Minority Electorates and Ranked Choice Voting

Nolan McCarty*

January 10, 2024

Abstract

Ranked Choice Voting (RCV) has become a very popular reform designed to mitigate several of the perceived flaws inherent in single-district plurality electoral systems. However, relatively little attention has been paid to how RCV might impact the representation and influence of minority voters. In theory, RCV poses several difficulties for minority representation. First, RCV is by design a majoritarian system in that the winner must claim the support of a majority of the participating voters. Thus, RCV forecloses opportunities under plurality voting for minority-group-backed candidates to win elections when majority-group voters fail to coordinate on a single candidate. Second, this problem is compounded to the extent that majority-group candidates lack incentives to appeal to minority-group voters. Such incentives will be lacking to the extent to which minority voters are unwilling or unable to rank multiple candidates. So patterns of ballot exhaustion and truncation across demographic groups is key to understanding how RCV might affect opportunities for minority-group voters. Third, high ballot exhaustion rates among minority-group voters would mean that those voters exercise less electoral influence. In this paper, I examine the racial and ethnic patterns of ballot exhaustion in the 2021 New York City Democratic Primary and the 2022 elections in Alaska. I find strong evidence that electorates with heavy concentrations of ethnic and racial minorities have substantially higher rates of ballot exhaustion. These findings raise important questions about the impact of RCV on the electoral influence of such groups.

*School of Public and International Affairs, Princeton University, nmccarty@princeton.edu. This research is partially supported by the Center for Election Confidence. I would also like to thank Eric Manning and the data Driven Data Science Initiative for assistance in navigating the voter files. I also thank Roel Bos, Peter Buisseret, Dahyun Choi, Alina Dunlap, Kyuwon Lee, John Kastellec, Conner Phillips, Anthony Taboni, and Hye Young You for helpful comments.

1 Introduction

Following the rise of political polarization in the United States with its negative consequences for effective governance, scholars and activists have touted electoral reform as a possible solution.[1] These arguments have focused on perceived deficiencies associated with the United States' reliance on the combination of plurality voting and party primaries to elect most officeholders. According to the critics that combination leads to pathologies that reduce voter choice and generate polarized outcomes. First, the critics claim that partisan primaries are dominated by the preferences of the most polarized voters who in turn nominate only extreme candidates leading to general elections in which voters must choose among polarized alternatives. Second, they argue that the use of plurality voting deters the entry of independent candidates and third-parties because they are very unlikely to obtain a plurality of the vote. Moreover, if such candidates do enter, they mostly serve as "spoilers" by elevating the less popular of the major party candidates. Finally, some scholars argue that the winner-take-all nature of plurality elections heightens conflict and negative campaigning in ways that exacerbate polarization.

To address these concerns, observers have suggested a set of reforms ranging from altering the rules for participation in primary elections, fusion voting, and various forms of proportional representation. But by far and away the most popular reform calls for the widespread adoption of ranked-choice voting (RCV). In a RCV election, voters rank candidates in order of preference, and election officials use these rankings to determine the election winners. Although advocates argue for a wide range of procedures, actual implementations of RCV tend to operate as follows:[2]

1. The ballot asks voters to rank the candidates in order of preference. In some systems, voters may rank all of the candidates while others systems ask only that the voters

[1]For discussions of polarization and electoral reform McCarty (2019) and Drutman (2020).
[2]See Santucci (2021) for a discussion of the procedural variants.

rank up to a certain number of candidates.

2. The first round of the tabulation procedure, counts the first-rank votes. If any candidate receives a majority of the first-rank votes, she wins the election. If no candidate secures such a majority, the last place candidate, as well as any other candidates that have been mathematically eliminated, are dropped, and the tabulation proceeds the second round.

3. In the second round, the votes are recounted using the first-ranked votes of the remaining candidates and the second-ranked votes of those who supported one of the eliminated candidates. Those voters who only ranked one of the eliminated candidates are said to have "exhausted" their ballots.

4. If a candidate obtains a majority of the votes from non-exhausted ballots in this round, she is the winner. If not, the process continues through multiple rounds where votes are tabulated based on each voter's highest ranking of the non-eliminated candidates. A winner is declared once a candidate obtains a majority of the votes from the non-exhausted ballots.

Advocates of RCV tout many ways in which it would improve upon plurality voting. First, the promoters contend that the system improves the electoral fortunes of small parties and independent candidates. By encouraging a larger set of candidates to contest office, advocates argue that RCV provides voters with more choice, which in turn should result in greater voter turnout and engagement. RCV also purportedly eliminates the possibility of spoiler candidates who siphon off so many votes that the most popular major candidate loses. Finally, advocates suggest RCV elections are more legitimate because the winner is required to earn the support of a majority of the electorate.

As discussed below, the evidence that RCV has demonstrated these advantages in practice is mixed. But even if RCV elections achieve the promised features, their usage raises important questions about the impact on minority and disadvantaged voters and their opportunities for electoral representation. First, RCV elections are intended to be more majoritarian than plurality elections. Indeed, a common argument is that they provide a way to get the benefits of a majority-runoff system without holding separate elections.[3] Whereas minority candidates have some chance of winning plurality elections when there is a close split in the vote among majority-group candidates, RCV works to reduce those opportunities especially in the presence of racially- or ethnically-polarized voting. RCV advocates defend that attribute by arguing that RCV would increase the likelihood that the majority-candidate most favorable to the minority group wins. But such an outcome depends on majority candidates' willingness to appeal to minority voters to obtain their second-rank votes and for the minority voters to fully use their ballots to support such candidates in the later rounds. But recent theoretical work by Buisseret and Prato (2022) casts doubt that such conditions hold generally. In their model, if the preferences of the majority and minority are sufficiently distinct, both majority candidates may compete for the support of majority voters in hopes of entering a second round against the minority-backed candidate in which they will win. Moreover, minority group voters may exhaust their ballots and fail to rank either majority-backed candidate. Thus, minority voters may actually lose influence in the case of a majority-versus-majority second round. Such arguments highlight the problems of ballot exhaustion which previous research has found to be both endemic to RCV and concentrated in minority electoral precincts.[4]

In this paper, I contribute to the literature on RCV and ballot exhaustion by focusing on its disproportionate concentration among minority electorates as well as its potential to decrease representation and electoral influence of minority voters. In section 2, I sketch an

[3]For this reason, some advocates refer to the system as Instant Runoff Voting.

[4]On the magnitude of ballot exhaustion, see Burnett and Kogan (2015) and McCarty (2020). On the correlations with race and ethnicity see Polubinksi (2023) and `https://www.politico.com/states/new-york/city-hall/story/2021/09/08/lower-income-areas-of-nyc-had-a-harder-time-with-ranked-choice-voting-1390719`.

argument that RCV systems can be harmful to minority voters especially when those voters are more likely to exhaust ballots. I then examine two cases in which RCV was recently adopted and show that exhausted ballots were far more common in precincts and electoral districts with high concentrations of minority voters. The first case is the New York City Democratic Primary held in 2019 which is discussed in Section 3. Using micro-data on cast vote records (CVR) combined with demographic records of primary voters from the voter registration file, I show that electoral districts with large concentrations of minority voters cast substantially more exhausted ballots than other districts. These relationships are especially strong in heavily Hispanic and Asian districts. These correlations persist even in those cases where a co-ethnic candidate advances to the final round of tabulation. In section 4, I examine the introduction of the Top Four Primary system and RCV general election in Alaska. There I combine the cast vote records with Census demographics to examine the correlates of ballot exhaustion in the special and regular elections held there in 2020. Given the very low numbers of Black and Hispanic voters (and the political salience of those identities), I do not find strong correlations between exhaustion and the size of those populations. I do find, however, that areas with high concentrations of Alaskan Natives are more prone to ballot exhaustion. I conclude and discuss the implications of the results in section 5.

2 Theoretical Framework

To illustrate how RCV may negatively impact minority voters, consider a hypothetical example where there are three candidates representing three blocs of voters.[5] I label the candidates/blocs as A, B, and C. Further, I assume that blocs A and B are part of the "majority" group and C is the "minority." Consequently, the total number of voters

[5] See Buisseret and Prato (2022) for a more fully-elaborated model along the lines of this example.

in A and B is larger than the number of voters in C.[6] However, bloc C may be larger than either bloc A or B individually. Moreover, I assume that no single bloc constitutes a majority of the electorate. Assuming that voters in each bloc vote sincerely for the candidate representing them, plurality elections elect the candidate of the largest bloc. Voters may, however, choose to vote strategically. If majority-group voters are able to coordinate electoral support for candidate A or B, then that candidate wins. If they fail, however, the minority candidate C may win.

Now consider the effects of ranked choice voting. As a first case, assume that C is the largest single bloc and would therefore win a first-past-the-post election. Without loss of generality, let A be the second largest bloc. Under the assumption that all voters give the highest rank to the candidate of their bloc, C does not win in the first round. Moreover, the winner is determined by how voters in B allocate their second ranks between A and C. If B prefers A as we might expect on shared in-group status, then A wins. Thus, RCV has insured that majority voters can coordinate on a single candidate, making it impossible for the minority candidate to win.[7]

As a second case, assume that C is the smallest group. Consequently, the second round is likely to be a contest between the majority candidates A and B. C's only opportunity for influence is when its second-place ranks to help elect the majority candidate most sympathetic to its interests. Ideally, the majority candidates would appeal to C's voters to enhance their electoral prospects. But suppose C's voters "exhausted" their ballots by failing to rank A or B. This behavior would both reduce the likelihood that the most sympathetic majority candidate would win as well the incentives for either majority candidate to compete for C's support. The C voters will, therefore, have less influence if their exhaustion rates are high.

[6]Depending on the context, majority and minority may be designated based on racial, ethnic, socioeconomic or partisan categories.

[7]See Morton and Rietz (2007) for a similar argument and consistent experimental evidence in the context of traditional runoff elections.

These two examples illustrate how minority electorates may be negatively impacted by the adoption of ranked-choice voting. First, RCV helps to ensure that majority voter blocs can coordinate on a single candidate thereby depriving minority voters of the ability to elect a candidate of choice even in cases where the minority bloc is the largest. Second, RCV may dilute minority voter influence to the extent to which those voters exhaust their ballots by failing to rank the majority-group candidates.

As the second example shows, the impact of RCV on minorities depends on the extent to which they disproportionately cast "truncated ballots" (i.e., ballots that doe not rank all alternative, viable candidates) that lead to their non-participation in the final round of tabulation. Consequently, much research on RCV focuses on truncation and ballot exhaustion, see e.g. Burnett and Kogan (2015). In a study of municipal elections in three cities, Polubinksi (2023) finds strong evidence that rates of ballot exhaustion are higher in precincts with heavy concentrations of minority voters. [8]

Other scholars have noted that minority electorates have faced other challenges in using RCV. Neely and Cook (2008) and Neely and McDaniel (2015) find that rates of RCV overvoting, applying the same rank to multiple candidates, was significantly higher in minority precincts in San Francisco municipal elections. More recently, Cormack (2023) finds that ballot disqualifying overvoting was higher in non-White assembly districts in the 2021 NYC mayoral primary, and that correlation can be attributed to lower incomes and educational attainment.

Perhaps the most important question for my purposes is why voters would choose

[8]Survey experimental work has found less evidence for racial and ethnic disparities in ballot truncation or exhaustion. But these studies may suffer a lack of external validity. For example, Coll (2021) asks respondents to rank the top five 2020 Democratic presidential candidates and finds that age and gender are the only demographic categories correlated with truncation. But this setting may not generalize for a variety of reasons. First of all, the 2020 primary was a very high profile election where voters could be assumed to have reasonably good information about a wide variety of candidates – far different than the elections analyzed in this paper. Second, as discussed below, the presence of strong minority candidates like Kamala Harris and a White candidate with strong endorsements from Black elites, Joe Biden, can affect patterns of truncation and exhaustion relative to elections without such candidates.

not to fully participate by truncating their ballots. Voters who truncate their ballots are deprived of potential opportunities to influence the election outcome, even though their preferences among lower ranked candidates may be decisive. In fact, if the goal of a voter is to maximize electoral influence, she should always rank at least $n-1$ candidates in an n candidate election.[9]

Underscoring this problem, Kilgour, Grégoire and Foley (2020) conduct a simulation study of the consequences of truncated ballots in RCV elections. The authors find that ballot truncation is very common and hard to rationalize. But more importantly, the authors demonstrate how some of the supposed salutary properties of RCV fail when voters do not fully participate. First, they find that even small amounts of truncation can alter the identity of the election winner, especially in elections with more than three candidates. Often these distortions disadvantage and result in outcomes that are contrary to the will of the voter whose ballot is truncated.

Given the lack of a clear strategic motive, there are at least two other explanations for why voters might truncate ballots. The first is that voters are voting expressively and refuse to rank any candidates but their top choice. The most plausible form of such behavior is based on partisanship or group-identity – voters refuse to rank candidates from their out-party or group. While such behavior may be intentional and well-informed, it does undermine the stated objectives of RCV elections. Low rates of full participation make it less likely that the winner is supported by a majority of the total electorate, more likely that a candidate can be a spoiler, and less likely that a Condorcet winner is victorious. Moreover, persistence of this form of expressive partisanship and/or identity politics suggests that RCV is not succeeding in building cross-party/group coalitions and reducing polarization. Specifically, racial polarization may manifest as ballot truncation

[9]Unless of course the ballot design limits the number of candidates that can be ranked. Such limitations are commonly imposed for the convenience of electoral authorities, but they obviously exacerbate the problem of ballot exhaustion. Below I present evidence that such limitations have only a modest effect on ballot exhaustion.

and exhaustion. Most importantly, as discussed above, it may dampen the incentive for candidates to appeal to those groups who tend to exhaust their ballots. Moreover, as candidates reduce their appeal to high exhaustion groups, members of those groups have even less incentive to fill out complete ballots.

A second source of ballot truncation and exhaustion is that voters have poor information about how RCV tabulation works or lack adequate information about candidates necessary to do a full ranking. That truncated votes count less than fully participating ones suggests the possibility that low information voters may be relatively disadvantaged by RCV. Such variances in participation rates based on information gaps are troubling. And if those information disadvantages are concentrated on certain communities on the basis of race, ethnicity, education, or socio-economic status, the democratic legitimacy of RCV might be called into question.

My paper does not address other potential effects of RCV on minority electoral success and representation. But the prior literature suggests few benefits. McDaniel (2016) finds that turnout dropped in San Francisco mayoral elections following the adoption of RCV, especially among African-Americans and Asians. In a study of several RCV cities matched against comparable plurality cities, Kimball and Anthony (2016) find a four percentage point drop in turnout associated with RCV, although the estimate is not statistically significant on its own. In a more recent study, McDaniel (2019) finds a statistically significant five percentage point drop due to the introduction of RCV in municipal elections relative to similar cities that maintain plurality electoral systems. While there is disagreement about the magnitude and statistical reliability of the estimated declines in voter turnout, I am not aware of any study that finds a boost in turnout associated with switching to RCV from plurality voting.

I also do not consider whether RCV increases or decreases the salience of racial and ethnic differences. But McDaniel (2018) finds indicates that RCV did little to reduce –

and may have increased – racially polarized voting in mayoral elections. Finally, I do not consider effects of RCV on the pool of minority candidates, but note that Colner (2023) finds a modest, but short-lived, boost in the diversity of the candidate pool upon adoption of RCV. Experimental work reported by Santucci and Scott (2021) finds that RCV does not increase minorities' interest in running for office. More generally, Vishwanath (2022) finds that RCV has little effect on the ideological composition of the candidate pool.

3 New York City Democratic Primary

After several years of study, in 2019 the New York City Charter commission proposed a voter referendum calling for the use of RCV voting in NYC municipal elections. The referendum was supported by 75% of those voting in a low turnout affair. The most direct motivation for the adoption of RCV was the elimination of costly runoff elections necessitated by the NYC Charter's requirement for plurality winners with at least 40% of the votes cast. But advocates touted many other claims about RCV's ability to produce majority winners, lessen negative campaigning, and promote moderation. To the extent that there was opposition, however, it focused on the possible negative consequences for minority and poorer voters.[10]

The first use of RCV voting in NYC was for the city-wide primary elections held on June 22, 2021. Those elections nominated candidates for Mayor, Comptroller, Public Advocate, the five Borough Presidencies, and the City Council. Although RCV was used in the Republican and Conservative party primaries, I focus on the Democratic primary. Table 1 reports some basic information about the outcomes of those contests. The table illustrates several important points.

The first is that even in elections with large numbers of candidates, the leading candidate

[10] See `https://www.nytimes.com/2019/10/28/nyregion/ranked-choice-voting-ny.html` and `https://ibo.nyc.ny.us/cgi-park3/2019/10/22/eliminate-the-need-for-citywide-run-off-elections/`.

Table 1: 2019 NYC Democratic Primary Outcomes

Election	# Cands	Winner	Runner-Up	Round 1 Plurality	Final Share	Share of Total	Rounds	% Exhausted
Mayor	13	Eric Adams	Kathryn Garcia	30.7	50.4	42.9	8	14.9
Comptroller	10	Brad Lander	Corey Johnson	30.9	51.9	39.3	10	24.4
Public Advocate	3	Jumaane Williams	Anthony Herbert	70.0	70.0	70.0	1	0.0
Manhattan President	7	Mark Levine	Brad Holman	28.3	53.8	42.4	7	21.2
Brooklyn President	12	Antonio Reynoso	Jo Anne Simon	27.9	54.9	37.3	11	32.0
Queens President	3	Donovan Richards	Elizabeth Crowley	41.1	50.3	47.2	3	6.2
Bronx President	5	Vanessa Gibson	Fernando Cabrera	39.5	53.5	48.7	3	9.0
Staten Island President	5	Mark Murphy	Lorraine Honor	46.5	65.0	57.5	6	11.5

received a very large vote share. Only in two cases did the leading candidate fail to get 30% of the vote. In three cases, candidates received more than the 40% threshold that would have avoided a runoff under the old system. In every case, the first round plurality winner went on to win after the RCV tabulations were conducted.[11] A second notable finding is the large number of exhausted votes. With the exception of the Public Advocate's race which was decided in a single round, the rates of exhaustion are very high. In a recent report, McCarty (2020) shows that the average rate of ballot exhaustion across 95 municipal RCV elections is 10.5%. Therefore, five of the seven contests with RCV tabulations were well above the historical norm. Moreover, exhaustion may have been consequential in some cases. In six of these elections, the percentage of exhausted votes exceeded the margin between the final two candidates. This fact implies that had there been fewer exhausted ballots, the results may have changed. This pattern also implies that in those elections, the winner failed to obtain support from a majority of voters who cast ballots in the election (see "Share of Total" column). In two cases, the Comptroller and Brooklyn President, the winner did not even crack 40% of the votes cast, the old threshold for triggering a runoff election under the Charter. These outcomes are troubling given that RCV is touted as producing winners supported by a majority of the electorate.[12]

[11] In the case of public advocate, Jumaane Williams won in the first round, therefore avoiding RCV tabulation.

[12] It might be tempting to blame these high exhaustion rates on the fact that the ballot only allowed voters to rank up to five candidates. But note that there are minority winners in two races with five or fewer candidates – the Bronx and Queens presidencies. Moreover, in the Mayor's race, the average exhaustion rate of those who ranked five candidates was only 6.4% compared to 21.8% for those who ranked fewer. So exhaustion rates would have been high even without the five candidate limitation.

Table 2: 2019 NYC City Council Primary Outcomes

Number	Avg Cands	One Round	Multi Round	RCV Reversals	Sub-Majority Outcomes	Avg Exhaust Rate (all)	Avg Exhaust Rate (multi-round)
46	6.4	14	32	2	19	12.4	17.8

Table 2 provides a similar set of measures for the outcomes of the 46 contested City Council primary elections. Those elections witnessed an average of over six candidates, but over a quarter of them were resolved in the first round. But of the 32 elections that required RCV tabulations beyond the first round, only two cases generated a winner different from the candidate who secured a plurality in the first round. One of these was in District 9 where Kristin Richard Jordan squeaked by incumbent Bill Perkins by 114 votes after 13 rounds of tabulation. But Jordan ultimately only received support from 32% of the total ballots cast in the election – a considerably lower percentage than the 36% of ballots that were exhausted! And District 9 was not alone in producing winners who failed to receive a majority of the votes cast and high rates of ballot exhaustion. In fact a majority – 19 elections – of the multi-round RCV calculations resulted in non-majority winners. Figure 1 provides the distribution of the winner's share in RCV-tabulated races and shows that there were a large number of outcomes in which the winner failed to get as high as even 40% of the total ballots cast.

Of course, the reason that such a large share of races lacked an overall majority winner was that exhaustion rates in the council elections were extraordinarily high. Table 2 reports two measures. The first is the average exhaustion rate for all contested council elections, 12.4%. But of course, races that were resolved in the first round have no exhausted ballots. So if we focus on the cases that required RCV tabulation, the rate is much higher at 17.8%.[13]

One objection to my focus on non-majority outcomes and wasted votes under RCV is

[13] As I discuss below, there is a way to measure "potential exhaustion" in single round outcomes by considering whether a voter's ballot would have been exhausted had the majority threshold not been met in the first round. Such calculations are not included in Table 2.

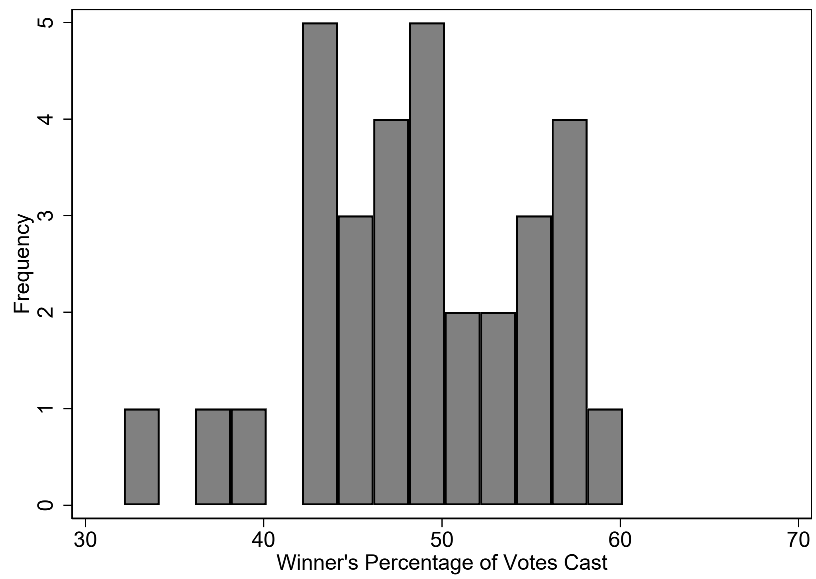

Figure 1: **Winner's Share of Votes Cast** Figure includes those races which required multiple rounds of tabulation.

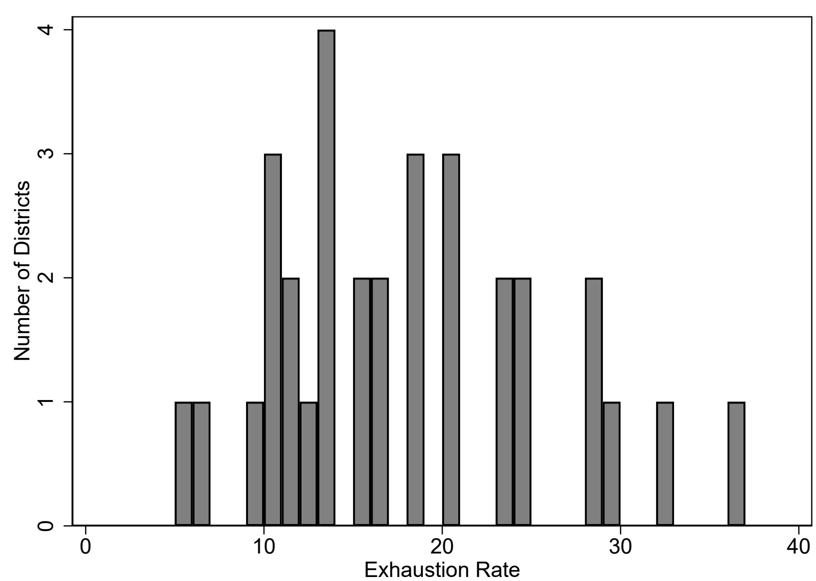

Figure 2: **Ballot Exhaustion Rates in NYC Council Democratic Primary Races** Figure includes those races which required multiple rounds of tabulation.

that similar problems clearly exist with plurality voting. Plurality voting generates non-majority outcomes and suffers from the problem of "wasted votes" – those going to a candidate with little chance of winning. To address this concern, I collected data on the 33 contested Democratic City Council primary elections in 2017. From that data, I can compute the vote shares of the winner and the number of wasted votes (which I define as a vote for a candidate other than the winner and the runner-up).

As it turns out, the data confirm that rates of vote exhaustion under RCV were approximately the same as the average wasted votes under plurality. Focusing on all contested races in both elections, the average percentage of exhaustion across districts was 12.4% while the average wasted votes was 12.2%. Moreover, the average winning percentage under plurality in 2017 was higher than the percentage under RCV (58.8% versus 52.3%). Similarly, plurality voting produced a lower rate of non-majority winners than RCV (33.3% versus 41.3%).

So why did RCV fail to outperform plurality voting on these key metrics? The answer is that RCV generated high levels of candidate entry. In 2021 under RCV, 46 nominations were contested with an average of 6.4 candidates per race. In 2017, only 33 districts were contested with 3.4 candidates per race. In the appendix, I report on an analysis of differences between RCV and plurality in terms of majority support and the differences between exhaustion and "wasted votes" as a function of the number of candidates. The analysis of winner's share demonstrates that those shares fall as the number of candidates rise under both RCV and plurality. Understandably, the ability to transfer votes under RCV reduces the impact of additional candidates compared to plurality.[14] However, there is no direct impact of RCV, and the winners' shares for races with 2 to 5 candidates do not vary systematically across systems. RCV only outperforms when there are a very large number of candidates. But in those cases RCV is never sufficient to produce a majority

[14]See Figure 6 and Table 8.

winner.

The results on exhaustion and wasted votes provided in the appendix are similar.[15] There is no statistically significant direct association with RCV, but the system does reduce the impact of additional candidates. Under plurality, each additional candidate is associated with a six percentage point increase in the number of wasted votes while such an increase was three points under RCV. So it appears that the dramatic proliferation of candidates under RCV led exhaustion rates in 2021 to be higher than wasted votes in 2017.

In summary, the comparison on the 2017 and 2021 elections does show that RCV is associated with a larger number of candidates in Democratic primaries for the City Council. But many of these additional candidates were not very competitive and served primarily to boost ballot exhaustion and non-majority winners. At the same time, RCV tabulations proved pivotal in very few elections – and those involved large numbers of candidates and high exhaustion rates.

3.1 Race, Ethnicity, and Exhaustion

As demonstrated in the last section, the evidence is consistent with the idea that RCV (at least as implemented in New York City) entails a trade-off of more candidates at the cost of more non-majority winners and high rates of ballot exhaustion. Such a trade-off might be deemed acceptable if the negative consequences were born uniformly across all demographic groups. But given previous findings suggesting that racial and ethnic minorities may be more prone to ballot exhaustion, I now examine whether ballot exhaustion rates were higher in electoral districts with higher concentrations of minority voters.[16]

Ideally, one would like to have individual data on ballot exhaustion linked to the racial, ethnic, and other characteristics of the voter as this would allow us to ask whether certain

[15]See Figure 5 and Table 8.

[16]The existence of such racial and ethnic disparities might be grounds for challenging RCV on equal protection grounds (see Bryer (2021)).

types of voters are more likely to truncate their ballot in ways that lead to exhaustion. Unfortunately, although individual cast vote records (CVR) are available, they cannot be linked to individual demographic data for privacy reasons. Thus, scholars are forced to use aggregated data on demographics and make ecological inferences about their relation to vote choice. Of course, ecological inferences face several challenges. Ecological models may be prone to omitted variable bias if neighborhood composition is correlated with unobserved factors that correlate with vote choice. A similar problem may arise to the extent to which the ethnic/racial composition directly effects vote choice. For example, suppose we observed that electoral districts with large Asian populations had large numbers of exhausted ballots. This pattern could arise in two ways – Asian voters could be more likely to cast truncated ballots or other groups who live in proximity to Asians might truncate ballots more frequently. Another common issue is that local demographic information may not distinguish between voters and non-voters.

While these concerns are impossible to address completely, the use of the NYC voter file can ameliorate them to some extent. From information provided by the commercial data company L2, I am able to estimate the aggregate racial and ethnic characteristics of the participants in the 2021 primary at the level of the electoral district. Given that electoral districts are quite small and that there is substantial residential segregation, the ecological biases should be reduced relative to the use of larger and more diverse population units.[17] Over the 5633 electoral districts in my data, the average number of 2021 primary voters is 180. There are very few districts with more than 400 (only 118 or 2.1%).[18]

Of course, the low level of aggregation and the use of the demographics of the actual

[17]There are slight differences between the data from voter file and the cast vote records which I discuss in the appendix. For example, the raw NYC voter file of 2021 primary voters contains 948,340 records whereas the cast vote record file contains 951,444 votes. At the electoral district level, there are some discrepancies between the voter file totals and the number of cast votes for very small districts. Presumably, these are the consequence of the NYC Board of Elections pooling the tabulation of some smaller districts. The results I present below are unaffected by the exclusion of such districts.

[18]See Appendix Table 7 for the distribution of primary voters across districts.

primary voters does not completely eliminate concerns about ecological biases. But those measures in addition to the robustness of the results across a number of elections and ethnic groups lead some credence to the idea that the findings can be attributed to individual-level behavior.

The models that I report below are based on the following variables:

- *Ballot Exhaustion Rate.* This measure is computed directly from the cast vote record file. After processing the data to account for NYC rules for legal ballots, I determine whether or not a voter cast a ballot ranking one of the two final candidates in a multi-round election.Those who did not cast such a ballot are coded as exhausted and the rate is calculated as the ratio of exhausted ballots to legal ballots in the electoral district. This rate is multiplied by 100 for ease of interpretation.

- *Average Number of Ranks* and *Rate of Single-Rank Ballots.* Using the CVR file, I compute the average number of ranks used by voters in each district along with the proportion of voters who rank only a single candidate. The proportion of single-rank ballots is multiplied by 100 for ease of presentation.

- *Voter Race and Ethnicity.* Data on voter race and ethnicity is provided by L2 and based on a proprietary model that estimates the likelihood of racial and ethnic identities of individual voters from surname and geographical location.[19] The available categories are White, African-American, Hispanic (including Portuguese), Asian (East and South), and Other. Within the Other category, L2 identifies several ethnic or nationality groups. The largest are Arab, Russian, Pakistani, Persian, and Filipino. Although it might make sense to treat the Other category as a combination of ethnic minority groups, I will not emphasize those results given the heterogeneity of the

[19] In future iterations of this paper, I hope to replace the L2 data with that computed from open source models.

classification. Some voters are not classified when the model does not generate a clear prediction. I label these "unknown".

- *Candidate Race and Ethnicity.* Using web searches, I categorized the racial and ethnic identity all of the RCV finalists. The categories include White, Black, Asian, and Hispanic. In may cases, the candidate stress multiracial identities such as Afro-Latino. In such cases, I categorized the candidate as both Black and Hispanic.

- *Number of Candidates.* This data is generated from the certified election reports available form the NYC Board of Elections website.

The results I present are multiple regression models of exhaustion rates (or average votes or single rank ballots) on the shares of each racial and ethnic group in the primary electorate of each voting district. The base category is the share of White voters so that each coefficient represents the increase or decrease in exhaustion relative to 100% White electorates. In all cases, the models include borough fixed effects and robust standard errors.

Table 3 reports the results of the baseline specification for the city- and borough-wide elections.[20]. First, consider column 1 which reports the results from the mayor's race. Here we find that the concentration of all ethnic groups other than Blacks increased the district exhaustion rate substantially. For example, every ten percentage point increase in the Asian population increased the exhaustion rate by about four points. This is rather large effect given that the average exhaustion rate was only 14 points. A similar ten point increase in Hispanic voters is associated with a 1.5 point increase in the exhaustion rate. The Other electorate is also consistently associated with a substantial increase in the exhaustion rate. The only non-White group associated with lower exhaustion in the

[20]Because the Pubic Advocate's race was resolved in the first round, there were technically no exhausted votes. But I include it for comparison purposes and define exhaustion as not voting for one of the top two candidates

mayor's race was African-Americans. But this is largely a function of high-levels of Black support for Eric Adams, the African-American candidate who ultimately won. Clearly, any voter who ranked Adams first could not exhaust her ballot. In the comptroller's race and the combination of borough presidencies (columns 2 and 3), the percentage of Black voters in an electoral district did correlate strongly with ballot exhaustion. Moreover, the findings about Asian and Hispanic electorates is repeated. The findings for Public Advocate replicate those of Mayor – higher exhaustion rates in Asian and Hispanic areas but no effect of the concentration of Black voters, presumably in part because an African-American candidate, Jumaane Williams, was declared the winner in the first round of tabulation.

Table 3: Exhaustion

	Mayor	Boro Pres	Comptroller	Advocate
Black	-0.040***	0.254***	0.151***	0.001
	(0.004)	(0.011)	(0.008)	(0.001)
Asian	0.385***	0.185***	0.446***	0.044***
	(0.009)	(0.012)	(0.013)	(0.003)
Hisp	0.155***	0.207***	0.296***	0.116***
	(0.006)	(0.013)	(0.011)	(0.003)
Other	0.235***	0.380***	0.382***	0.087**
	(0.022)	(0.028)	(0.021)	(0.028)
Unkown	-0.170***	0.270***	0.430***	0.012*
	(0.012)	(0.036)	(0.033)	(0.006)
N	5620.000	5620.000	5620.000	5620.000
R-Squared	0.652	0.572	0.419	0.510

Standard errors in parentheses

Regression models with borough fixed effects

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

As noted above, the conventional measurement of exhaustion is limited in that any ballot with a first-place rank for one of the top two candidates cannot, by definition, be exhausted. Thus, the measure conflates a group's support for one of the top candidates with its members' willingness to take full advantage of the RCV ballot. To help isolate these distinct factors, Table 4 repeats the analysis with a measure I call "adjusted" exhaustion. This measure is a calculation of the exhaustion rate for those voters who do not give the highest ranking to one of the two leading candidates. For example, in the Mayor's election, it is the percentage of exhausted ballots among those who did not rank Eric Adams or Kathryn Garcia first. Specifically, the adjusted exhaustion measure helps to determine whether the lower exhaustion rate in Black districts reported in Table 3 is a result of higher support for Adams in those districts. The results shown in Table 4 generally confirm this possibility.[21] Among voters who did not rank Adams or Garcia first, the exhaustion rates correlate strongly with the concentration of Black voters. The other results mirror those of Table 3 except the comptroller's race where the adjusted exhaustion rate is lower in Black electoral districts.

To briefly summarize, the results are very consistent with high exhaustion rates in Asian, Hispanic, and Other electoral districts. The results regarding Black electorates are contingent on whether there is a Black candidate among the top two vote-getters. In races such as the mayoral and advocate contests with Black finalists, Black districts exhibited slightly lower exhaustion rates than White districts. But in other races, where Black candidates were not finalists, Black districts exhibited higher rates of ballot exhaustion.

The appendix reports on three additional analyses designed to explore the underlying behavior behind the higher exhaustion rates in heavily minority primary electorates. Table 9 repeats the analysis but focuses instead on the number of ranks used by voters in primary electorates of different compositions. I find that heavy concentrations of Asian and Hispanic voters reduces the average number of ranks used by voters relative to White districts in all elections except for the lopsided Advocate's race. The pattern for Black

[21] I do not include the Advocate's race because the adjusted exhaustion rate is very high in every district.

Table 4: Adjusted Exhaustion

	Mayor	Boro Pres	Comptroller
Black	0.047***	0.133***	-0.042***
	(0.006)	(0.010)	(0.009)
Asian	0.403***	0.064***	0.183***
	(0.010)	(0.015)	(0.014)
Hisp	0.260***	0.126***	0.059***
	(0.009)	(0.012)	(0.012)
Other	0.366***	0.311***	0.222***
	(0.022)	(0.027)	(0.018)
Unkown	-0.173***	0.003	-0.021
	(0.018)	(0.033)	(0.038)
N	5608.000	5597.000	5605.000
R-Squared	0.525	0.587	0.215

Standard errors in parentheses

Regression models with borough fixed effects

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

electorates is somewhat different – fewer ranks in the Mayor's race and slightly more in the others. While one would not want to overinterpret these results, this pattern may be consistent with English-language proficiency playing an important role.

A second analysis reported in Table 10 looks at the proportion of voters in each district that cast a ballot ranking only a single candidate. Here the results are also mixed. In the Mayor's race, concentrations of racial and ethnic voters are associated with a strong increase in the number of voters choosing only a single candidate. However, this is not true about Black electorates in the other races where Black electorates voted for a single candidates at rates similar to those of White electorates (again the lopsided Advocate's race stands out as an anomaly). Table 11 examines the effect of the NYC's limit of five candidate rankings per ballot. For the elections that required multiple rounds of tabulation, I estimate two models. The first is based on those voters who fully participated in the election by casting the minimum of 5 or $n-1$ ranks in a n candidate election.[22] The second model is based on the exhaustion of those who truncated their ballot to a degree not required by the ballot design (less than the minimum of 5 or $n-1$). The correlations of the minority voter percentages and exhaustion rates are statistically significant and have the same sign for both groups of voters. However, the magnitudes are far larger for the voters who voluntarily truncated by ranking fewer than five candidates. These results suggest that NYC's RCV primary would have had substantial racial and ethnic disparities in exhaustion even if the ballot had allowed voters to rank more candidates.

3.2 City Council Elections

In this section, I extend the analysis of the correlates of exhaustion to the 32 City Council primaries that were resolved though multiple-round tabulations. This analysis allows me to better control for additional factors such as the total number of candidates in a council district as well as the racial and ethnic identities of the finalists. Table 5 reports these results. Column 1 uses a similar specification as the one for the executive elections, but controls for the number of candidates. Not surprisingly, given the discussion above, the number of candidates strongly correlates with ballot exhaustion. Each individual candidate is associated with almost a two percentage point increase in the exhaustion rate. But more importantly, districts with large racial and ethnic minority populations have considerably higher rates of ballot exhaustion.

The second column conditions on the race and ethnicity of the final two candidates. The model includes both the unconditional effect of the candidate's identity as well as an interaction between the candidate's identity and the concentration of co-racial/ethnic voters in each district. The unconditional effect allows exhaustion to go up or down in each district independent of its composition, and the interaction effect allows for the possibility

[22] Voting for $n-1$ of n ensures that one's ballot cannot be exhausted.

that voters are less likely to exhaust if there is a co-ethnic finalist.

The unconditional effects show that the identity of the finalists has a substantial impact on exhaustion rates. The presence of a Black finalist is associated with an exhaustion rate five points greater than a contest with two White candidates. Asian candidates are associated with a boost of 2.6 points while Hispanic candidates coincide with a 3 point reduction. All three interaction effects are negative and statistically significant. This finding is consistent with the idea that voters are less likely to exhaust when there is a co-ethnic/racial candidate in the final round.

When I combine the coefficients on the percentage of each group with the associated interaction effect, the effect of percentage Black on ballot exhaustion in the presence of a Black finalist remains negative but is not statistically significant. However, the effect of percent Asian and Hispanic are statistically significant at the .1% in the presence of a co-ethnic finalist.[23] The coefficients for the multi-language groups are larger than that of Blacks, suggesting that ballot complexity may be a contributing factor.

To illustrate the magnitudes of these relationships, Figure 3 presents the predicted differences in the exhaustion rates between hypothetical homogeneous minority districts and those of 100% White districts. In the cases where there is no co-ethnic finalist, the figure shows that homogeneous Black, Asian, and Hispanic districts would have 12 to 20 points higher exhaustion rates than a homogeneous White district (holding the number of candidates and the borough constant). When there are co-ethnic finalists, the exhaustion rates in homogeneous Asian and Hispanic districts remain 6 to 8 percentage points higher, but the rates in Black districts are indistinguishable from White districts.

Column three presents a different model where I condition the effects of racial composition on the number of candidates. These interactions of the district composition for all three groups are broadly similar. For the minimum number of candidate in RCV tabulated

[23]The estimated condition effect for Percent Asian is .067 with a standard error of .017. For Percent Hispanic, it is .084 with a standard error of .018.

Table 5: Exhaustion in Council Primaries

	Baseline	Candidate Demographics	Number of Candidates
# of Candidates	1.924***	1.865***	0.984***
	(0.056)	(0.054)	(0.152)
% Black	0.035**	0.174***	-0.027
	(0.012)	(0.018)	(0.018)
% Asian	0.080***	0.190***	-0.165***
	(0.016)	(0.031)	(0.046)
% Hispanic	0.076***	0.131***	-0.154***
	(0.016)	(0.022)	(0.040)
% Other	0.371***	0.336***	0.359***
	(0.051)	(0.055)	(0.051)
% Unknown	0.061	0.091	0.050
	(0.055)	(0.055)	(0.054)
Black Cand in Final Rnd		5.304***	
		(0.657)	
Black Cand x % Black		-0.185***	
		(0.016)	
Asian Cand in Final Rnd		1.672**	
		(0.611)	
Asian Cand x % Asian		-0.122***	
		(0.031)	
Hispanic Cand in Final Rnd		-2.990***	
		(0.637)	
Hispanic Cand x % Hispanic		-0.047*	
		(0.022)	
# of Candidates × % Black			0.008***
			(0.002)
# of Candidates × % Asian			0.033***
			(0.007)
# of Candidates × % Hispanic			0.029***
			(0.005)
N	3552.000	3552.000	3552.000
R-Squared	0.376	0.429	0.387

Standard errors in parentheses
Regression models with borough fixed effects
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

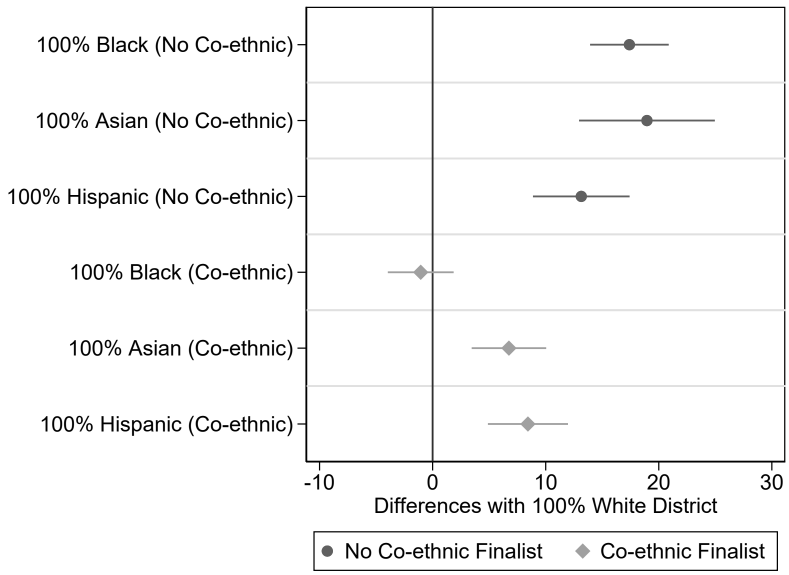

Figure 3: **Predicted Exhaustion Rate Differences with 100% White District** Figure includes those races which required multiple rounds of tabulation.

elections (3), there is very little difference across districts based on ethnic composition. But as the number of candidates gets larger, there is substantial variation related to composition. Figure 4 illustrates the magnitudes of the racial and ethnic composition coefficients as a function of the number of candidates appearing on the ballot. The effect of the number of candidates on the magnitude of difference between 100% White districts is especially large for Asian and Hispanic districts. Such a pattern is consistent with minority voters being disadvantaged by the candidate proliferation of RCV much more than White voters.

The data on City Council races allows me to test an additional claim about RCV – that it boosts voter engagement. If this claim were true, we would expect to see less voter roll-off between the higher-profile executive races and the down-ballot council races. However, since previous research has shown that ballot completion is less likely when voters have less information and sophistication (Lamb and Perry 2020), one might expect RCV to exacerbate roll-off given the increased informational demands required to rank multiple

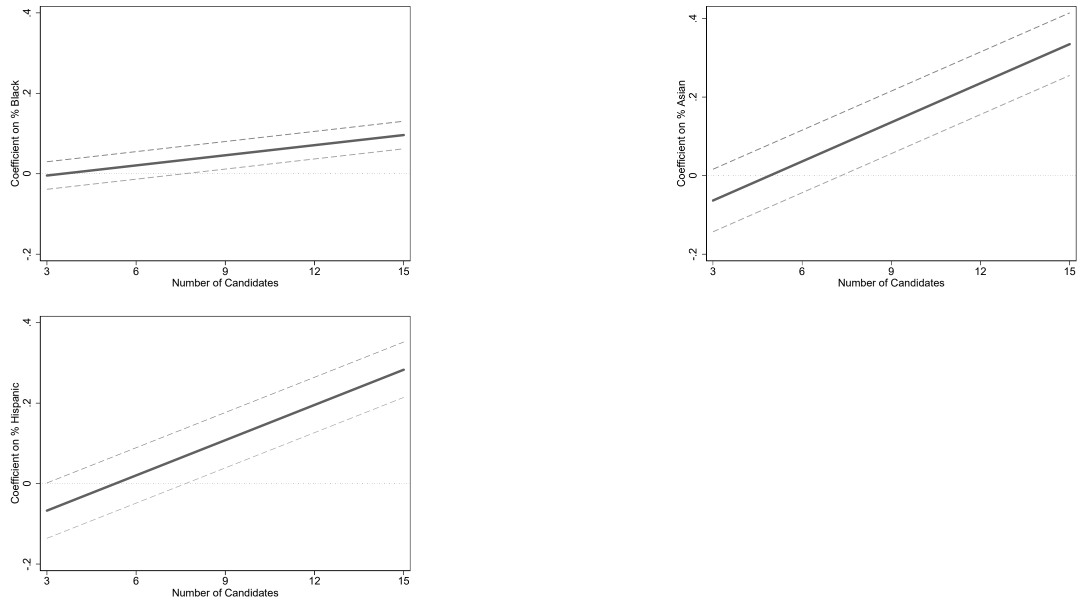

Figure 4: Coefficients on Racial and Ethnic Composition and % of Candidates

candidates.[24]

The data are much more consistent with the latter perspective as we observe very high roll-off rates in the council races. I find that 9.3% of the voters who voted in the mayor's race failed to cast a vote in one of the 32 RCV tabulated council races. This is much higher than the 5.7% of 2017 voters who skipped voting in a contested council primary.[25] This gap is consistent with the voters being deterred by the use of RCV in the lower profile elections. But for my purposes, it is important to know whether rates of roll-off

[24]The question of roll-off is distinct from whether RCV induces more voters to show up at the polls in the first place. McDaniel (2016) finds that turnout dropped in San Francisco mayoral elections following the adoption of RCV, especially among minority groups. In a study of several RCV cities matched against comparable plurality cities, Kimball and Anthony (2016) find a four percentage point drop in turnout associated with RCV, although the estimate is not statistically significant on its own. In a more recent study, McDaniel (2019) finds a statistically significant five percentage point drop due to the introduction of RCV in municipal elections relative to similar cities that maintain plurality electoral systems. While there is disagreement about the magnitude and statistical reliability of the estimated declines in voter turnout, I am not aware of any study that finds a boost in turnout associated with switching to RCV from plurality voting.

[25]One might object that that these numbers are not strictly comparable because some voters may have skipped voting in the 2017 mayor's election and then voted in a council race. But given the low number of voters skipping the mayor's race, such voters would have a very small effect on the comparison.

varied significantly across electoral districts based on their racial and ethnic composition. So Table 12 in the Appendix reports a model of ballot roll-off similar to those reported above. The results show that ballot roll-off rates were higher in electoral districts with larger Black, Asian, and Hispanic populations. As with exhaustion rates, roll-off rates are attenuated in the presence of co-ethnic finalists. The conditional effects remain positive for Black and Hispanic populations, but roll-off rates in Asian districts are slightly smaller when there is a competitive Asian candidate on the ballot.[26]

In summary, the evidence shows that ballot exhaustion was endemic in the NYC Council primaries. Rates were especially high in elections with large numbers of candidates despite the fact that the vast majority of the incremental candidates were not at all competitive. The findings are also consistent with large gaps in the ballot exhaustion rates across ethnic and racial groups, especially groups with large numbers of non-native English speakers. The gaps were partially attenuated when co-ethnic candidates were strong enough to advance to the final round. Given Colner (2023)'s finding that the boost to the diversity pool associated with the adoption of RCV is modest and short-lived, the findings about co-ethnic candidates may portend greater problems for RCV in the future.

4 Alaska Top Four Primary and RCV General

To explore the generality of the findings from New York City, I now examine a very different context – the 2022 Alaska state and federal elections. In 2020, the voters of Alaska adopted Measure 2 which replaced their existing electoral system of first-past-the-post (FPTP)

[26]These observational results can be usefully contrasted with recent experimental results. In Ntounias (2023), respondents are assigned to vote in a hypothetical RCV election while a control group votes in a plurality election with the same candidates. He finds that RCV voters are no more likely to search for candidate information (i.e. read candidate bios) and are equally likely to abstain. Thus, the opportunity to rank more candidates had no important impact on voter engagement. Experimental evidence from international settings reported by Blais et al. (2021) also confirms that ranked choice does not impact voter satisfaction.

partisan primaries followed by FPTP general elections with a two-stage process where the top four candidates from a "pick one" open primary compete in a general election conducted under RCV rules. The measure passed narrowly with a margin of less than 4000 votes of the roughly 344,000 valid ballots cast.[27]

Following the passage of Measure 2, Alaska implemented its Top Four system for the first time in 2022. The primary stage of these elections was almost completely inconsequential. While the top races did involve large numbers of candidates (US Senate 19, US Rep 22, and Governor 10), only one of the 59 state legislative primaries had more than four candidates (HD 35 which had 5). Even with the large number of candidates, the top of the ticket primaries were almost as meaningless. The fourth place candidates polled 2.13% in the Senate race, 3.77% in House race, and 3.86% in the governor's race. On average, they trailed the leading candidates by over 35 points, but only beat the fifth place candidate by about two points. In the general election, the fourth candidates tallied a mere 3% of the vote in the first round. Given the trivial outcomes of the primaries, I focus on the role of RCV and ballot exhaustion in the general elections.

Table 6 reports the rates of ballot exhaustion in the 2022 Alaska elections. The table reports exhaustion rates both for elections that involved RCV calculations as well as "potential rates" for elections that were resolved in the first round. Across all elections, the data show that around 1 of 20 Alaskan voters who went to the polls had no vote recorded in the last round of tabulation. While these rates are somewhat lower than those in NYC, it is worth noting that there were many fewer candidates in Alaska's Top 4 setting. But of course, it is clear that the four candidate limitation did not eliminate high rates of exhaustion. Moreover, the rates of exhaustion in Alaska generally exceed those in similar RCV elections in Maine (see McCarty (2020).)

[27]Brooks, James (November 18, 2020). "Alaska becomes second state to approve ranked-choice voting as Ballot Measure 2 passes by 1%". Anchorage Daily News. Retrieved December 6, 2022. Hillman, Anne (September 15, 2022) "Why Alaska uses ranked choice voting and what we know about how it affects elections". Alaska Public Radio, retrieved March 6, 2023.

Table 6: Exhausted Ballots in Alaska Elections

Election	**% Exhausted**
House Special	6.0%
House General	5.5%
Senate	3.4%
Governor (potential)	6.1%
State Senate	4.9%
State Senate (potential)	7.5%
State House	3.7%
State House (potential)	6.5%
State House (four candidates)	4.8%

Potential exhaustion rates include those voters whose ballots would have been exhausted had the election proceeded to RCV tabulation

As I discussed in the context of New York City, high exhaustion rates might arguably be acceptable if voters from across all racial, ethnic, and social groups were roughly equally likely to exhaust their ballots. So the main question is whether or not certain groups of Alaskans are more or less likely to exhaust their ballots. Therefore, as I did for NYC, I conduct a multivariate regression analysis of the correlates of ballot exhaustion. The primary dependent variable is the ballot exhaustion rate at the precinct level. Using CVR data provided by the State of Alaska Division of Elections, I was able to determine whether each ballot in the cast vote record file was exhausted in a given race.[28] I then aggregate these data to the precinct level. I use two versions of this dependent variable. The first, labeled "raw," is the total rate of exhausted ballots in a precinct for a given election. The problem with this measure, however, is that it might be conflated with partisanship as a voter who ranks one of the final two candidates (generally a major party candidate) first cannot exhaust her ballot regardless of how many candidates she chooses. So as I did for the NYC executive elections, I use a second "adjusted" measure which is the rate of exhaustion among those voters who do not rank one of the final two candidates first. This measure has the advantage of eliminating the effects of ranking a top candidate

[28]See `https://www.elections.alaska.gov/election-results/e/?id=22genr`.

first, but it is noisier because it is based on a much smaller number of voters. Below I report both sets of results. Another issue is that I can only calculate exhaustion rates for elections that use RCV tabulations. Therefore, I used "potential" exhaustion in the governor's race and state legislative districts with more than two candidates. This measure is based on a determination of whether the voter's ballot would have been exhausted had the leading candidate failed to reach 50%. Precincts in state legislative districts with only two candidates cannot be included in the analysis.

Unfortunately, the L2 data file does not contain reliable data on race and ethnicity in Alaska, so I must aggregate census block and block group data to the precinct level.[29] From the Census data, I compile racial and ethnic shares of Whites, Blacks, Asians, Hispanics, Alaskan Natives, and Other.[30] The use of Census data has limitations. The level of aggregation is higher, and the measures are based on the full population rather than voters. But the estimated relationships may still be informative especially in light of the findings with higher quality data in NYC. To help offset some of these concerns, I include additional demographic data on education and age. I include education variables for less than high school degree, high school degree, some college, and college graduate. I also calculate the share of precinct residents over the age of 65.

Finally, it is worth noting that Alaska presents a fairly difficult case for detecting racial and ethnic differences in ballot exhaustion. Since the Top 4 system serves to limit the number of candidates on the RCV ballot, Alaska is unlikely to produce the large cross-group variations we saw in NYC with its larger number of candidates. Yet the results presented below do provide compelling evidence of ethnic group differences even in elections with a lower number of candidates.

[29]This problem largely stems from the historical surname adoption practices of Alaskan Natives. See `https://namecensus.com/last-names/common-american-indian-and-alaskan-native-surnames/`.

[30]The data on Alaskan Natives is based on the Census classification American Indian/Alaskan Native. For simplicity, I refer to the group simply as Alaskan Natives, conceding that a small share of this group may consist of members of non-Alaskan tribal groups.

My main analyses are regressions of the exhaustion rates on the racial, educational, and age variables. In the models of state house elections, I also include the number of candidates in the election (this is a constant in all of the other cases including state senate elections, none of which had more than three candidates). My analysis did not uncover any systematic correlations between education levels and racial demographics other than Alaskan Native. However, I found that the percentage of Alaskan Natives was consistently highly correlated with exhaustion rates across electoral contexts. Tables 13–18, found in the appendix, present these findings in full.

Table 7 presents the full set of coefficients on the share of Alaskan Natives in a precinct across all of the elections. Panel 1 reports the estimates for the special US House election held in July of 2022. In this election, Mary Peltola, an Alaskan Native, won a four-way race against three Republican candidates including former Vice-Presidential candidate Sarah Palin and Nick Begich III, a member of a prominent political family. Not surprisingly, given Peltola's co-ethnicity, there is no correlation between the Alaskan Native share and the exhaustion rate. However, the exhaustion rates of those ranking Begich first were high and somewhat concentrated in Alaskan Native precincts, although the coefficient is only significant at the $p < .10$ level. One might argue that the success of an Alaskan Native candidate rebuts the idea that RCV is bad for minority-group voters. But the pattern of voting on the RCV ballots indicate that the outcome would likely have been the same under the prior system of a partisan primary followed by a general election.[31]

Panel 2 reports the findings from the House general election in November of 2022. This election was generally a replay of the special election.[32]. The pattern of exhaustion is just a clearer version of what happened in the special election. In the general election, Alaskan Native support for Peltola was strong enough to reduce the exhaustion rate for their

[31]Assuming RCV rankings are indicative of how voters would have voted in primary and general elections, Palin would have clearly received the GOP nomination and lost to Peltola head-to-head in the general.

[32]The main difference was that the fourth place candidate dropped out of the race, but still appeared on the ballot

Table 7: Coefficients on Alaska Native Population

	Exhaustion	Exhaustion Adj
Special House Election	0.007	0.052
	(0.009)	(0.027)
N	369	369
R^2	0.068	0.116
House General Election	-0.031***	0.205***
	(0.008)	(0.029)
N	374	370
R^2	0.186	0.312
Governor	0.125***	0.181***
	(0.012)	(0.028)
N	374	372
R^2	0.435	0.409
US Senate	0.013*	0.033
	(0.005)	(0.033)
N	374	369
R^2	0.128	0.156
State Senate	0.076*	0.156
	(0.036)	(0.092)
N	141	141
R^2	0.139	0.150
State House	0.258	1.117*
	(0.168)	(0.518)
N	91	91
R^2	0.316	0.288

Models include shares of other racial and ethnic groups, senior citizens and educational attainment groups.
Potential exhaustion rates used for Governor and state legislatures.
State house model controls for number of candidates.
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

precincts, but the exhaustion rate for those who ranked Begich first are heavily concentrated in Alaskan Native areas. The correlation is highly significant.

Panel 3 reports on the Governor's race and is based on potential exhaustion since the winner, Michael Dunleavy obtained 50.2% of the first ranks. But had Dunleavy received about 800 fewer voters, 6% of the ballots would have been exhausted (see above). The regression models show again that these exhausted ballots would have again been concentrated in Alaskan Native precincts.

The US Senate race is reported in Panel 4. Despite the fact that this race had the lowest overall exhaustion rate of any of the elections, I still estimate a small but statistically significant relationship between raw exhaustion and the share of Alaskan Native residents.[33]

Panels 5 and 6 mostly replicate the above patterns in State Senate and House elections. Because there were many uncontested and two candidate state legislative races, the models of exhaustion could be estimated using only a fraction of the precincts. To ensure an adequate sample size, I use the potential exhaustion measure for races with three or more candidates that resolved in the first round. Although this loss of statistical power led to a loss of precision in the estimates, the point estimates are substantial and in line with the findings for the other elections.

In summary, despite the fact that the Top Four limited the proliferation of candidates, the results from Alaska are very consistent with the findings from NYC. Across races, there is a statistically significant relationship between ballot exhaustion and the share of the population belonging to a politically-salient minority. Also similar to NYC, the outcomes of the US House election suggest that these relationships may be mitigated when there are strong co-ethnic candidates.

[33]The coefficient on Alaskan Native is not significant in the adjusted exhaustion model largely due to the fact that just slightly more than 10% did not vote for one of the top two candidates. Thus, the adjusted measure is very noisy in this case.

5 Conclusion

Partisan polarization and related political dysfunctions have greatly increased interest in fundamental reforms to our electoral processes. But such reforms often come with a variety of trade-offs and unintended consequences. So careful scrutiny and evaluation of the effects of reforms is crucial.

Ranked choice voting is a reform that has excited a lot of people. Its advocates suggest that it can both turn down the temperature surrounding electoral politics and increase the diversity of choices available to voters. But scholarly attempts to evaluate such claims and to root out any downsides are still in their infancy. In this paper, I try to evaluate one such downside – the high rates of ballot exhaustion and their concentration in precincts with large minority populations. The findings suggest that these are indeed drawbacks of RCV. Across a variety of electoral contexts in New York City and Alaska, I find consistent correlations between the ethnic and racial composition of a precinct and the share of exhausted ballots. These correlations are especially large when there are large numbers of candidates and when there are not strong co-ethnic candidates in the race.

These findings are consistent with RCV providing an advantage to majority-group voters over minority-group voters. Whereas RCV allows majority-group voters an additional opportunity to resolve candidate coordination problems, the patterns of ballot exhaustion suggest that minority-group voters are not taking full advantage the system. Whether those higher rates of exhaustion are due to ballot complexity, lower levels of information and mobilization, or racial and ethnic polarization, it is clear that the potential effects of RCV on minority voters needs to be carefully scrutinized before further adoption.

References

Blais, André, Carolina Plescia, John Högström and Gabrielle Péloquin-Skulski. 2021. "Do (Many) Voters Like Ranking?" *Party Politics* 27(6):1223–1228.

Bryer, Brandon. 2021. "One Vote, Two Votes, Three Votes, Four: How Ranked Choice Voting Burdens Voting Rights and More." *University of Cincinnati Law Review* 90:711.

Buisseret, Peter and Carlo Prato. 2022. "Politics Transformed? How Ranked Choice Voting Shapes Electoral Strategies." Unpublished manuscript.

Burnett, Craig M. and Vladimir Kogan. 2015. "Ballot (and Voter) "Exhaustion" under Instant Runoff Voting: An Examination of Four Ranked-Choice Elections." *Electoral Studies* 37:41–49.

Coll, Joseph. 2021. "Demographic Disparities Using Ranked-Choice Voting? Ranking Difficulty, Under-Voting, and the 2020 Democratic Primary." *Politics and Governance* 9(2):293–305.
URL: *https://www.cogitatiopress.com/politicsandgovernance/article/view/3913*

Colner, Jonathan. 2023. "Running Towards Rankings: Ranked Choice Voting's Impact on Candidate Entry and Descriptive Representation." *Available at SSRN 4317298* .

Cormack, Lindsey. 2023. "More Choices, More Problems? Ranked Choice Voting Errors in New York City." *American Politics Research* OnLine First.
URL: *https://doi.org/10.1177/1532673X231220640*

Drutman, Lee. 2020. *Breaking the Two-Party Doom Loop: The Case for Multiparty Democracy in America.* Oxford University Press, USA.

Kilgour, D. Marc, Jean-Charles Grégoire and Angèle M. Foley. 2020. "The Prevalence and

Consequences of Ballot Truncation in Ranked-Choice Elections." *Public Choice* 184:197–218.

Kimball, David C. and Joseph Anthony. 2016. Voter Participation with Ranked Choice Voting in the United States. In *Annual Meeting of the American Political Science Association*.

Lamb, Matt and Steven Perry. 2020. "Knowing What You Don't Know: The Role of Information and Sophistication in Ballot Completion." *Social Science Quarterly* 101(3):1132–1149.

McCarty, Nolan. 2019. *Polarization: What Everyone Needs to Know*. New York: Oxford University Press.

McCarty, Nolan. 2020. "Expert Report, Hagopian, et al. v. Dunlap, et al." *U.S. District Court for the District of Maine* .

McDaniel, Jason A. 2016. "Writing the Rules to Rank the Candidates: Examining the Impact of Instant-runoff Voting on Racial Group Turnout in San Francisco Mayoral Elections." *Journal of Urban Affairs* 38(3):387–408.

McDaniel, Jason A. 2018. "Does More Choice Lead to Reduced Racially Polarized Voting? Assessing the Impact of Ranked-Choice Voting in Mayoral Elections." *California Journal of Politics and Policy* 10(2).

McDaniel, Jason A. 2019. "Electoral Rules and Voter Turnout in Mayoral Elections: An Analysis of Ranked-Choice Voting.".

Morton, Rebecca B. and Thomas A. Rietz. 2007. "Majority Requirements and Minority Representation." *NYU Annual Survey of American Law* 63:691.

Neely, Francis and Corey Cook. 2008. "Whose Votes Count?: Undervotes, Overvotes, and Ranking in San Francisco's Instant-Runoff Elections." *American Politics Research* 36(4):530–554.
URL: *https://doi.org/10.1177/1532673X08318110*

Neely, Francis and Jason McDaniel. 2015. "Overvoting and the Equality of Voice under Instant-runoff Voting in San Francisco." *California Journal of Politics and Policy* 7(4).

Ntounias, Theodoros. 2023. "Voter Information Search and Ranked Choice Voting." *Election Law Journal: Rules, Politics, and Policy* 22(4):337–362.
URL: *https://doi.org/10.1089/elj.2022.0052*

Polubinksi, Madeleine. 2023. "One Person, How Many Votes? Race and Representation in Ranked Choice Elections.". Senior Thesis, Politics Department, Princeton University.

Santucci, Jack. 2021. "Variants of Ranked-Choice Voting from a Strategic Perspective." *Politics and Governance* 9(2):344–353.

Santucci, Jack and Jamil Scott. 2021. "Do Ranked Ballots Stimulate Candidate Entry?" *Available at SSRN 3956554* .

Vishwanath, Arjun. 2022. "Electoral Institutions and Substantive Representation in Local Politics: The Effects of Ranked Choice Voting.".

6 Appendix

6.1 Comparisons of 2017 and 2021

Column 1 of Table 8 reports regression models of the number of exhausted or wasted voters in contested city council primaries in 2017 and 2021. Note that while the direct effect of RCV elections in 2021 is not statistically different from zero, the correlation between exhausted and wasted votes with the number of candidates is lower under RCV.

Column 2 of Table 8 reports regression models of the size of the winning majority in contested city council primaries in 2017 and 2021. Here the models suggest that RCV was associated with substantially lower winners' shares, but that RCV may have mitigated the effect of the number of candidates.

Table 8: Comparison of RCV and Plurality

	Exhaust/Waste	Winner's Share
Candidates	6.427***	-5.334***
	(0.658)	(0.921)
RCV (2021)	3.040	-12.119*
	(2.639)	(4.899)
RCV x Candidates	-3.420***	3.375**
	(0.698)	(1.003)
Constant	-9.851***	77.026***
	(2.152)	(3.951)
N	79.000	79.000
R-Squared	0.752	0.475

Standard errors in parentheses
Regression model
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Figures 5 and 6 present these results graphically.

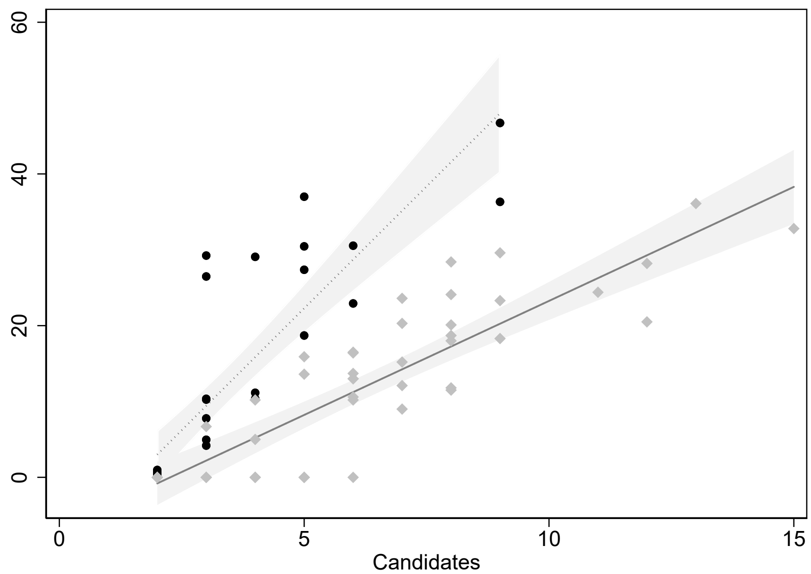

Figure 5: **Exhaustion and Waste Rates by Number of Candidates** Diamonds and solid line represent RCV races in 2021 while circles and dotted line represent plurality contests in 2017.

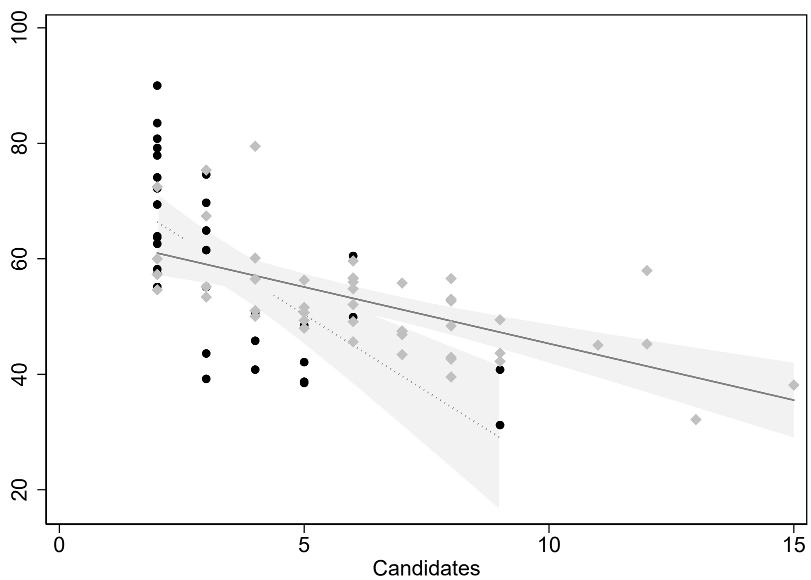

Figure 6: **Winner's Share by Number of Candidates** Diamonds and solid line represent RCV races in 2021 while circles and dotted line represent plurality contests in 2017.

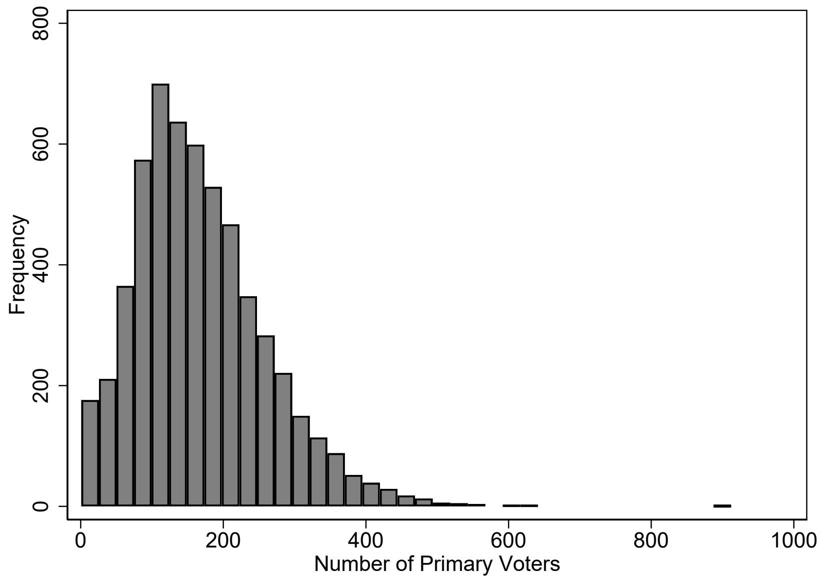

Figure 7: **Number of Primary Voters by District** From NYC Voter File

6.2 Cast Vote Records and the Voter File

Figure 7 shows a histogram of the number of cast vote records for each NYC precinct. Only a handful of precincts had more than 400 voters with most ranging from 100 to 200 voters.

Figure 8 plots the number of records in the CVR with the number of primary voters as recorded in the L2 voter file most proximate to the election. In most cases, the figures closely match. There are some discrepancies which might be attributed to moving or attrition of voters from the voter file soon after the election and/or the NYC Board of Elections combining precincts for tabulation purposes.

6.3 Correlates of the Number of Ranks and the Single Ranks

Table 9 re-estimates the models described in the main text by using the number of ranks used by each voter to construct the dependent variable. All observations are weighted by the number of votes cast in each electoral district. The model contains borough fixed effects, and robust standard errors are reported.

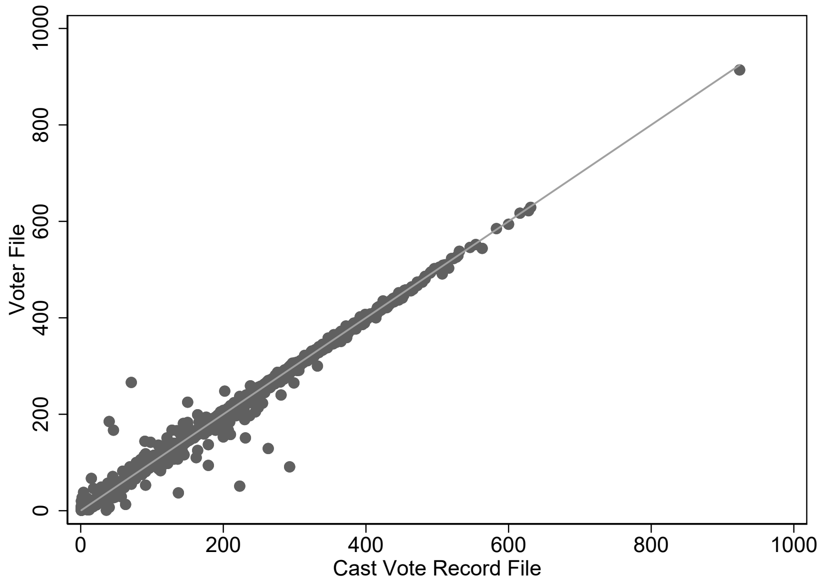

Figure 8: **Number of Records in Voter File versus Cast Vote Records** with 45 degree line

Table 9: Number of Votes

	Mayor	Boro Pres	Comptroller	Advocate
Black	-0.008***	0.001***	0.002***	0.002***
	(0.000)	(0.000)	(0.000)	(0.000)
Asian	-0.016***	-0.001***	-0.002***	0.003***
	(0.000)	(0.000)	(0.000)	(0.000)
Hisp	-0.014***	0.000	-0.001***	0.003***
	(0.000)	(0.000)	(0.000)	(0.000)
Other	-0.010***	0.002**	0.004***	0.004***
	(0.001)	(0.001)	(0.001)	(0.000)
Unkown	-0.022***	-0.009***	-0.009***	-0.002***
	(0.001)	(0.001)	(0.001)	(0.000)
N	5620.000	5614.000	5619.000	5616.000
R-Squared	0.399	0.757	0.359	0.522

Standard errors in parentheses

Regression models with borough fixed effects

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 10 re-estimates the models described in the main text but uses the number of voters who ranked only a single candidate to construct the dependent variable. All observations are weighted by the number of votes cast in each electoral district. The model contains borough fixed effects, and robust standard errors are reported.

Table 10: Single Vote Ballots

	Mayor	Boro Pres	Comptroller	Advocate
Black	0.202***	0.006	-0.010	-0.234***
	(0.006)	(0.006)	(0.006)	(0.007)
Asian	0.319***	0.021	0.061***	-0.396***
	(0.011)	(0.011)	(0.011)	(0.012)
Hisp	0.323***	0.030***	0.082***	-0.349***
	(0.008)	(0.009)	(0.008)	(0.010)
Other	0.270***	-0.018	0.042**	-0.200***
	(0.017)	(0.014)	(0.014)	(0.017)
Unkown	0.181***	-0.106***	-0.052*	-0.640***
	(0.021)	(0.021)	(0.024)	(0.032)
N	5620.000	5620.000	5620.000	5620.000
R-Squared	0.543	0.294	0.153	0.434

Standard errors in parentheses
Regression models with borough fixed effects
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 11 reports estimates of separate models distinguishing between the rates at which voters who fully participated exhausted their ballots (F) and the rate at which those who truncated (T) exhausted their ballots.[34] For Asian, Hispanic, and Other electorates, the magnitudes of the coefficients are much higher for voters who voluntarily truncated by not ranking as many candidate as there were allowed. Yet I still find significant correlations between the size of those electorates and exhaustion among those who fully participated in the election.

[34]The number of electoral districts varies due to districts where every voter cast a full ballot or no voter cast a full ballot.

Table 11: By Source of Truncation

	Mayor F	Mayor T	BP F	BP2 T	Comp F	Comp T
Black	-0.031***	-0.066***	0.091***	0.325***	-0.026***	-0.028***
	(0.004)	(0.006)	(0.004)	(0.016)	(0.005)	(0.005)
Asian	0.081***	0.518***	0.028***	0.288***	0.347***	0.425***
	(0.007)	(0.011)	(0.005)	(0.022)	(0.012)	(0.011)
Hisp	0.049***	0.215***	0.032***	0.345***	0.112***	0.207***
	(0.005)	(0.009)	(0.005)	(0.019)	(0.007)	(0.008)
Other	0.080***	0.351***	0.082***	0.580***	0.118***	0.332***
	(0.014)	(0.027)	(0.011)	(0.042)	(0.017)	(0.027)
Unkown	-0.093***	-0.322***	-0.011	0.219***	-0.065***	-0.196***
	(0.013)	(0.017)	(0.012)	(0.047)	(0.015)	(0.015)
N	5598.000	5602.000	5605.000	5596.000	5585.000	5610.000
R-Squared	0.221	0.649	0.644	0.429	0.477	0.621

Standard errors in parentheses

Regression models with borough fixed effects

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

6.4 Ballot Roll-Off

Table 12 presents the estimates of a model of ballot roll-off in NYC precincts as a function of the number of city council candidates and the racial and ethnic composition of each electoral district. All observations are weighted by the number of votes cast in each district. The model contains borough fixed effects, and robust standard errors are reported.

Table 12: Ballot Roll-Off between Mayor and Council Primaries

	Baseline	Candidate Demographics
# of Candidates	-0.310***	-0.275***
	(0.032)	(0.030)
% Black	0.019***	0.049***
	(0.004)	(0.008)
% Asian	0.012	0.140***
	(0.007)	(0.015)
% Hispanic	0.039***	0.084***
	(0.007)	(0.010)
% Unknown	0.072***	0.052***
	(0.015)	(0.015)
% Other	-0.001	-0.032**
	(0.013)	(0.010)
Black Cand in Final Rnd		-1.229***
		(0.243)
Black Cand x % Black		-0.022**
		(0.008)
Asian Cand in Final Rnd		1.337***
		(0.265)
Asian Cand x % Asian		-0.178***
		(0.015)
Hispanic Cand in Final Rnd		-2.376***
		(0.329)
Hispanic Cand x % Hispanic		-0.013
		(0.012)
N	3552.000	3552.000
R-Squared	0.168	0.260

Standard errors in parentheses

Regression models with borough fixed effects

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

6.5 Alaska Models

Tables 13–18 provide estimates of the full specifications for the models of ballot exhaustion in the 2022 Alaskan elections. In each case, the observations are weighted by the number of voters who cast ballots in the precinct. Each model reports robust standard errors. In some cases, the number of precincts used for the adjusted exhaustion model is lower than the number in the raw exhaustion model. This occurs when there are precincts where all voters ranked one of the top two candidates first.

Table 13: Special House Election

	Exhaustion	Exhaustion Adj
Black	-0.158*	-0.384**
	(0.064)	(0.116)
Hisp	0.018	-0.130
	(0.099)	(0.191)
American Indian/Alaska Native	0.007	0.052
	(0.009)	(0.027)
Asian	0.002	0.032
	(0.028)	(0.050)
Less than HS	0.015	0.013
	(0.029)	(0.067)
High School	0.005	0.032
	(0.012)	(0.025)
Some College	0.035	0.081*
	(0.019)	(0.037)
Over 65	0.030	0.100*
	(0.019)	(0.047)
N	369.000	369.000
R-Squared	0.068	0.116

Standard errors in parentheses

Regression models

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 14: General House Election

	Exhaustion	Exhaustion Adj
Black	-0.201***	-0.611***
	(0.060)	(0.150)
Hisp	-0.070	-0.114
	(0.093)	(0.232)
American Indian/Alaska Native	-0.031***	0.205***
	(0.008)	(0.029)
Asian	5.785*	35.266***
	(2.689)	(7.073)
Less than HS	0.046	0.172*
	(0.025)	(0.080)
High School	0.010	-0.010
	(0.013)	(0.037)
Some College	0.048**	0.071
	(0.016)	(0.041)
Over 65	0.056**	0.232***
	(0.018)	(0.045)
N	374.000	370.000
R-Squared	0.186	0.312

Standard errors in parentheses

Regression models

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 15: Governor Election

	Exhaustion	Exhaustion Adj
Black	-0.322***	-0.559**
	(0.069)	(0.186)
Hisp	-0.007	-0.209
	(0.092)	(0.242)
American Indian/Alaska Native	0.125***	0.181***
	(0.012)	(0.028)
Asian	0.141***	0.225**
	(0.027)	(0.080)
Less than HS	-0.010	0.134
	(0.031)	(0.080)
High School	-0.026	0.182***
	(0.014)	(0.032)
Some College	0.031	0.190***
	(0.020)	(0.043)
Over 65	0.110***	0.201***
	(0.024)	(0.053)
N	374.000	372.000
R-Squared	0.435	0.409

Standard errors in parentheses

Regression models

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 16: Senate Election

	Exhaustion	Exhaustion Adj
Black	0.048	-0.378*
	(0.038)	(0.175)
Hisp	0.054	-0.143
	(0.057)	(0.288)
American Indian/Alaska Native	0.013*	0.033
	(0.005)	(0.033)
Asian	0.018	0.147
	(0.016)	(0.091)
Less than HS	0.041*	0.191*
	(0.019)	(0.097)
High School	0.020*	0.155***
	(0.009)	(0.043)
Some College	0.030**	0.216***
	(0.010)	(0.058)
Over 65	0.018	0.165*
	(0.013)	(0.066)
N	374.000	373.000
R-Squared	0.128	0.156

Standard errors in parentheses

Regression models

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 17: State Senate Election: Exhaustion and Vote

	Exhaustion	Exhaustion Adj
Black	-0.344	-1.106
	(0.207)	(0.570)
Hisp	0.533	-0.556
	(0.317)	(0.809)
American Indian/Alaska Native	0.076*	0.156
	(0.036)	(0.092)
Asia	0.029	0.296
	(0.078)	(0.180)
Less than HS	-0.166	-0.021
	(0.122)	(0.334)
High School	-0.033	-0.068
	(0.074)	(0.134)
Some College	-0.195*	-0.278
	(0.081)	(0.163)
Over 65	0.016	0.076
	(0.030)	(0.101)
N	141.000	139.000
R-squared	0.139	0.150

Standard errors in parentheses

Regression models

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 18: State House Election: Exhaustion and Vote

	Exhaustion	Exhaustion Adj
Black	-0.443	-2.877**
	(0.325)	(0.859)
Hisp	0.653	1.057
	(0.448)	(1.118)
American Indian/Alaska Native	0.258	1.117*
	(0.168)	(0.518)
Asian	-0.289**	-0.474
	(0.098)	(0.344)
Less than HS	-0.258*	-0.429
	(0.127)	(0.387)
High School	0.049	0.018
	(0.032)	(0.118)
Some College	0.154**	0.345**
	(0.047)	(0.123)
Over 65	-0.073	0.451
	(0.063)	(0.228)
Candidates	0.035***	-0.032
	(0.009)	(0.024)
N	91.000	91.000
R-Squared	0.316	0.288

Standard errors in parentheses

Regression models

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$