

Voter Perceptions of Trust in Risk-Limiting Audits

Asmita Dalela¹, Oksana Kulyk¹, and Carsten Schürmann¹

IT University of Copenhagen, Denmark
{asmd,okku,carsten}@itu.dk

Motivation: A Risk-limiting audit (RLA) [2] is a post-election auditing technique that is gaining increasing popularity, because it can automatically correct a wrong election outcome, while being very efficient especially if the margins are wide. The purpose of RLAs has been to strengthen public confidence in the election, first, because they can be integrated into existing election processes, for example, in Denmark, where the result of the first (rough) count can be verified during the second (fine) count [3]. Second, some of the ceremonies surrounding RLAs can be turned into public events, such as the dice-rolling ceremony used to create entropy to select a random sample.

The question, however, remains open, whether RLAs really strengthen public confidence. While the theory behind the audits is sound, the resulting sample size is often very small (e.g. 523 ballots audited in an RLA given a total of 393,826 cast votes in the 2020 election in Denver, Colorado). Thus it remains an open question whether the voters would find an audit with such a sample size convincing or not.

Method: To answer the research question *if RLAs really strengthen public confidence in the outcome of an election*, we conducted a user study with 105 randomly chosen US residents across all demographics using the Prolific platform. We study several hypothesis, most importantly:¹:

$H_{1,1}$ When asked about their opinions about which number of ballots should be selected for auditing, the participants provide a number higher than the one prescribed by the RLA methodology.

$H_{1,2}$ Participants' confidence in the audit results changes when they are informed about the number of ballots selected for auditing

Results: When asked which number of ballots the participants would prefer to be audited, this number tended to be magnitudes higher than the actual number required by the RLA for most of the participants (see Figure 1). The sign test has confirmed that the difference between preferred and actual number of ballots is significantly different from zero ($p < .001$, 95% CI for median difference between preferred and actual ballots (as percentage of total ballots) is [3.23%, 16.1%]), thus, **$H_{1,1}$ is confirmed.**

While the majority of the participants (70%, 74 out of 105) had a positive attitude towards conducting RLAs, choosing either “maybe yes” or “definitely

¹ For a more detailed description of the methodology and the rest of tested hypotheses and conducted analyses, see the extended version of the paper [1]

yes” as the answer to the question whether their confidence in the election result would increase after an RLA, only 44% provided a positive answer to the same question asked after presenting the number of audited ballots to the participants. Figure 1 shows the distribution of changes of participants’ answers. The Wilcoxon signed-rank test shows a significant difference between the “before” and “after” answers ($p < .001$, $Z = -4.47$, effect size $r = .33$, moderate), thus, **H_{1,2} is confirmed.**

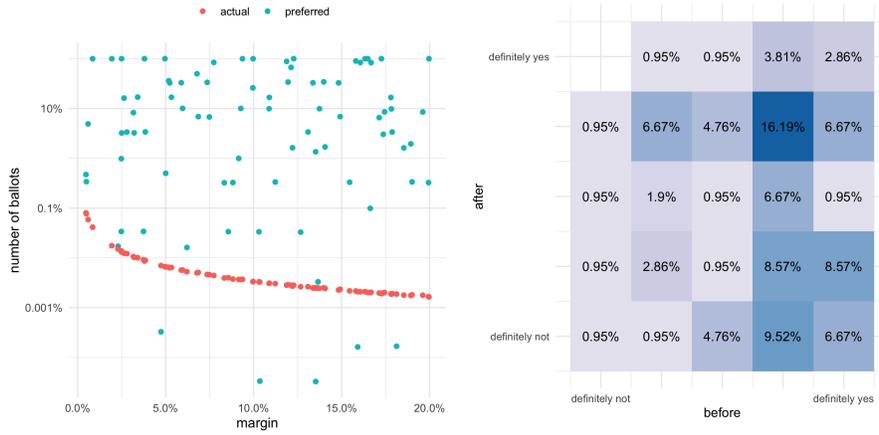


Fig. 1: Left: Preferred vs. actual number audited ballots (as percentage of total ballots) depending on the margin. The scale is logarithmic. Right: Percentage of participants for each case of confidence change.

Conclusion: We recognize the value of RLAs in confirming the integrity of the election result. However, our results show that as a measure to create trust, they are not sufficient by themselves, and additional measures such as voter education need to be considered. While this study is the first one to investigate this issue, follow-up work is needed to better understand the factors influencing voter’s trust and the effectiveness of various ways one can educate voters about RLAs or raise trust via other measures.

References

1. Asmita Dalela, Oksana Kulyk, and Carsten Schürmann. Voter perceptions of trust in risk-limiting audits, 2021.
2. Mark Lindeman and Philip B. Stark. A gentle introduction to risk-limiting audits. *IEEE Security & Privacy*, 10(5):42–49, 2012.
3. Carsten Schürmann. A risk-limiting audit in Denmark: A pilot. In *First International Joint Conference on Electronic Voting and Identity (E-Vote-ID’16)*, pages 192 – 202. Springer Verlag LNCS 10141, October 2016.