

STATE OF NORTH CAROLINA
COUNTY OF WAKE

IN THE GENERAL COURT OF JUSTICE
SUPERIOR COURT DIVISION
No. 19-cv-012667

REBECCA HARPER, *et al.*,

Plaintiffs,

v.

DAVID LEWIS, IN HIS OFFICIAL CAPACITY AS SENIOR
CHAIRMAN OF THE HOUSE SELECT COMMITTEE ON
REDISTRICTING, *et al.*,

Defendants.

**DECLARATION OF DR.
JONATHAN C.
MATTINGLY**

I, Dr. Jonathan C. Mattingly, upon my oath, declare and say as follows:

1. I am over the age of eighteen (18) and competent to testify as to the matters set forth herein.
2. I am the James B. Duke Professor of Mathematics at Duke University and the Chair of the Department of Mathematics. I am also Professor of Statistical Science at Duke. I received a B.S. in Applied Mathematics with a concentration in physics from Yale University in 1992, and a Ph.D. in Applied and Computational Mathematics from Princeton University in 1998.
3. I lead a group at Duke University which conducts non-partisan research to understand and quantify gerrymandering. I have testified either at deposition or at trial in the following cases: *Common Cause et al. v. Robert A. Rucho et al.* (M.D.N.C. 2016); *Common Cause et al. v. David Lewis et al.* (N.C. Super. 2019).
4. Plaintiffs' counsel asked me to analyze the HB 1029 remedial plan for North Carolina's congressional districts (the "Remedial Plan"), as passed on November 15, 2019. Specifically, plaintiffs' counsel asked me to compare the partisan attributes of the Remedial Plan

to those of the ensemble of congressional plans I created in the federal lawsuit *Common Cause v. Rucho*. Because the ensemble of congressional plans I created in *Common Cause v. Rucho* used racial data and the adopted criteria for the Remedial Plan stated that “[d]ata identifying the race of individuals or voters shall not be used in construction or consideration of districts in the 2019 Congressional Plan,” Plaintiffs’ counsel also asked me to compare the partisan attributes of the Remedial Plan to a new nonpartisan ensemble that did not consider race. Parts of this analysis were already in progress for our academic work.

5. The first ensemble that I use for my analysis in this Declaration contains 57,202 congressional plans and does not consider race. The second ensemble that I use for my analysis contains 24,518 congressional plans; it is the same ensemble described in my March 6, 2017 expert report in the federal lawsuit *Common Cause v. Rucho*.

6. To create both congressional ensembles, I employed the same general methodology that I used in creating the ensemble of simulated state House and state Senate plans in *Common Cause v. Lewis*. Specifically, I generated a random, representative collection of alternative redistricting maps using a Markov Chain Monte Carlo algorithm combined with simulated annealing. No partisan data were used to construct either ensemble of maps. In constructing the ensemble that did not consider race, I used only the generally accepted redistricting criteria of population equality, contiguity, compactness, and keeping counties and VTDs whole. In constructing the ensemble that I used in *Rucho* that did consider race, I used the above criteria and in addition tuned the ensemble to prioritize maps that contained one district with at least 44.48% African American voting age population and one district with at least 36.20% African American voting age population, based on percentages of the 2016 Plan. The *Rucho* ensemble also required that at least one district contain a BVAP above 40% and a second

district have a BVAP above 33.5%. Both ensembles are tuned to have similar compactness scores,¹ similar population deviations,² and number of split counties.

7. To assess the partisanship of the ensembles and the 2019 Remedial Plan, I have investigated the ranked-ordered marginal distributions using 10 elections in North Carolina from 2012, 2014, and 2016. While I have come to prefer statewide elections as the effects of incumbency, funding, and other such factors are uniform across the state, I have also included two sets of votes from North Carolina congressional elections (from 2012 and 2016) because I used these results to assess partisanship in my report in *Rucho*.

8. I used the phrase “signature of gerrymandering” in *Rucho* and *Lewis* to describe the significant jump in the Democratic vote-share in the rank-ordered box plots (Figure 4 in my report from *Rucho*) between a group of districts with abnormally few Democratic voters and a group of districts with atypically many Democratic voters. This packing effect translates into locking in the election results; thereby, making the outcome essentially predetermined. My analysis in *Common Cause v. Lewis* made the same point in a number of county clusters. There, the same analysis provided compelling evidence that particular county groupings had “baked in” the election results. In all of these cases, the exceptionally large jump is the signature of gerrymandering. Such gerrymandered maps are structured to be exceptionally non-responsive to shifting public opinion and shifting election results.

9. My results are described in the Figures and Tables appended to this declaration. Using 10 different elections, Figures 1 and 2 compare the partisanship of each district in the 2019 Remedial Plan to the partisanship of the corresponding districts in each of the 57,202 plans in my nonpartisan, no-racial-data ensemble. Figure 1 gives ranked-marginal distributions of the

¹ As measured by the Polsby-Popper index.

² The analysis in the *Rucho* report showed that the population deviation is small enough to reliably be zeroed out without qualitatively changing any results.

Democratic vote percentage over six historic elections from 2016, using the ensemble of 57,202 maps that does not consider race. The districts are ordered from least to most Democratic. The Remedial Plan is depicted with an orange circle, and the plans in the nonpartisan ensemble are represented by the purple histograms. The right-most histogram in each of the six figures gives the distribution of the Democratic percentage in the most Democratic district. The left-most histogram in each plot gives the marginal distribution of the partisan outcome in the most Republican-leaning district in each map in the ensemble. Figure 2 gives the ranked-marginal distributions of the Democratic vote share in four historic elections from 2012 and 2014, again using the ensemble of 57,202 maps that does not consider race. These plots are explained in more detail in *Common Cause v. Lewis*; they are slightly different from the box-plots used in *Common Cause v. Rucho* as they demonstrate more detail.³

10. There are two striking features of these plots. The first striking feature is the sizable jump in the orange dots between the 5th and 6th most Democratic districts. This implies a large range of election outcomes which produce the exact same partisan seat count under the 2019 remedial plan, while the typical map in the ensemble would have multiple seats change hands over this range of outcomes. This observation is based on uniform swing analysis and the relation to this jump in the rank ordered marginal plots and is described in my reports and testimony in *Common Cause v. Rucho* and *Common Cause v. Lewis*.

11. The second (related) feature is the extent to which Democrats have been packed in the 5 most Democratic districts of the Remedial Plan when compared to the ensemble. Similarly the next seven districts typically have significantly fewer Democrats than is typical in

³ For example, see Figure 4 and 5 in *Rucho* and Figure 4, 7, 10, 12 and 40 in *Lewis*.

the ensemble. This is reflected in the fact that the orange dots corresponding to these districts are in the extremes of the marginal distributions.

12. My analysis shows that the Remedial Plan was much less sensitive to swings in the partisan vote fractions than the vast majority of the maps in the ensemble. The plots in Figure 1 and 2 show that under a uniform swing analysis the nonpartisan maps in the ensemble often produce 6 and sometimes 7 Democratic seats in election environments when the Democrats perform well (a statewide vote fraction in the low 50%) for many sets of votes, while the 2019 Remedial Plan reliably produces 5 Democratic seats in most instances.

13. As in *Lewis* and *Rucho*, we have further illustrated this point by quantifying the packing of Democrats in the 2019 Remedial Plan. We count the maps within the ensemble which have higher average Democratic vote fractions than the Remedial Plan in the five most Democratic districts. These results are summarized in Table 1. We find that the Remedial Plan packs Democrats into these five districts in an extreme way. In eight of the 10 historic elections, there is not a single plan from the ensemble that contains a higher fraction of Democrats in the five most Democratic districts than the Remedial Plan; in one of the two remaining elections, only a single plan out of the 57,202 plans in the ensemble has as many Democrats as the remedial plan in those five districts. In the other remaining election, only 12 plans of the 57,202 plans in the ensemble have as many Democrats as the remedial plan in the five most Democratic districts.

14. Figures 3 and 4 and Table 2 repeat the previous analysis for the 24,518 maps presented in our expert report in *Common Cause v. Rucho*. As described earlier, these maps differ from the primary ensemble in that they considered racial data. The results are qualitatively

the same as the results in our first ensemble, with the exception of the results from the U.S. House 2012 election, and possibly the 2012 Governor election (see Figures 3 and 4).

15. I conclude that the 2019 Remedial Plan is an extreme outlier. In eight of the 10 elections that I considered, the 2019 Remedial Plan showed more packing of Democrats than 100% of the 57,202 plans in my nonpartisan, no-racial-data ensemble: not a single plan in my ensemble had as many Democrats as the Remedial Plan did in the five Democratic districts. In the remaining two elections, the Remedial Plan was a 99.996% and a 99.95% outlier, making it an extreme case of packing.

I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge.

This 26th day of November, 2019.



Dr. Jonathan C. Mattingly

EVALUATING 2019 REMEDIAL MAP FOR NC CONGRESSIONAL DISTRICTS

JONATHAN C. MATTINGLY

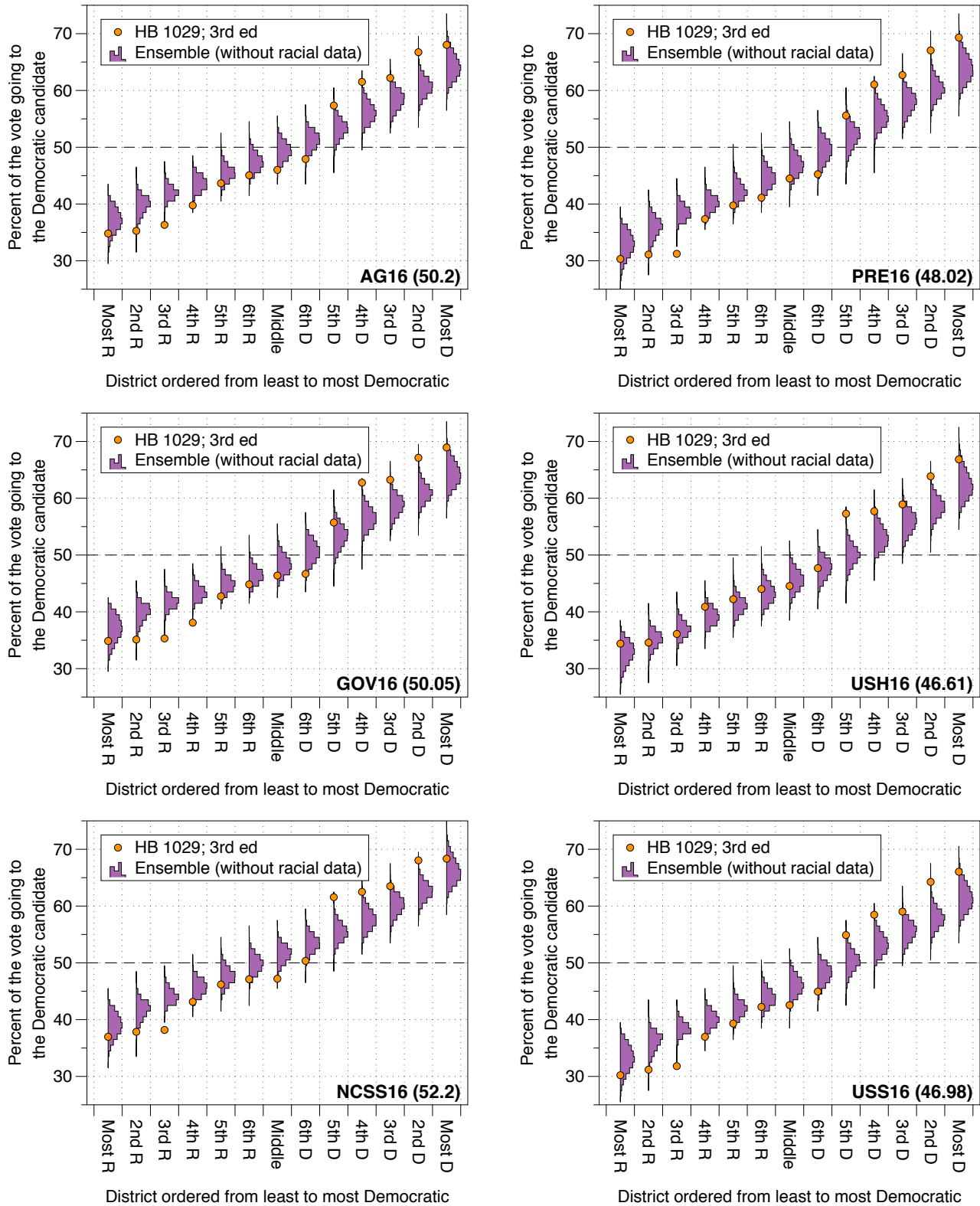


FIGURE 1. Ranked Marginals for 2016 elections for the ensemble which includes no racial data. The proposed 2019 remedial map is marked orange for comparison.

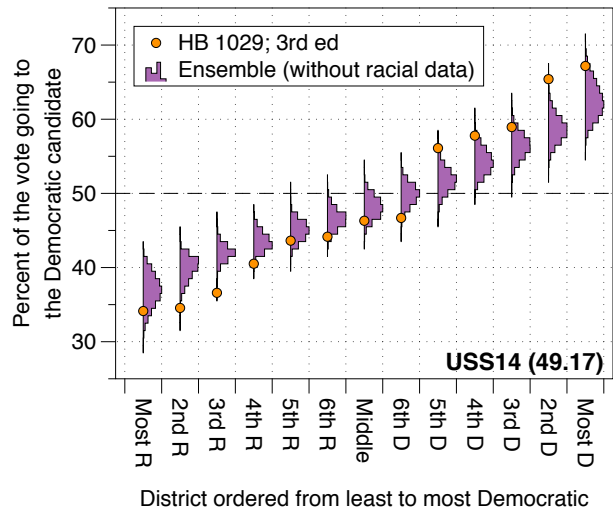
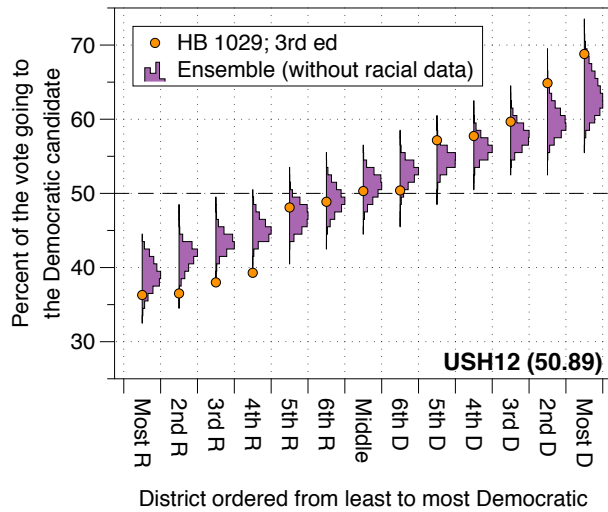
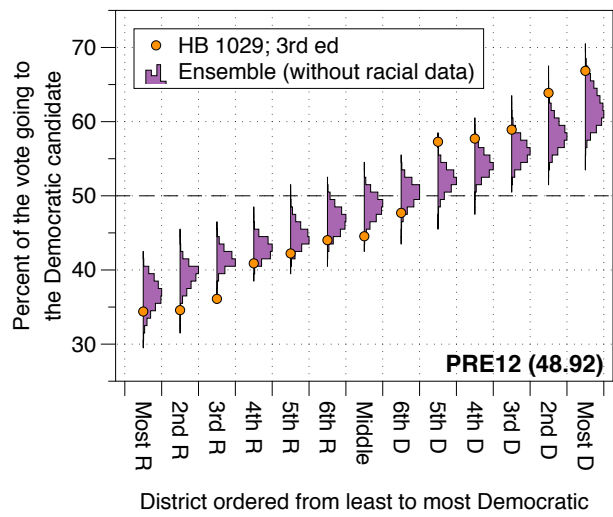
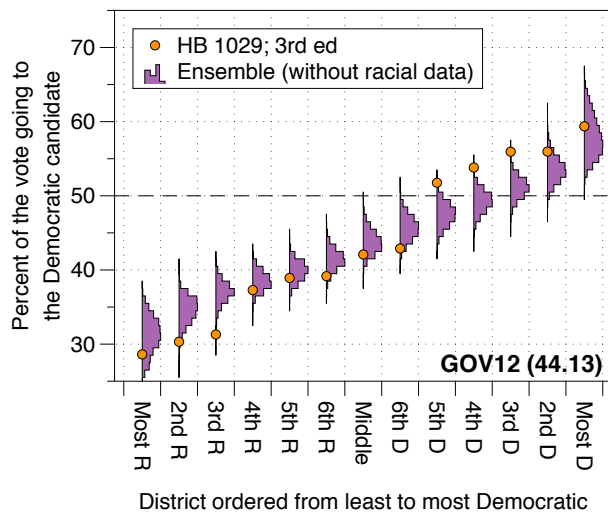


FIGURE 2. Ranked Marginals for 2012 and 2014 elections for the ensemble which includes no racial data. The proposed 2019 remedial map is marked orange for comparison.

TABLE 1. # maps in ensemble w/ more Dems in top 5 Dem. Dist. than Remedial Plan.

Race	Year	# maps w/ more in top 5 Dem Dist.	% maps w/ more in top 5 Dem Dist.
ATTORNEY GENERAL	2016	0	0%
GOVERNOR	2012	1	.004%
GOVERNOR	2016	0	0%
SECRETARY OF STATE	2016	0	0%
PRESIDENT	2012	0	0%
PRESIDENT	2016	0	0%
US HOUSE	2012	12	.05%
US HOUSE	2016	0	0%
US SENATE	2014	0	0%
US SENATE	2016	0	0%

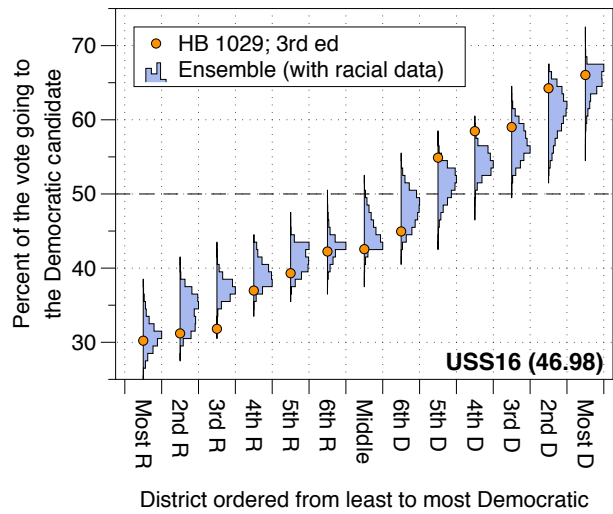
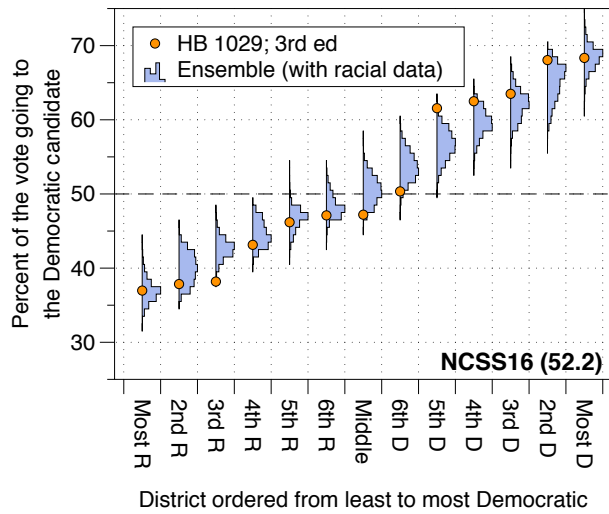
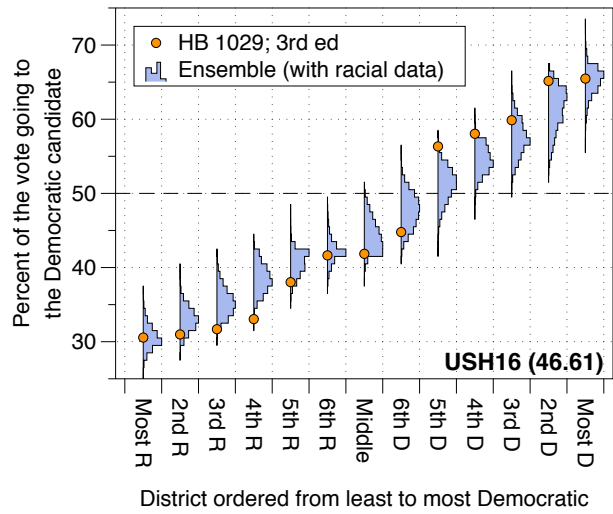
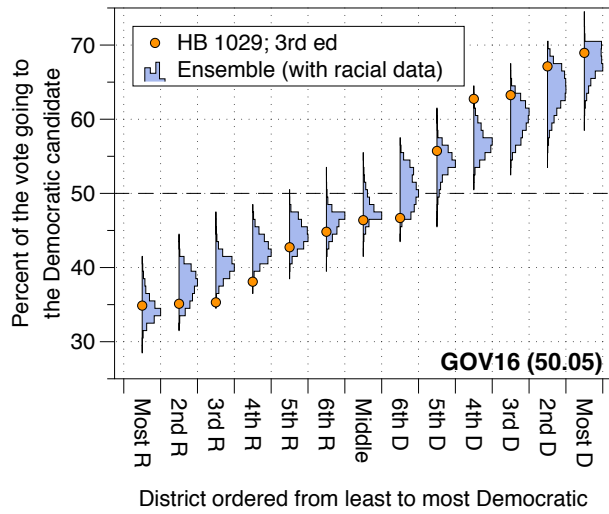
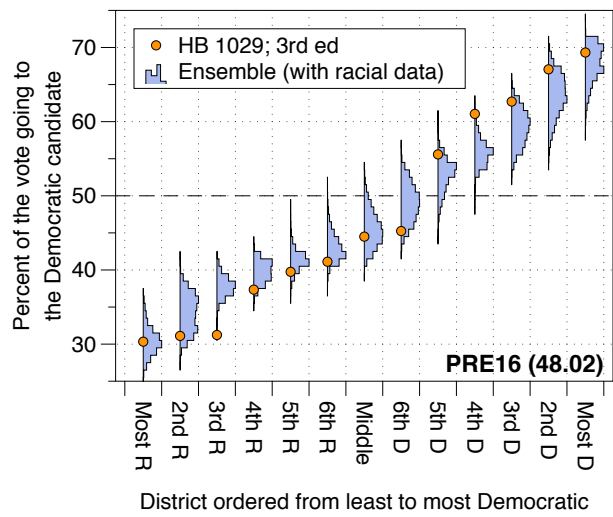
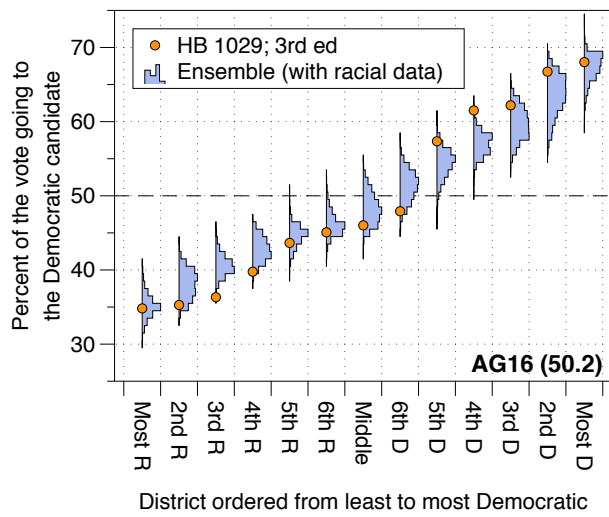


FIGURE 3. Ranked Marginals for 2016 elections for the ensemble which includes racial data. The proposed 2019 remedial map is marked orange for comparison.

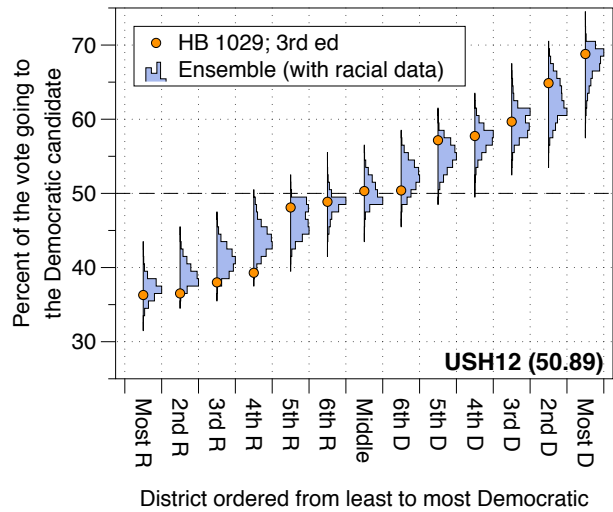
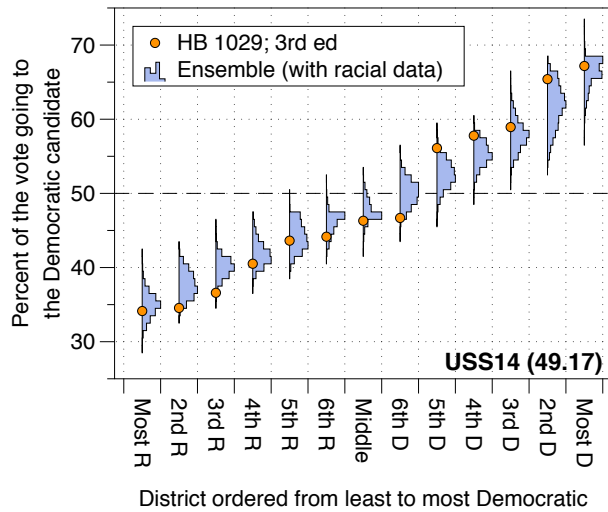
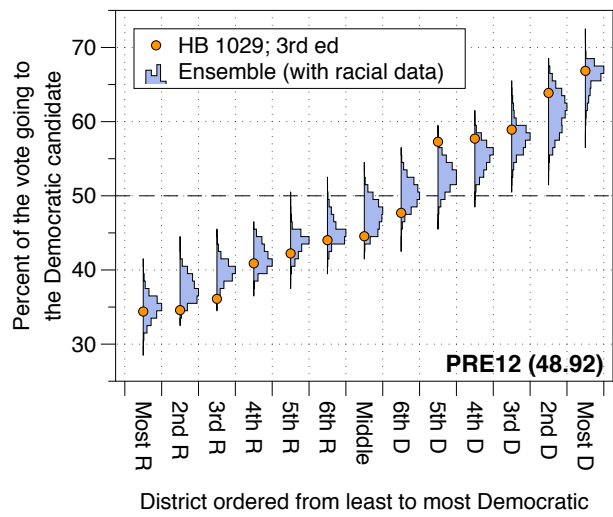
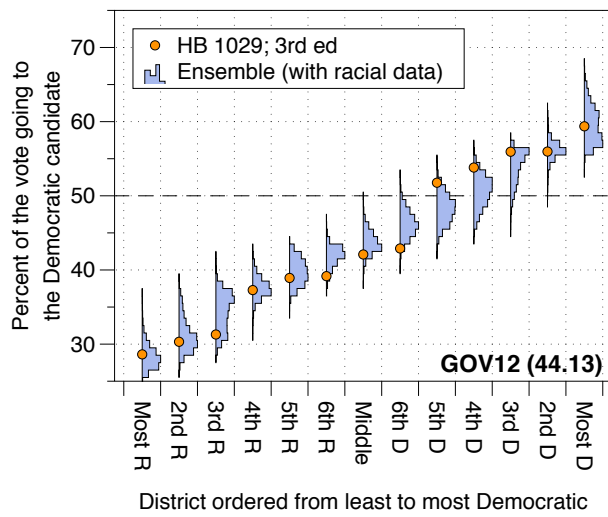


FIGURE 4. Ranked Marginals for 2012 and 2014 elections for the ensemble which includes racial data. The proposed 2019 remedial map is marked orange for comparison.

TABLE 2. # maps in ensemble w/ more Dems in top 5 Dem. Dist. than Remedial Plan

Race	Year	# maps w/ more in top 5 Dem Dist.	% maps w/ more in top 5 Dem Dist.
ATTORNEY GENERAL	2016	6	.024%
GOVERNOR	2012	528	2.2%
GOVERNOR	2016	5	.02%
NC SECRETARY OF STATE	2016	6	.024%
PRESIDENT	2012	22	.09%
PRESIDENT	2016	4	.016%
US HOUSE	2012	2976	12.1%
US HOUSE	2016	7	.028%
US SENATE	2014	20	.082%
US SENATE	2016	6	.024%