

On the Validity of Donut Regression Discontinuity Designs

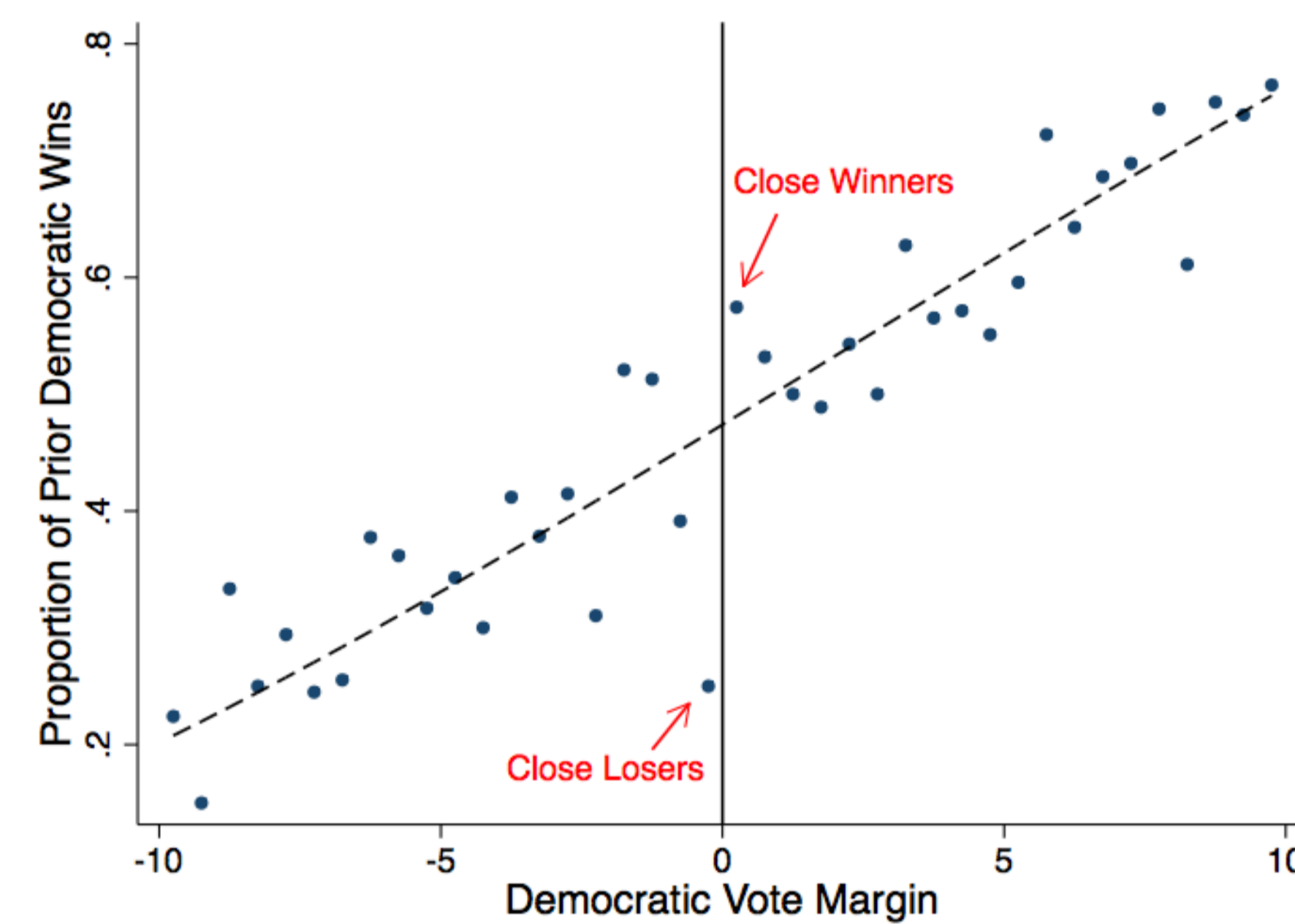
Evidence from 17 Electoral Settings in 10 Countries

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Chance Covariate Imbalance

- The incumbent party exhibits a systematic advantage in close elections in the post-WWII U.S. House (see figure).
- This research is very problematic for the plausibility of the "as if" random assumption for assignment to winner and loser status in close, supposedly "coin-flip" elections.
- Eggers et al. (2014) explore if sorting is present in several other electoral settings with the same basic rules and conclude that that the sorting in the U.S. House is the result of "chance" covariate imbalance at the threshold.

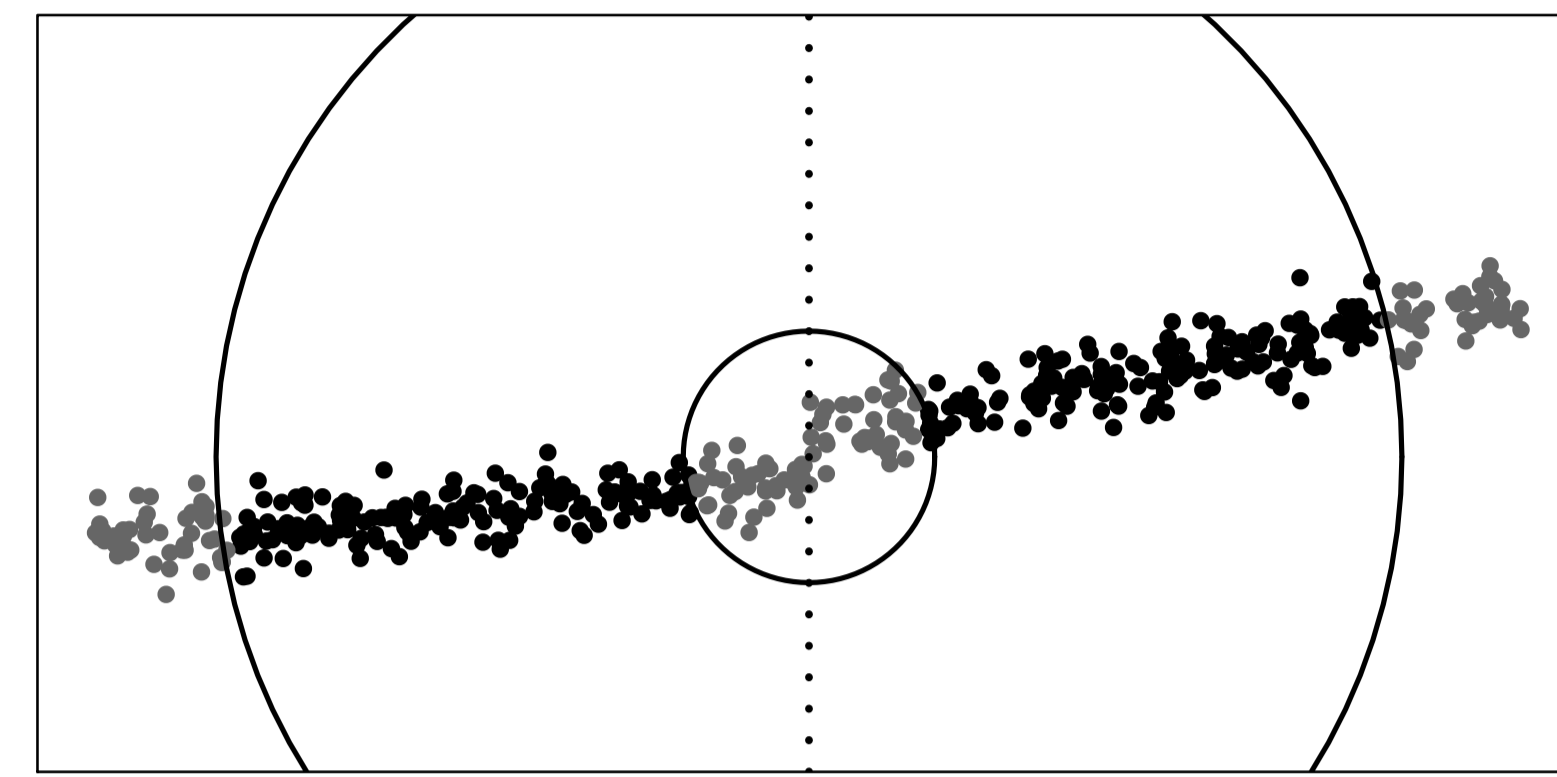
Evidence of Sorting in Post-War House



Possible Solution: Donut RD

- Even if the covariate imbalance in House elections is due to chance, scholars should account for this imbalance.
- One such method recommended (albeit cautiously) in Eggers et al. (2014) is a "donut" RD design.
- In such a design, the observations closest to the threshold where sorting is present (the "donut hole") are omitted from the analysis.
- An RD estimate is the local average treatment effect at the threshold, so the observations approaching the threshold are usually considered the most important and informative for making an inference at the threshold (hence bandwidths that restrict the sample to observations in the neighborhood of the threshold).
- Little is known about the validity of the donut RD in electoral contexts; this research is the first comprehensive validation effort.

Example Donut RD



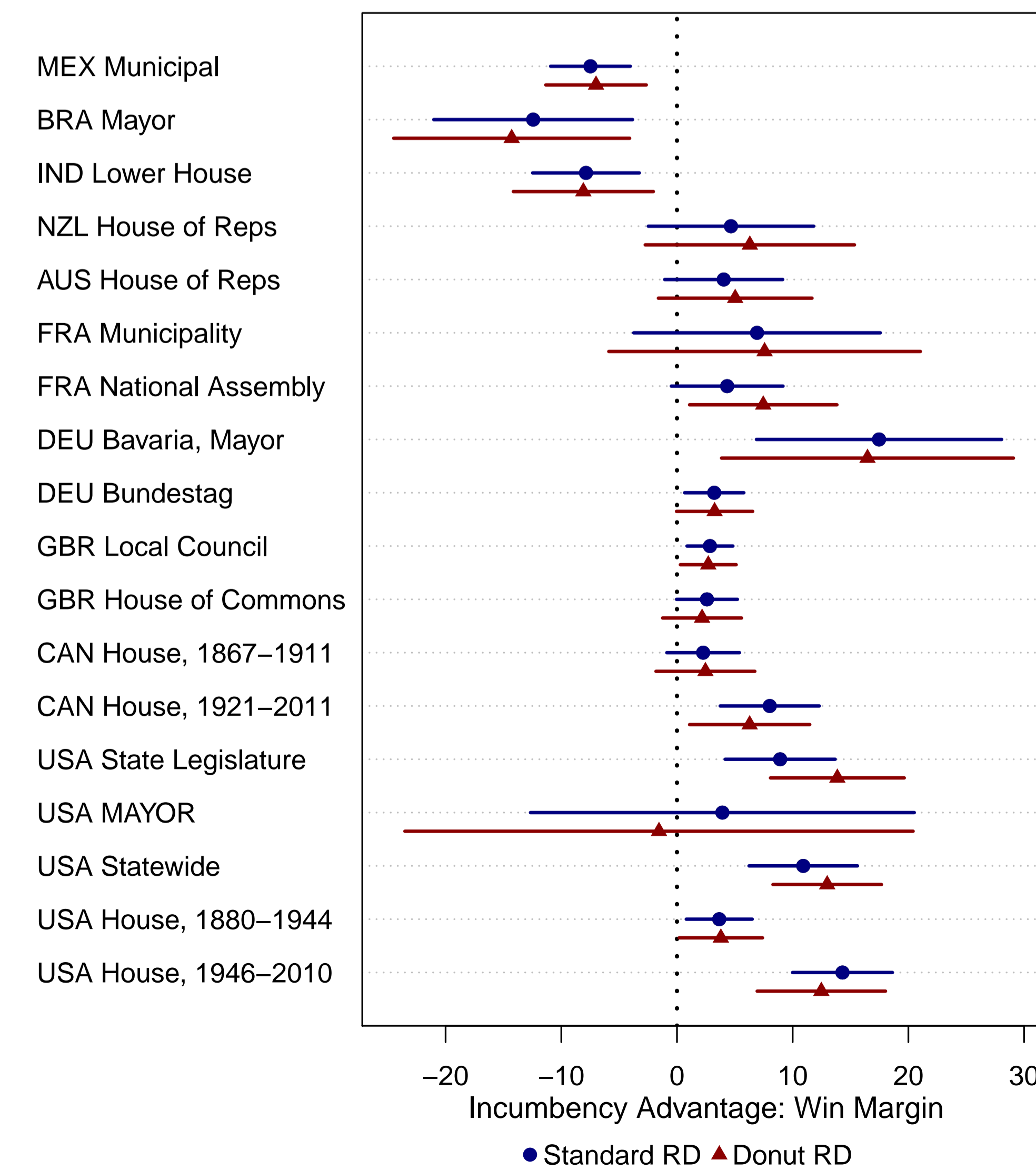
The outer grey observations are omitted from the analysis for being outside of the RD bandwidth, and the inner grey observations are omitted for being inside the donut hole. The remaining black observations are used in a donut RD.

Data

- I use the replication data set from Eggers et al. (2014).
- Settings with partisan, single-winner, plurality elections provide most informative test of validity of the donut RD for the House.
- Eggers et al. (2014) find no evidence of a systematic incumbency advantage in close elections in these other settings, thus RD estimates from these settings are widely considered valid.

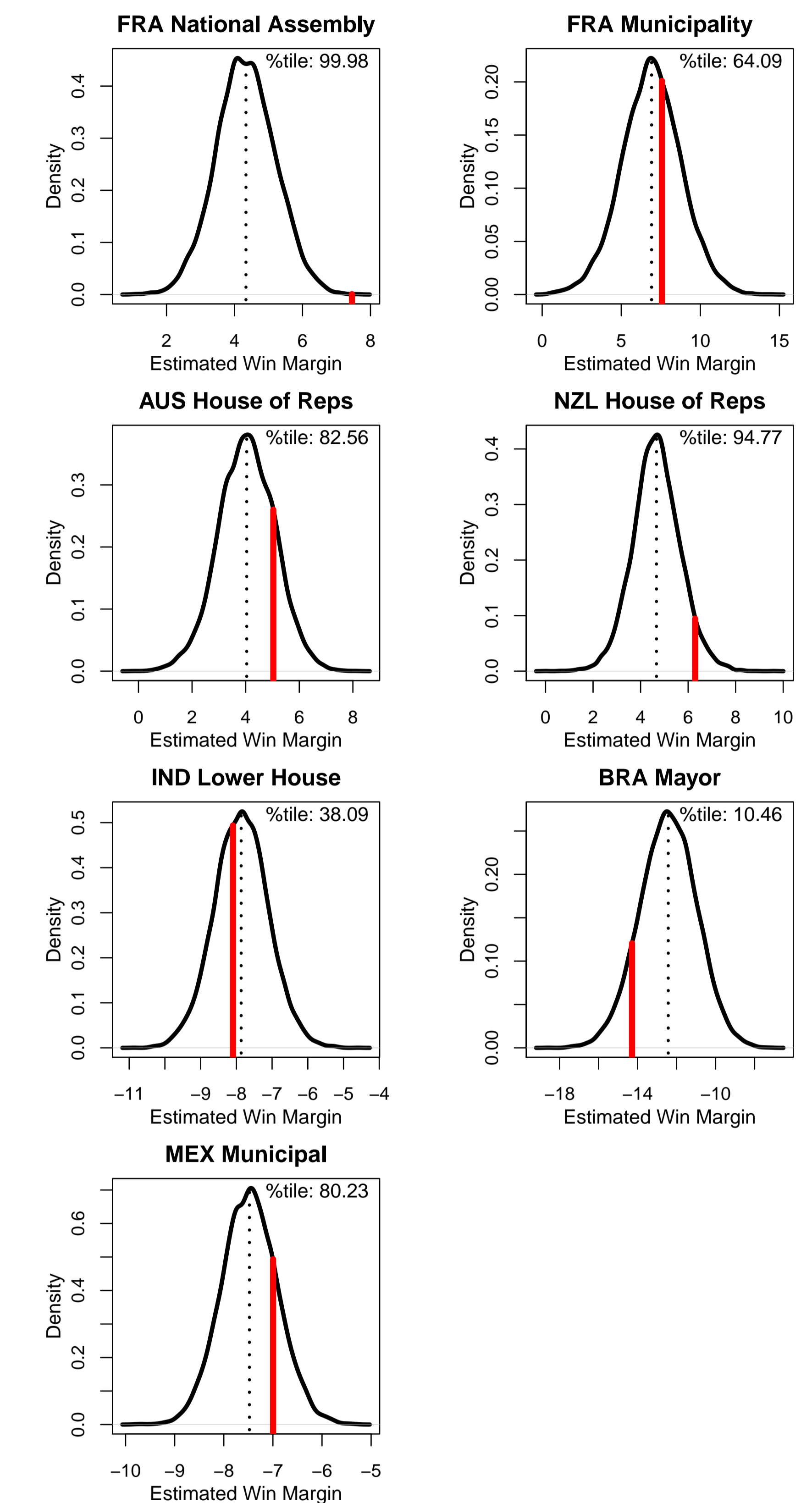
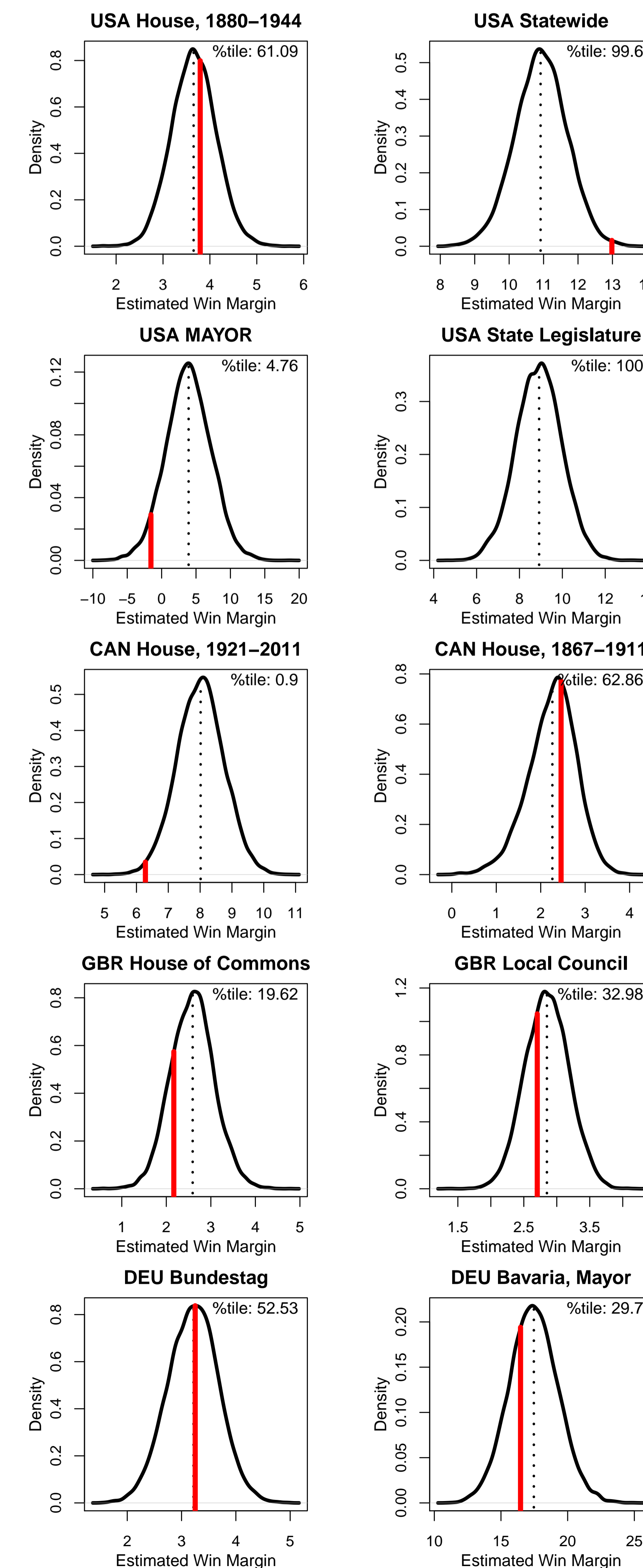
Standard RD vs. Donut RD

Win Margin Estimates by Electoral Setting
Linear Specification: RD Bandwidth=5, Donut Bandwidth=0.50



Simulating a Null Distribution

- I simulate a null distribution by repeating the following procedure many times: remove at random the number of observations that are contained in the donut hole and calculate the RD estimate.
- I do this for each of the 17 electoral settings using a local linear specification with a bandwidth of 5.
- Donut RD estimates rarely should be at the extremes of the null distribution if removing the donut hole is equivalent to removing observations at random.



Conclusion

- While donut RD estimates of incumbency advantage are rarely significantly different from valid standard RD estimates, the magnitude of the point estimates sometimes differ considerably.
- Simulating a null distribution by removing the same number of observations at random as are contained within the donut hole suggests that donut RD estimates are often more extreme than would be expected from removing observations at random.
- Perhaps most problematic is the deficit in the theoretical understanding of how sorting works in an electoral setting. Unless the comparability of observations on either side of the donut hole across the threshold is understood, one should be extremely cautious and judicious in using the donut RD.