the governor race, and that down ballot contests such as the state house elections have less easy information and is therefore much less salient making it more difficult to rank candidates. Importantly, the presidential primary election also utilizes

ranked-choice voting, but unlike the other election contests, voters are allowed to rank five candidates while the other elections only permit ranking four. Unfortunately, the presidential primary data does not also record vote method, so I can only use the primary to establish a baseline level of error. To test error rates, I isolate voters who used VBM versus those who did not. I then see what percentage of each method had errors (overvotes and skips) and perform t-tests to see if the percentage difference between the two is statistically significant or not. I collapse early voters and Election Day voters to those who voted in-person while those who turned in a mail-in ballot in person were counted with the VBM group.

I also examine which ballots are getting rejected. To do this part of the analysis, I look at the voter level to see what ballots in each contest are not counted in Alaska's counting procedure and what the overall rejection rate of ballots are. To do this part of the analysis, I hand calculate ballot rejection rates in each election. I find this by totaling the completed ballots (all preferences filled out) and partial ballots (1-3 preferences properly filled out) and take the difference between the total number of ballots. In Alaska, ballots are rejected if they are not sequentially ordered. In other words, if a ballot has a skip in rank 1, ranks 2 and 3 filled out, and a skip in rank 4, this ballot would be rejected. They must be ordered properly sequentially to count. It is important to note that the presidential primary data does not report method while the other levels do. Therefore, for all results, the presidential primary data is for all method types. While this is might be a setback, I still included it in the crosstabs results as a baseline for a high salience election in Alaska. The result of this analysis suggests that there are differences between vote-by-mail and in-person voting.

The variables tested from each dataset include the vote method (VBM vs. collapsed in-person), and different election levels along with error rates. Unfortunately, given the

limitations of the data, for this early analysis I am limited in performing t-tests to see if the differences at the rank level are statistically significant or not. The CVRs do not report important covariates such as race, ethnicity, gender, partisanship, or any other important variables that could be impacting voters' error rates. Therefore, it is difficult to put much credibility in any findings, but what I do find can be interpreted as suggestive of a relationship between election salience, error rates, and vote method. In future research, it would be possible to do census matching in attempts to more accurately impute the demographic and partisan dynamics of Alaska into the analysis.

Case Selection

I am primarily interested in studying the relationship between VBM and RCV elections in the state of Alaska for two reasons. First, there is the issue of data availability. As mentioned, the data for Alaska contains the required information about how individuals vote in terms of VBM and has multiple levels of RCV use. Alaska's error rate has been found to be lower than other RCV settings such as Maine, San Francisco, and New York even though Alaska implemented RCV more recently than those places (Pettigrew and Radley 2023). However even with Alaska's lowered error and rejection rates relative to other places utilizing RCV, it is still higher than non-RCV elections across the country which would suggest that a main drawback of RCV is its propensity to produce higher rates of rejection and error. What Pettigrew and Radley did not test is if there are differences when you test for voting method – in-person vs. vote-by-mail.

In Alaska, vote-by-mail is permitted across the state for all elections, but the vote-by-mail rate is much lower than other places that permit it. While this produces a biased sample – with drastically lower rates of VBM than in-person, of course error rate and rejection rate would be

lower – I address this problem by taking the mode and comparing within mode to one-another. This is important because Alaska differs from other RCV localities and states for having a lower error rate but rejecting more ballots because of its rules of not counting non-sequential ballots. Alaska as a case makes sense because of its data availability, but also the fact that it is on the lower end of using vote-by-mail so any effect of VBM might be more muted if anything.

Results: Preliminary Results

Based on Figures 1 and 2, there is some descriptive evidence that electoral salience matters in terms of error rates. The highest salience election I assumed was the national-level presidential race. It is important to say that the presidential primary voting data did not separate VBM and in-person voting, so both lines in Figures 1 and 2 are the same – it remained included to establish a baseline. When looking at the descriptive evidence, both Figures 1 and 2 suggest that the lowest salience elections (the state house districts) have higher error rates than both higher salience races (the governor and US House). It is important to point out the high error rates systematically for all elections especially at higher ranks. For example, all four elections have an error rate of over 80% in rank 4 irrespective of method used. This is likely because of partial ballots that skipped the rank. The systematic higher percentage of error in ranks 3 and 4 especially can be explained in three ways: first, that voters are unfamiliar with many candidates beyond the major party candidates. For example, the US House election featured three prominent candidates: two Republicans (former governor Sarah Palin and the grandson of a former US Representative, Nick Begich III) and a Democrat (former city councilor Mary Peltola). Outside of these three candidates, the “fourth” candidate would have been either a minor party or lesser candidate or write-ins.

The second reason that there are jumps in the error rate as the rank increases could be due to the lack of well-known candidates. Therefore, one reason pins the error rate on voters not knowing the candidates while the second suggests that the error rate is due to the lack of candidates in the first place. For example, the state house candidate jumps in error at rank 2 could be due to problems with RCV or due to the lack of known candidates outside the one candidate individuals wish to vote for. While this may seem problematic for my hypotheses that the error rate could be due to issues with either candidate supply (i.e., there are no serious candidates outside a certain rank, so why rank them) or voter knowledge (i.e., voters are generally unaware of who their options are), I do not think this is as much of a problem. An interpretation of Figures 1 and 2 could be that the error rate is baked in because of these two processes, it would still support the hypothesis that election salience makes a difference in the error rate.

The third reason why the error rate could be systematically high is because of discarded ballots varying between different election levels. In other words, while partial ballots could be driving the spike in error rates, it could also be the case that the error rate is influenced by rejected ballots. In Alaska, ballots are rejected if they are not sequential, so if there is an error in rank 1, then rank 2 and 3 have votes, and an error in rank 4 this ballot would not count. In contrast, most RCV systems would still count a non-sequential ballot as it would assume the lowest preference is first, so if someone marked 2 and 3 correctly, it would be imputed as 1 and 2 and counted. Alaska does not do this and would instead reject that ballot entirely, which could lead to a higher rejection rate in Alaska than other RCV settings. The error rate could, in part, also be driven by ballots that are genuinely rejected by Alaska's electoral rules.

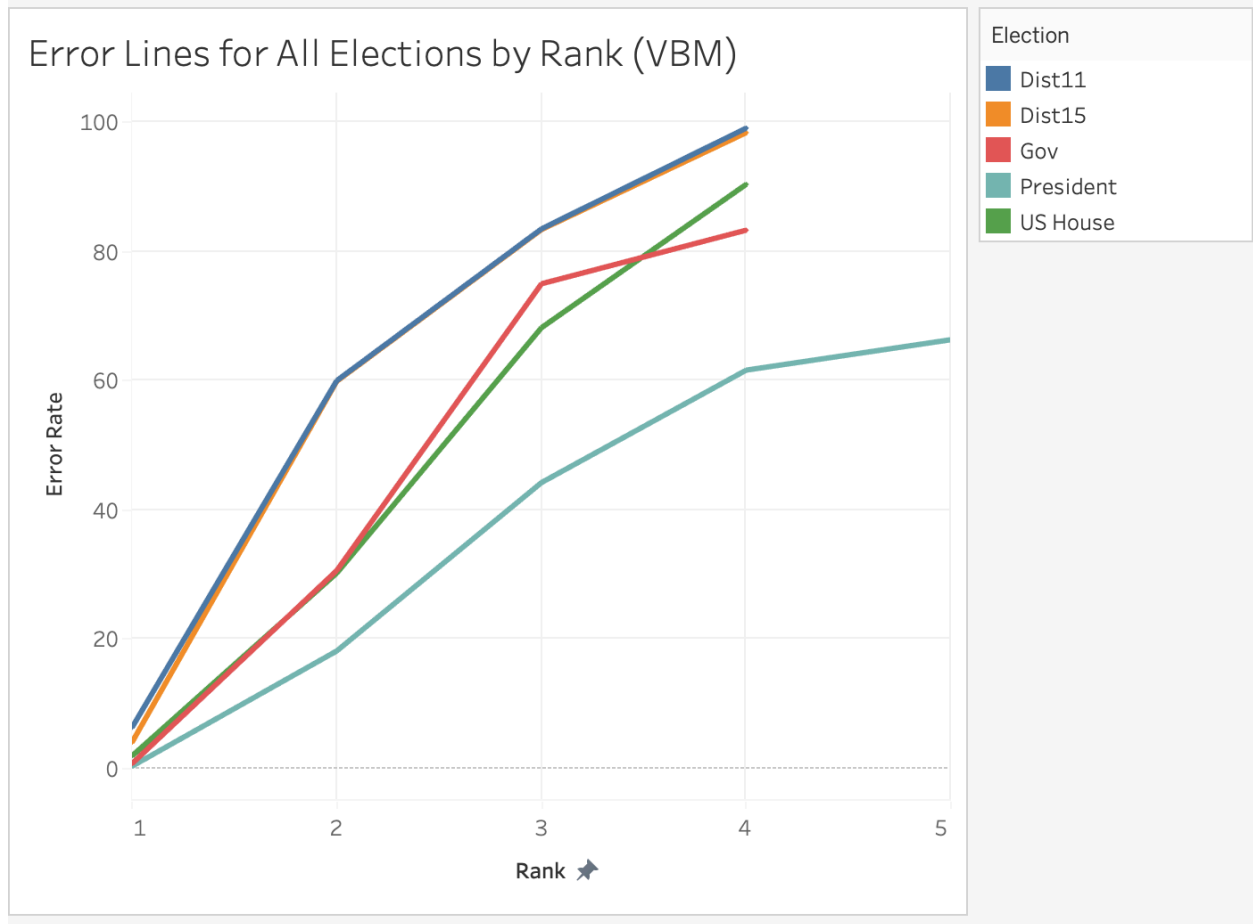
While all three of these reasons are likely driving the error rates – especially at higher ranks – the question becomes how much of a problem for my hypothesis this is. My hypotheses were that there are differences both in voting method and election salience level drives up the error rate. The error rates at the first rank provide an interesting insight into both hypotheses as these are likely either voters who fundamentally misunderstood the mechanics of RCV or they purposely turned in a blank ballot. In other words, given that ballots must be sequential, rank one errors are decent indicators (though not perfect) of the rejection rate between the election types. At the rank level, whether the supply of candidates is present or not is not relevant to the hypotheses as it still demonstrates that there are differences at different salience levels irrespective of what the reason for the variation is.

Figure 1 shows the error rate at each rank on a vote-by-mail ballot in the state of Alaska at different election levels. This is simply calculating how often each rank is skipped or overvoted in the two state house races (the blue and orange lines in Figures 1 and 2), the gubernatorial election (the red line), the US House Special Election (the green line), and the presidential primary (the cyan line) at each rank. The plots show the percentage of skips or overvotes (i.e., the error rate) in each rank (1-4 for all elections except for the presidential primary which goes to rank 5). On the y-axis is the percentage of skips or overvotes collapsed into an error percentage while the x-axis has each of the corresponding ranks. The lower salience races permit Alaskans to rank among four candidates (in the US House race, it was Nick Begich and Palin for the Republicans, Mary Peltola for the Democrats, and Write-In candidates). Strikingly, there is almost near perfect overlap for the two state house races – which suggest that for each rank, the error rate at both state house races is very close to each other. Further, the two state house races have higher error rates at all ranks across method, which would imply that there

is at least descriptive or preliminary evidence of salience mattering consistently. Figure 1 considers these trends for VBM voters while Figure 2 considers these trends among in-person (i.e., Early Voters and Election Day Voters).

Of particular interest is both the comparison between each of the elections within voting method but also the differences between the elections across voting method. In other words, I am primarily interested in both the differences within VBM and in-person for each election (so the differences between each election in each plot) and how each election differs from one method to the other. Thus, if the trend lines are systemically higher or lower for the state house elections for voters who used VBM versus those who voted in-person. The descriptive evidence suggests that the percentages of errors for VBM voters is usually *higher* than it is for in-person voters. I am also interested in the error rates at the first rank since these ballots are rejected and would suggest a lack of familiarity with the candidates.

Figure 1: Error Rate for All Elections for Vote-By-Mail Voters and Presidential Primary

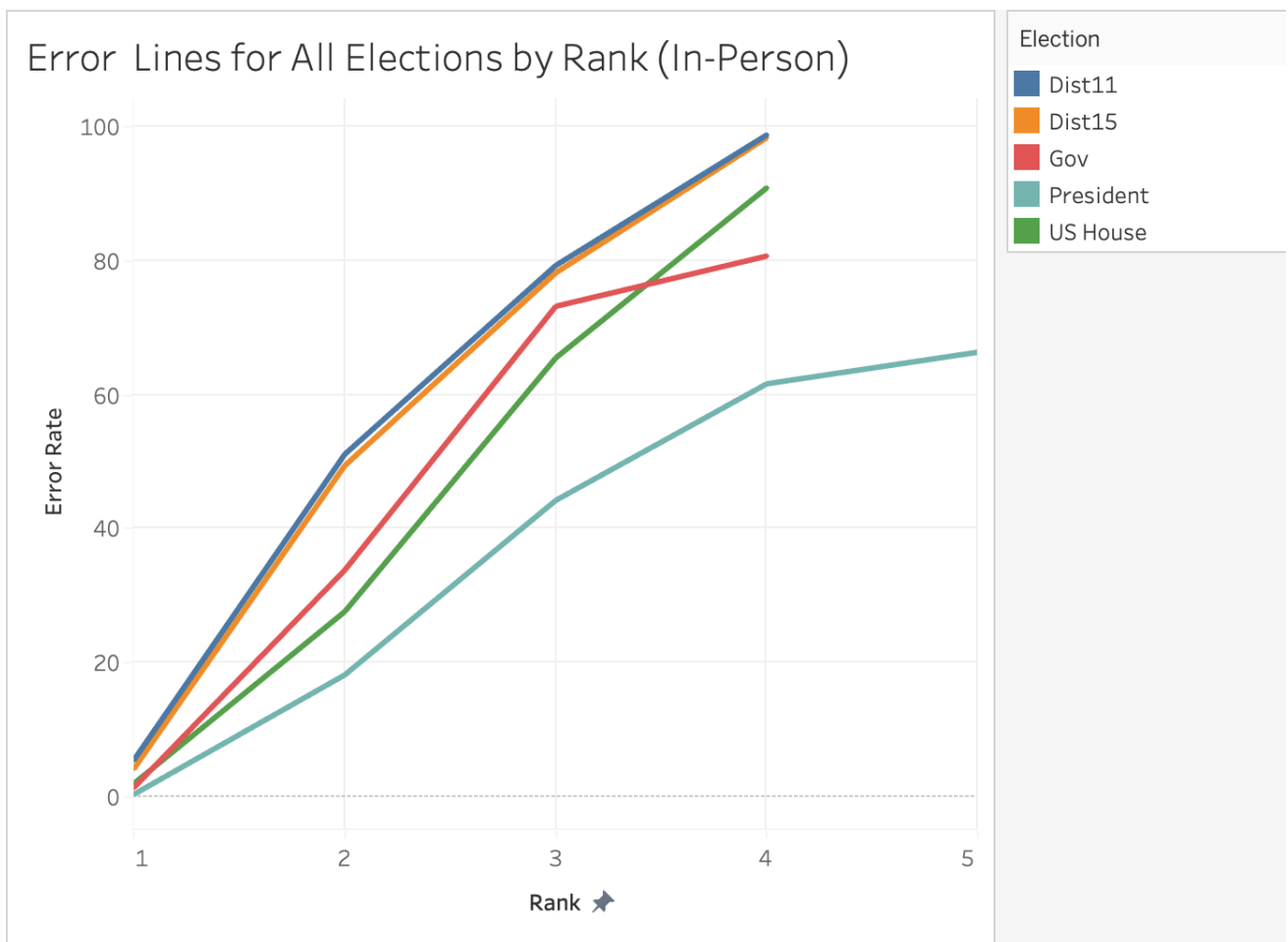


The results of the higher salience races having fewer errors at each rank holds across the board for both vote-by-mail and in-person. Based on these preliminary descriptives, there seems to be suggestive evidence that election salience matters, but not on the mode. Therefore, at least this part of the analysis is supportive of hypothesis 2. Election salience does make a difference in terms of the rate of errors and how quickly error rate accelerates. Moreover, there are more errors at rank 1 in the lower salience races than either the medium or highest salience races. While this seems to hold at the descriptive level, I use t-tests next to assess the statistical significance of differences at the rank level between VBM and in-person voting.

Figure 2 does a similar calculation to Figure 1 for in-person voters and descriptively, the same relationship seems to hold across ranks. The gap between the state house races and the

gubernatorial races does decrease, which would suggest that in-person voters could be committing *fewer* errors at the state house elections or that the higher salience races have *more* errors for RCV in each rank. However, the striking overlap at the state house level is still present which would be supportive of the idea that as a lower salience race, there is more of a skipping problem. Another quantity of interest would be skips or overvotes in rank 1 because those ballots are going to be rejected by Alaska's election laws, and there tends to be a higher error rate in rank 1 for state house races in both methods relative to

Figure 2: Error Rate for All Elections for in-Person Voters (Early and Election Day) and Presidential Primary



In terms of hypotheses 1 and 2 about vote-by-mail curbing errors, the evidence is much less decisive based on Table 1 below. Depending on the election, errors can be *more* common when voting by mail compared to voting in person. For example, in State District 11 there are more errors at every rank in vote-by-mail than at all ranks in-person. However, vote-by-mail voters in rank 2 for the governor race were less frequently skipping or over-voting. Performing chi-square tests, some of the differences between ranks and methods are significant, but others are not. Thus, based on the evidence presented, hypotheses 1 and 2 lack credible support, but it is important to note that the errors looked at are often summed (i.e., those who made errors in rank 2 may have also made errors in rank 1). My current plots do not speak to this possibility – I will consider the evidence from ballot rejections in the subsequent results section.

Meanwhile in Table 1, VBM is usually related to more errors as only those in bold have VBM have a lower percentage than in-person voters. In other words, in these cases, VBM acts in the hypothesized way, but is associated with *more* errors than for in-person voters. Therefore, based on the evidence presented in Table 1, hypothesis one is not supported because for most cases, VBM has a higher error rate than in-person. One limitation of this analysis, however, is that it does not differentiate between rejected ballots and partial ballots that are still counted.

Table 1: Statistical Tests at Each Rank

Election	Rank	P-Value	Mean (VBM)	Mean (In-Person)	Difference
US House	1	0.505	0.019	0.019	0.000
	2	$< 2.2e - 16$	0.302	0.28	0.022
	3	$< 2.2e - 16$	0.68	0.66	0.020
	4	0.012	0.904	0.91	-0.006
Alaska Governor	1	$< 2.2e - 16$	0.007	0.013	-0.006
	2	$< 2.2e - 16$	0.31	0.34	-0.03
	3	$< 2.2e - 16$	0.75	0.73	0.02
	4	$< 2.2e - 16$	0.83	0.81	0.02
House District 11	1	0.118	0.063	0.054	0.009
	2	< 0.001	0.6	0.51	0.09
	3	< 0.001	0.84	0.79	0.05
	4	0.21	0.99	0.99	0.00
House District 15	1	0.88	0.04	0.04	0.00
	2	< 0.001	0.6	0.49	0.11
	3	< 0.001	0.83	0.78	0.05
	4	0.92	0.98	0.98	0.00

Results: Statistical Tests

While the descriptive evidence provides some support for hypothesis 2 that lower-level elections tend to have more mistakes in ranked-choice voting than higher-salience elections and possibly that there is a mitigating effect of vote-by-mail at higher salience levels, we still need to assess if the percentage differences are statistically significant or not. To assess if the difference in error rates between each rank in vote-by-mail and in-person voting is statistically significant, I turn to t-tests for each election at each rank.

Looking first at the US House level, there is no discernible difference statistically or substantively in error rates for either VBM or in-person at the first rank. Meanwhile, in ranks 2 and 3 there are statistically and substantively significant effects (2.2% more errors in mail voting than in person and about 2% more errors in vote-by-mail than in-person respectively). At rank 4, the effect is much smaller as there are much more systematic skipping or overvoting occurring. This challenges hypotheses 1 and 2 because I had suggested that VBM would have fewer errors, but at least in the US House election, this is not supported at all. This would suggest that

vote-by-mail is not as much of a panacea for the error problems – at least at the highest level of election salience.

Next for the governor election, the results are again uneven with some more support of the first two hypotheses than the US House election. In the first rank, the difference of 0.7% errors for mail-in voting vs. 1.3% for in-person voting is statistically and substantively significant. At least for the gubernatorial election, there is some evidence that VBM performs better than in-person as this result also holds at rank 2 (31% vs. 34%) and this is also statistically significant. This would imply that this difference is unlikely to be driven by random chance. Meanwhile for ranks 3 and 4 mail-in ballots appear to lead to *more* errors than in-person ballots which could be due to differences in number of candidates or ballot design. Like with the US House election, there is a similar trend in the jumps and lower errors at lower ranks on the ballot.

Turning towards the two state house elections, District 11 sees no meaningful difference at ranks 1 and 4 as the confidence intervals include 0 making it not statistically significant. This would imply that VBM and in-person voting at these two ranks do similarly well (or poorly) at explaining variation in error rates. Meanwhile, in ranks 2 and 3 there is a robustly significant relationship between error rates. In rank 2, 60% errors for VBM and 51% for in-person is strongly and positively significant suggesting this is not due to random chance while rank 3 is 84% for vote-by-mail vs. 79% for in-person. Similarly, district 15 has the same exact significance patterns with ranks 1 and 4 not being statistically significant while ranks 2 and 3 are statistically significant. In District 15, the difference between VBM and in-person is substantively large (60% v. 49%) in rank 2 and rank 3 (83% v. 78%). All of these results suggest that the lower salience races are performing similarly.

Across all elections, ranks 2 and 3 often show the highest level of differences with mail-in-voting consistently performing worse than in-person voting when it comes to error rates. While the effect sizes vary across elections, there is a general pattern of “mid-level” rankings having more errors made especially when voting by mail. Rank 1 and 4 are generally not significant either due to understanding how to vote for one candidate in rank 1 and ballot fatigue in rank 4. In other words, most voters understood that ranking at least one candidate was important and usually did not rank 4 candidates regardless of the salience level of elections. However, higher-salience races (US House and Governor) tend to exhibit lower rates of errors than lower-salience but the relationship about middle rankings still holds.

Results: Rejection Rates

A key piece of the descriptive puzzle is if there are differences in rejection rates between mail-in ballots in RCV and in-person ballots between different election levels. If mail-in ballots constitute a lower percentage of rejected ballots between elections, then it would suggest that mail-in balloting would be effective because they would be rejected less often than other ballots. It is important to note that in-person voting is far more frequent in Alaska than mail-in ballots, so it would not be surprising to see differences in percentages between mail-in and in-person ballots since it is a very biased sample. However, if the percentages are lower at different salience levels, then it could suggest that there is an electoral salience effect. It is important to note how I calculated these rates. I first took a subset of the data from all four elections in the study of completed ballots (i.e., no errors in ranks 1-4) and of all possible partial combinations (i.e., first preference marked properly, three errors; preferences one and two marked properly, two errors;

preferences one, two, and three marked properly, one error). Importantly, Alaska does *not* count ballots or impute preferences if a ballot is marked like this: error in rank 1, rank 2 marked properly, rank 3 marked properly, and error in rank 4. In other words, only ballots that are sequential are counted. Table 1 shows the overall rates of accepted and rejected ballots in each election type prior to sub-setting.

Table 2 shows the overall accepted and rejected rates for all ballots in each of the corresponding elections. For example, in House District 11, 94% of all the ballots were counted while 6% of all the ballots were rejected. Within that 94% of accepted ballots are all the ballots that were completed (all four preferences ranked properly) along with all partial ballots. The rejected ballot percentage is the overall percentage of ballots that were not sequential and were thus not counted in the election. While there are still errors in the counted ballots that are partial, rejected ballots are either completely blank or are improperly filled out so they likely are a better indicator of truly messing up a ballot.

Overall Accepted and Rejected Ballots

Election	Overall counted	Overall rejected
Dist11	94.00	6.00
Dist15	95.00	5.00
Governor	98.00	2.00
House	96.00	4.00

Afterwards, I summed all the observations from each condition into one combined dataset and created a subset of those remaining ballots not counted. I calculated the percentage of accepted ballots that were vote-by-mail and in-person as well as the percentage of VBM and

in-person ballots among the rejected ballots (i.e., those not filled out partially or completely).

Figure 4 shows the percentage of VBM and in-person ballots among the overall rejected ballots.

Note that Figure 4 only considers the population of *rejected* ballots and not the percentage

compared to overall numbers of ballots.

As Figure 4 indicates, there does seem to be some relationship between election salience and the rejection of mail-in ballots, although this could be driven by sample size differences.

Figure 4 shows that among *only* the rejected ballots, the corresponding percentages that were vote-by-mail and in-person. While all elections have many more in-person ballots rejected than VBM ballots, this is likely due to how heavily in-person Alaskan elections are. What is worth pointing out given the biasedness of the sample is how the state house districts do have a higher rejection rate for VBM ballots than the governor and House elections. While the percentage of VBM in the rejected ballots would seem to not fit with my hypothesis, it does suggest that the more in-person voters there are, the more rejection occurs. This data is limited because of small sample sizes, but it is nonetheless interesting that VBM ballots seem to constitute a higher percentage of the rejected ballots than the accepted ballots.

Figure 4: Percentage of VBM and In-Person Ballots Among Overall Rejected Ballots

Percentage of VBM and In-Person Ballots among Rejected Ballots

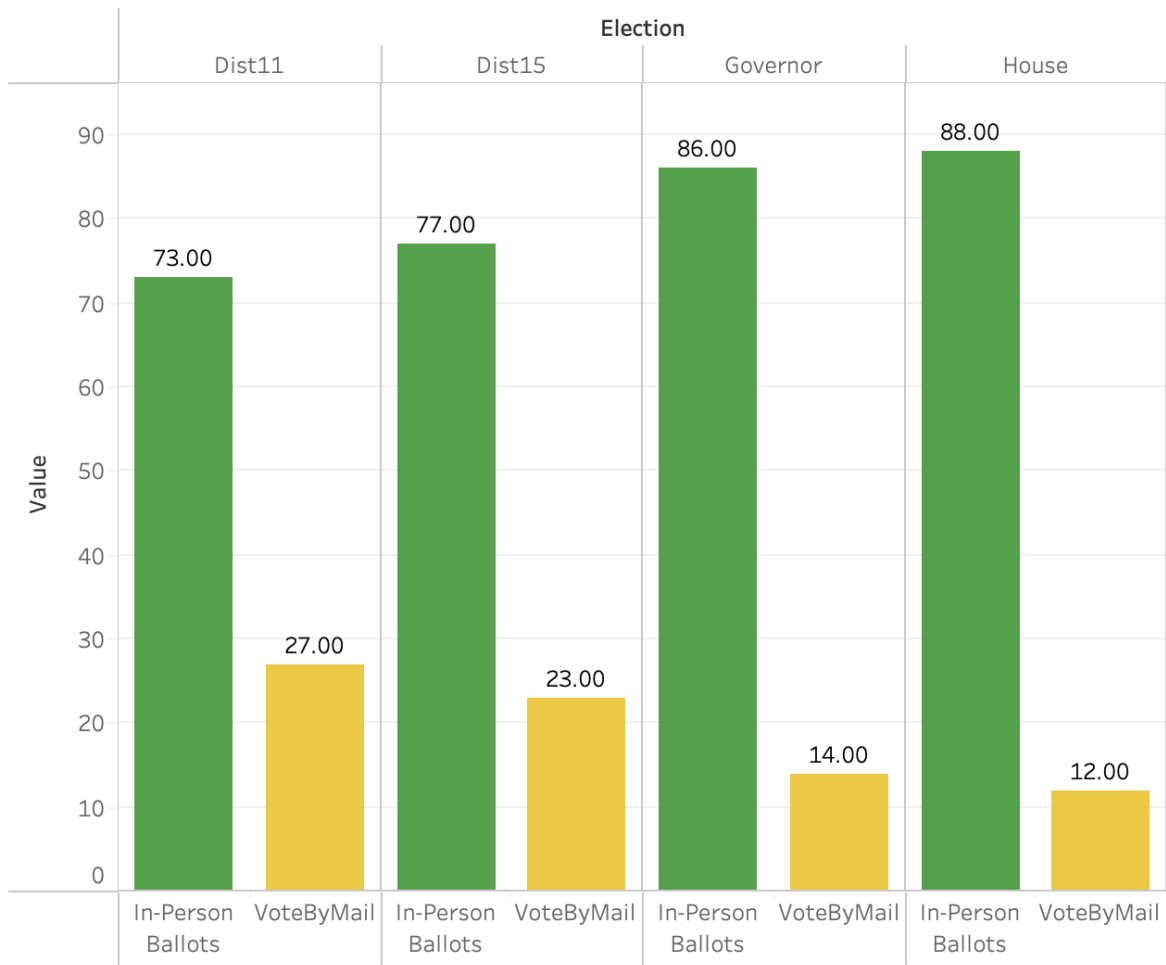
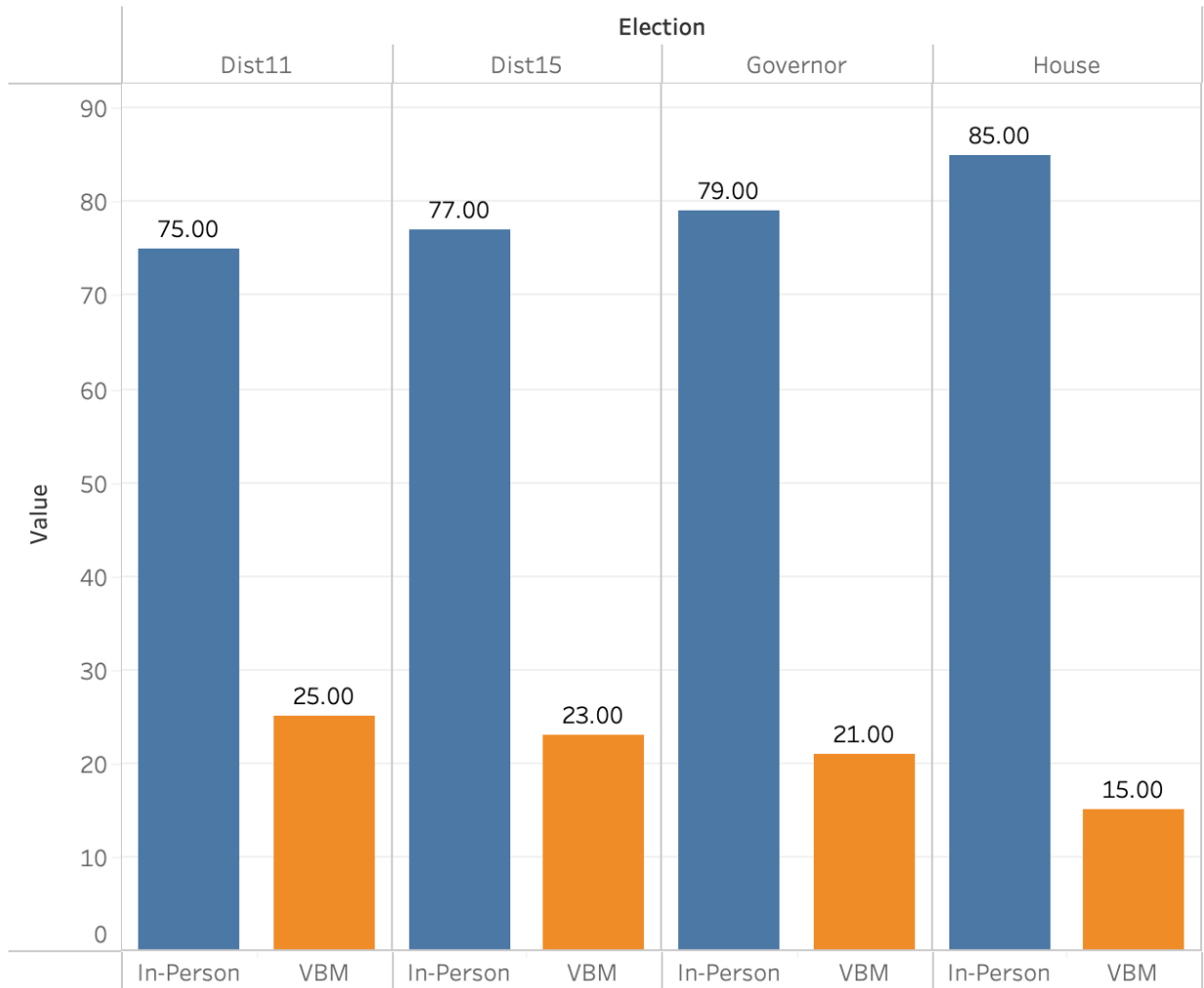


Figure 5 looks at the percentage of vote-by-mail ballots and in-person ballots among ballots that were counted. Figure 5 suggests that as election salience increases, the rate of accepted ballots becomes more skewed for in-person ballots. Lower salience elections seem to see a greater rate of VBM ballots being accepted. While this could be due to sample size differences, these findings would seem to support the possibility that VBM ballots have fewer mistakes at higher level elections than at lower level elections. It is important to emphasize that Figure 5 uses a different subset than Figure 4, hence why the percentages do not add up to 100% from one to the other. The fact that VBM ballots make up a higher percentage of the rejected

ballots than they do the accepted ones would also undermine hypothesis one that VBM in some way mitigates the effects of rejection and errors. If hypothesis one was right, there should have been a far higher percentage of in-person ballots among the rejected ballots than among the accepted and a lower percentage of VBM ballots among the rejected than among the accepted, but the opposite of expectations occurs.

Figure 5: Percentage of Accepted Ballots for VBM and In-Person Ballots

Overall Percentage for Accepted Ballots for VBM and In-Person



Conclusion

What can be done to address the error problems that have been found in ranked-choice voting? While higher-salience races are associated with greater familiarity towards the candidates and more scrupulous attention to rules, there are still substantial problems with errors and somehow the middle-tier rankings are the most effected. While errors could be due in-part to partial ballots, when accounting for rejected ballots, voting-by-mail continues to create issues

especially at lower salience levels. Given the uneven results of hypotheses 1 and 2, it leads to the normative question of how (or even if) it is possible to rectify the issues of errors in ranked-choice voting. I believe there is a possibility, and it has to do with ballot structure. In RCV states in the United States, voters fill in bubbles corresponding to their preferences, while in other countries that use preference vote systems, they write the number of their preference in the respective box. It could be the case that writing in the number associated with preference instead of trying to fill in bubbles corresponding to preferences leads to more inadvertent skips or overvotes. Ballot structure would be an interesting avenue for future research and could be considered experimentally.

Lower-salience races continue to have problems of imperfect information regardless of VBM or in-person voting as error rates are higher across the board. Interestingly, the rate of accepted ballots in lower-salience races are more skewed towards VBM than in higher salience races, but this could be due to sample sizes. Moreover, Alaska in general is heavily skewed towards in-person voting. Future research should also try to assess a more even sample of vote-by-mail and in-person ballots to address this question. Hypotheses 1 and 2 were not supported in the evidence presented while hypothesis 2 seem to have some level of support as there definitely seems to be an election salience effect. Future research could also perform census matching to assure that there is a more even representation of districts across Alaska. As the United States continues to grapple with which variant of ranked-choice voting, there are considerable strategic incentives found in each variant (Santucci 2021).

Ranked-choice voting has been found to have a larger amount of errors than other methods of voting in the United States and is a source of exasperation among poll workers and my research suggests that trying to remedy these issues using vote-by-mail might actually

backfire in reducing the error problems inherent in ranked-choice voting. I am curious to see what future research holds for this question as ranked-choice voting continues to be considered across the country as electoral reforms remain salient on the issue agenda.

Works Cited

- Atkeson, Lonna Rae. Eli McKown-Dawson, Jack Santucci, Kyle L. Saunders. 2024. "The Impact of Voter Confusion in Ranked Choice Voting," *Social Science Quarterly* (forthcoming). DOI: 10.1111/ssqu.13366
- Atkeson LR, Hansen WL, Oliver MT, Maestas CD, Weimer EC. 2022. "Should I vote-by-mail or in person? The impact of COVID-19 risk factors and partisanship on vote mode decisions in the 2020 presidential election." *PLoS ONE* 17(9): e0274357.
<https://doi.org/10.1371/journal.pone.0274357>
- Clinton JD, Lapinski J, Lentz S, Pettigrew S., 2020, "Trumped by Trump? Public Support for Vote by Mail Voting in Response to the COVID-19 Pandemic." *Elect Law Journal*
- Dellis, Arnaud and Sabine Kröger (2024). How do People Vote Under Instant Runoff Voting? An Experiment on Complexity and Voting Behavior. Working Paper
- Joseph Anthony, Amy Fried, Robert Glover, and David C. Kimball, 2021, Ranked Choice Voting in Maine from the Perspective of Local Election Administrators, *Election Law Journal* 20:254-274.
- Otis, Deb, 2022, "Single winner ranked choice voting CVRs", <https://doi.org/10.7910/DVN/AMK8PJ>, Harvard Dataverse, V13,
UNF:6:vklnaWLLs61D6l0Y55aovQ== [fileUNF]

Pettigrew, S., Radley, D. (2023). Ballot Marking Errors in Ranked Choice Voting

R. Michael Alvarez and Yimeng Li, “Universal Mail Ballot Delivery Boosts Turnout: The Causal Effects of Sending Mail Ballots to All Registered Voters,” *Journal of Politics* (forthcoming).

Santucci, Jack (2021). Variants of Ranked-Choice Voting from a Strategic Perspective. *Politics and Governance*

Thompson DM, Wu JA, Yoder J, Hall AB, 2020, “Universal Vote-by-Mail Has No Impact on Partisan Turnout or Vote Share,” *Proceedures of the National Academy of Science* 117:14052–12056.

Yuki Atsusaka, 2024 “Analyzing Ballot Order Effects When Voters Rank Candidates,” *Political Analysis (forthcoming)*