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Appendix: A Reasonable Bias Approach to Gerrymandering: Using Automated Plan Generation to Evaluate Redistricting Proposals

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APPENDIX: A REASONABLE BIAS APPROACH TO GERRYMANDERING: USING AUTOMATED PLAN GENERATION TO EVALUATE REDISTRICTING PROPOSALS

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Here, we present our findings, analogous to those on the efficiency gap in Part I.B of our Article published in the print edition of the *William & Mary Law Review*, on the other measures of partisan fairness.[1]

I. SEATS-VOTES BIAS

The graphs below are based on maps drawn from PEAR that improve upon the current Minnesota congressional plan on each of the following dimensions: competitiveness, responsiveness, proportional representation, and the efficiency gap. The red bars indicate the range of scores that the maps produce on each of those measures. The blue bars represent the seats-votes bias scores of the maps produced in each graph. Again, the purpose of this is to determine

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1. *See* Cain et al., *A Reasonable Bias Approach to Gerrymandering: Using Automated Plan Generation to Evaluate Redistricting Proposals*, 59 WM & MARY L. REV. 1521, 1540-47 (2018).

whether the maps that score higher than the current redistricting map in Minnesota on each of the measures in the graphs also score high on seat-vote bias. Overlap in the bars suggests that the measures capture similar features of the map, while distance between the bars suggests that the measures tap different features of partisan unfairness.

Figure 1. Comparing Bias Against Other Measures

Figure 1a. Bias v. Competitiveness

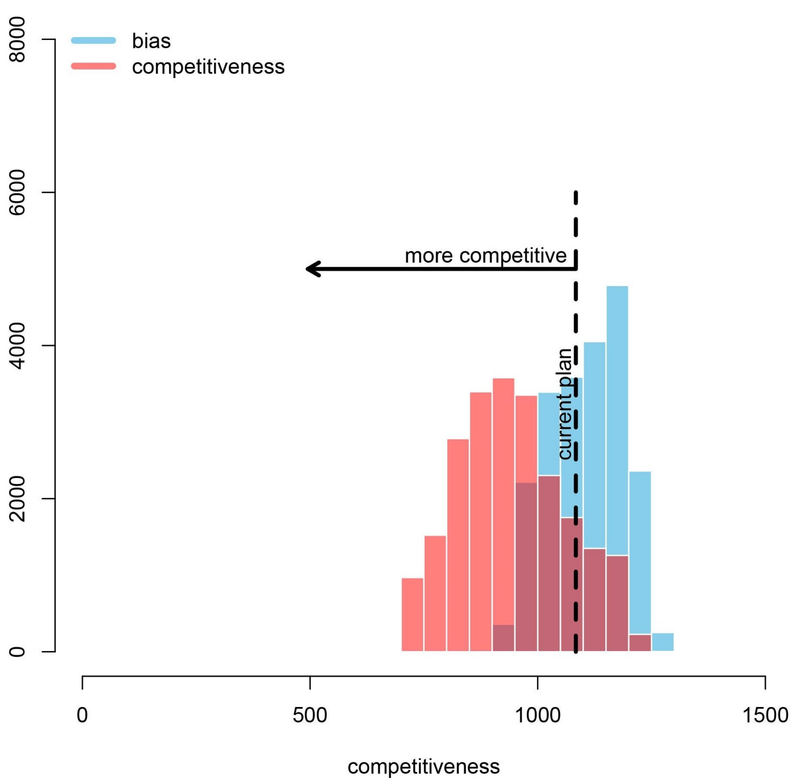


Figure 1b. Bias v. Responsiveness

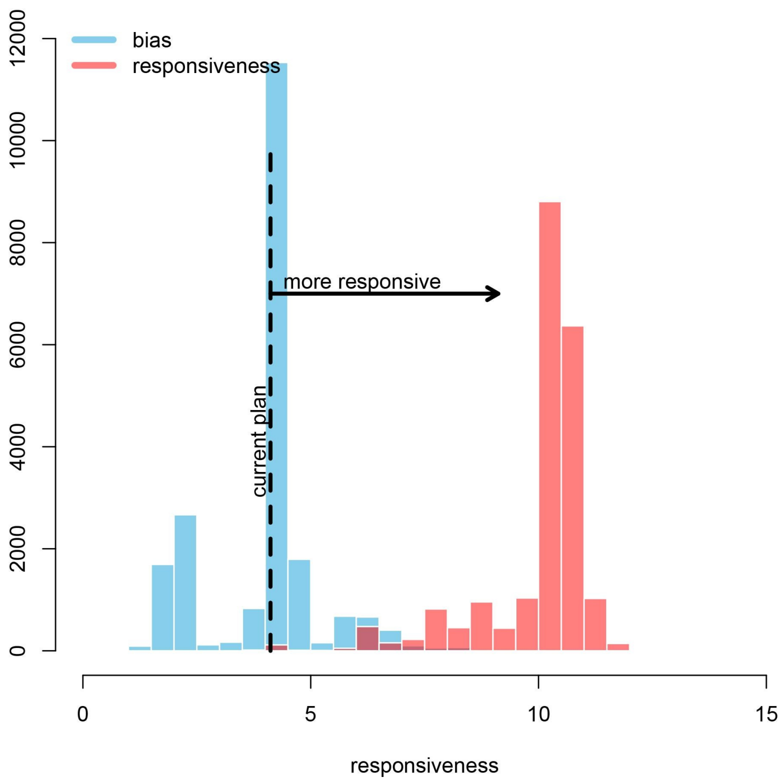


Figure 1c. Bias v. Proportional Representation

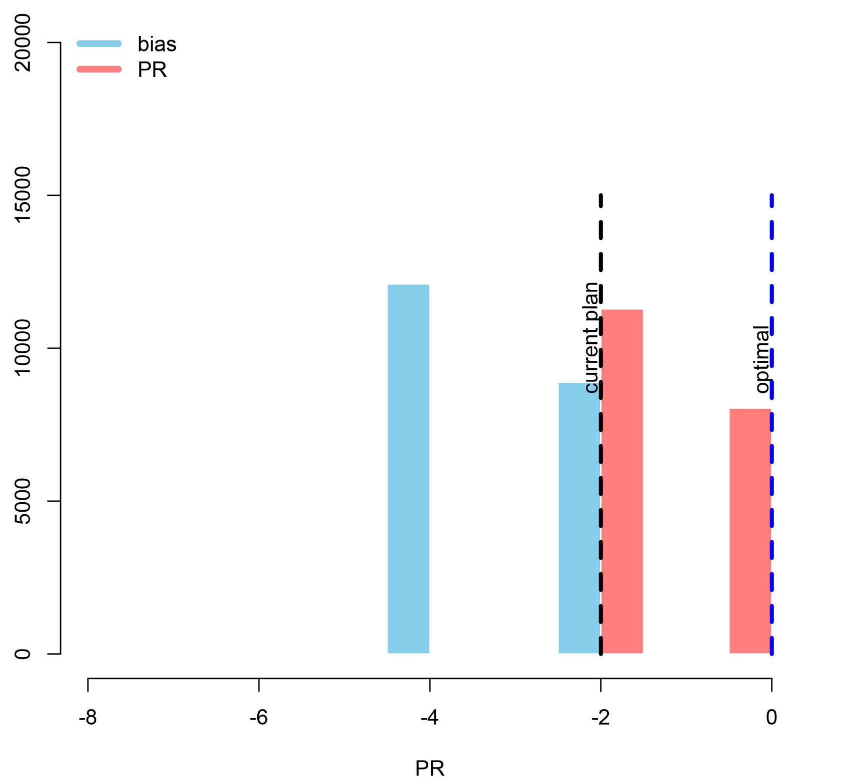
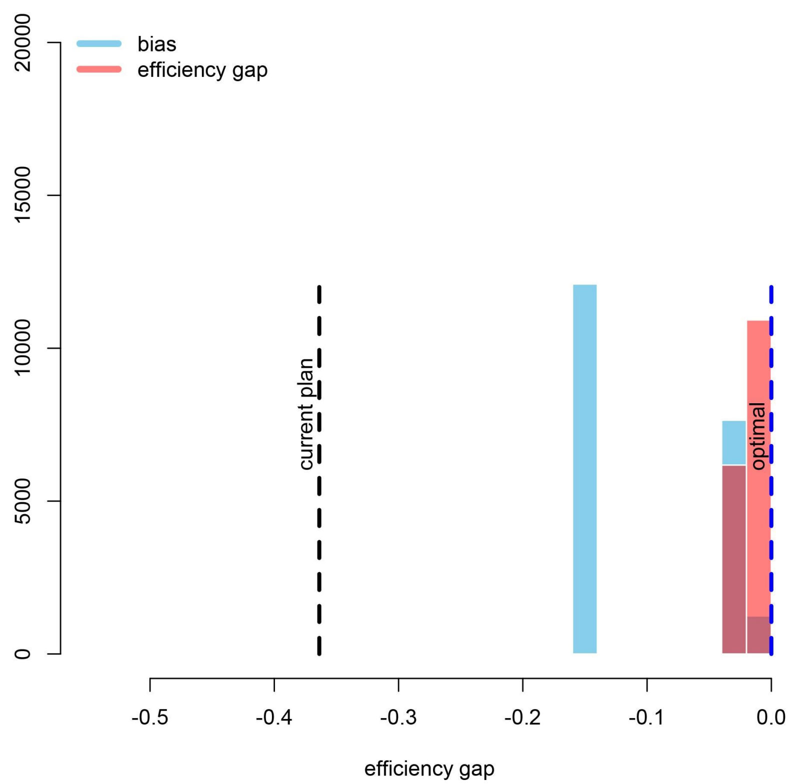


Figure 1d. Bias v. EG



Figures 1a and 1b are easy contrasts from one another, as are the bottom two. Seats-votes bias overlaps somewhat with competitiveness, as indicated in the first graph, whereas seats-votes bias does not overlap much at all with responsiveness. Seats-votes bias also does not seem to overlap much with proportional representation, while it does with the efficiency gap.

II. COMPETITIVENESS

We present the analogous findings for the measure of competitiveness below:

Figure 2. Comparing Competitiveness Against Other Measures

Figure 2a. Competitiveness v. Bias

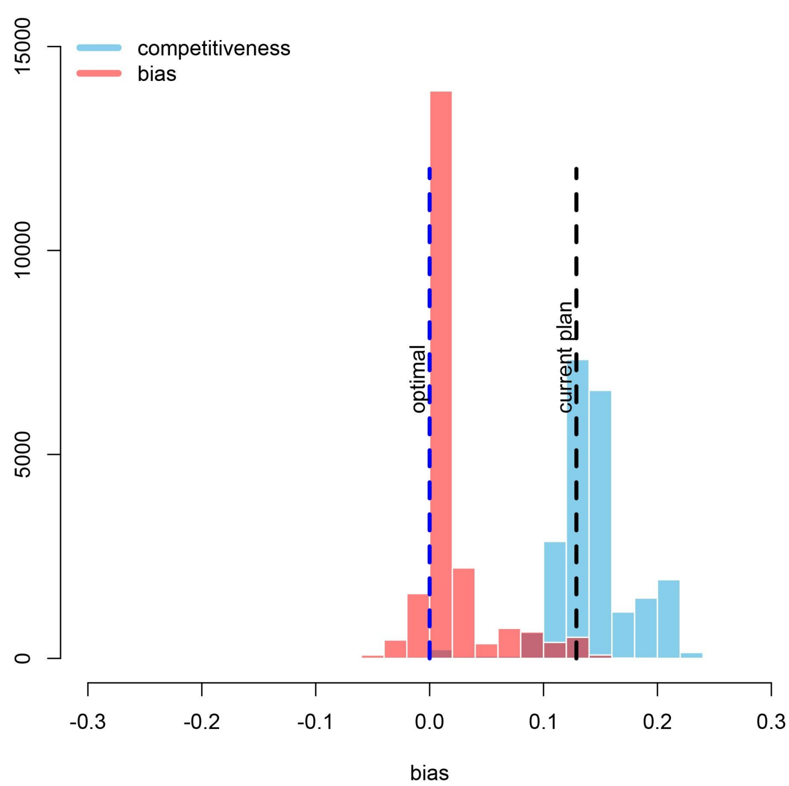


Figure 2b. Competitiveness v. Responsiveness

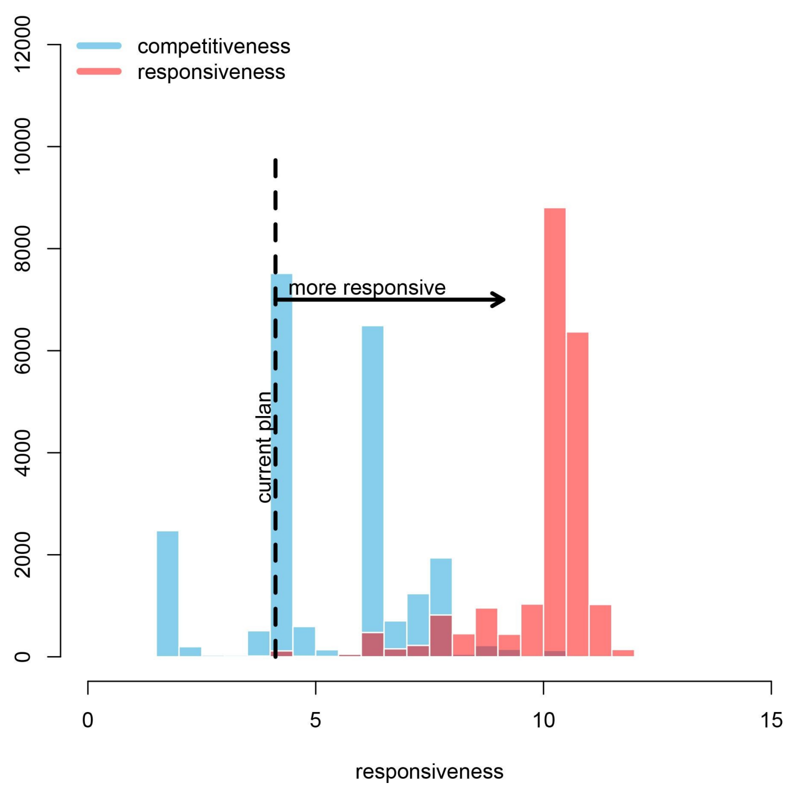


Figure 2c. Competitiveness v. EG

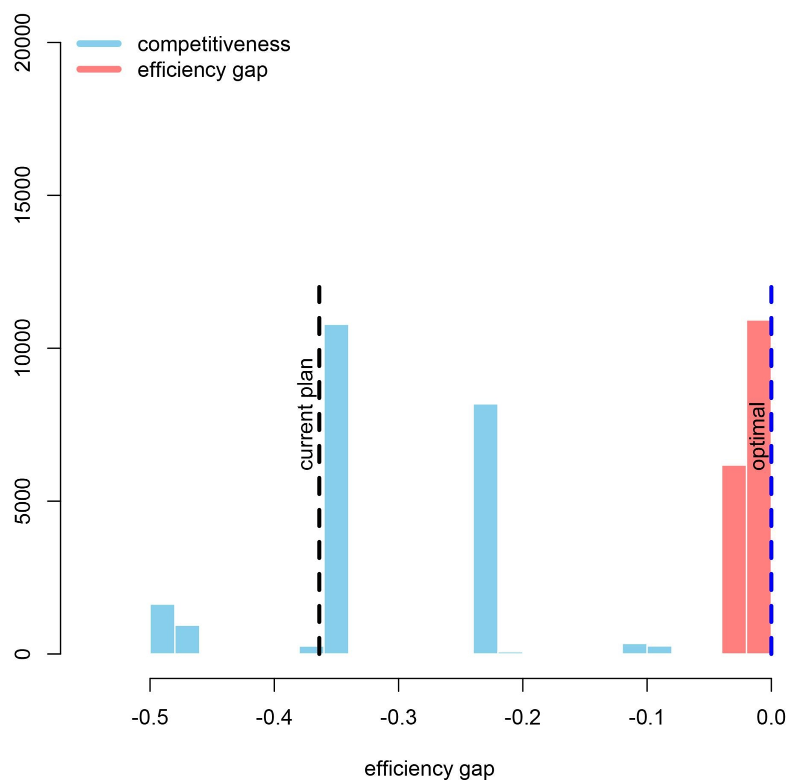
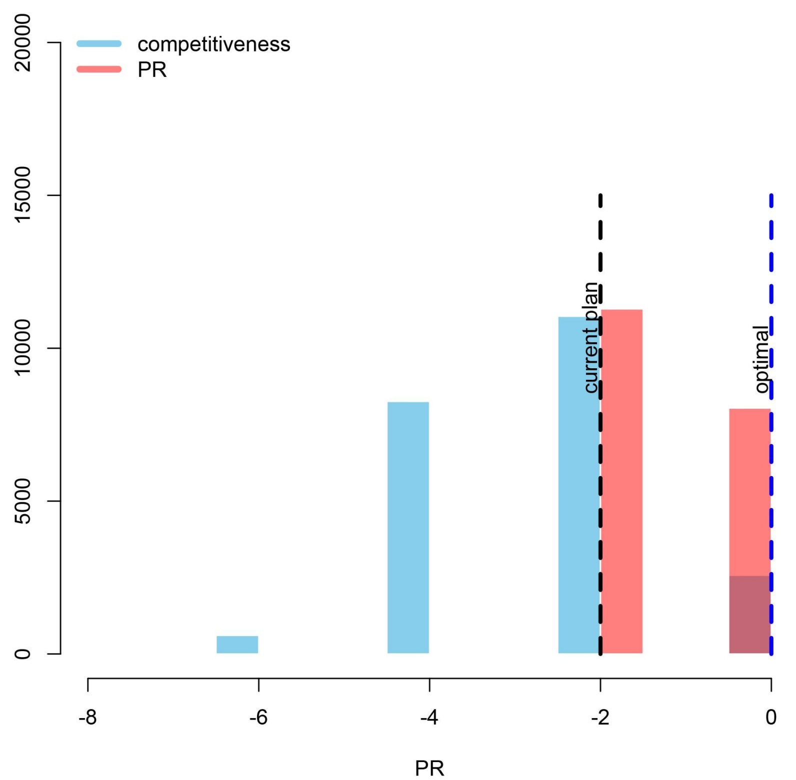


Figure 2d. Competitiveness v. Proportional Representation



At this point, some of the results begin to seem familiar, as they are often mirror images of results we have already presented.

III. RESPONSIVENESS

Figure 3. Comparing Responsiveness Against Other Measures

Figure 3a. Responsiveness v. Bias

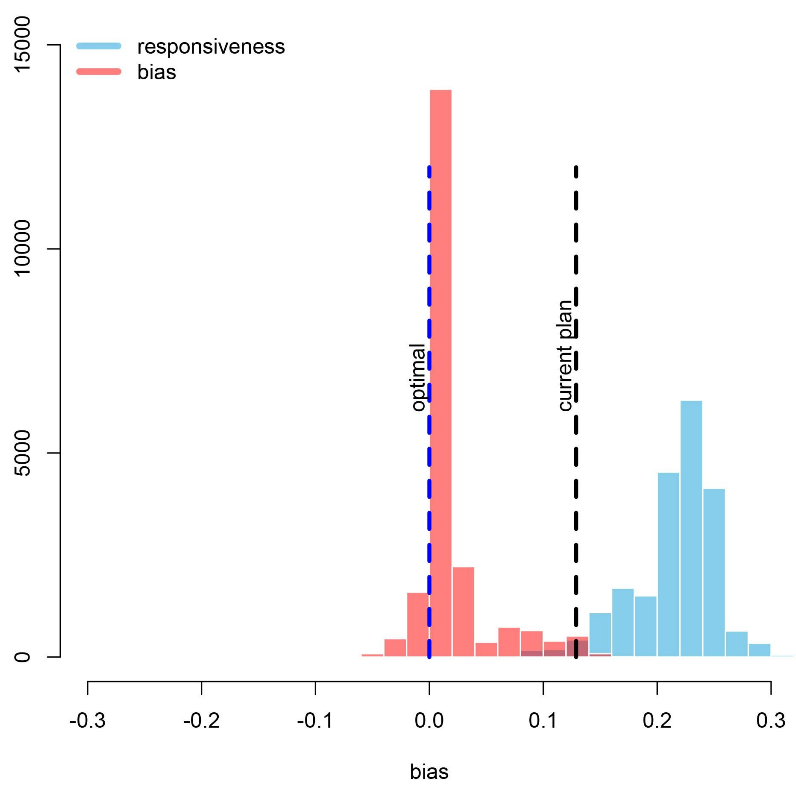


Figure 3b. Responsiveness v. Competitiveness

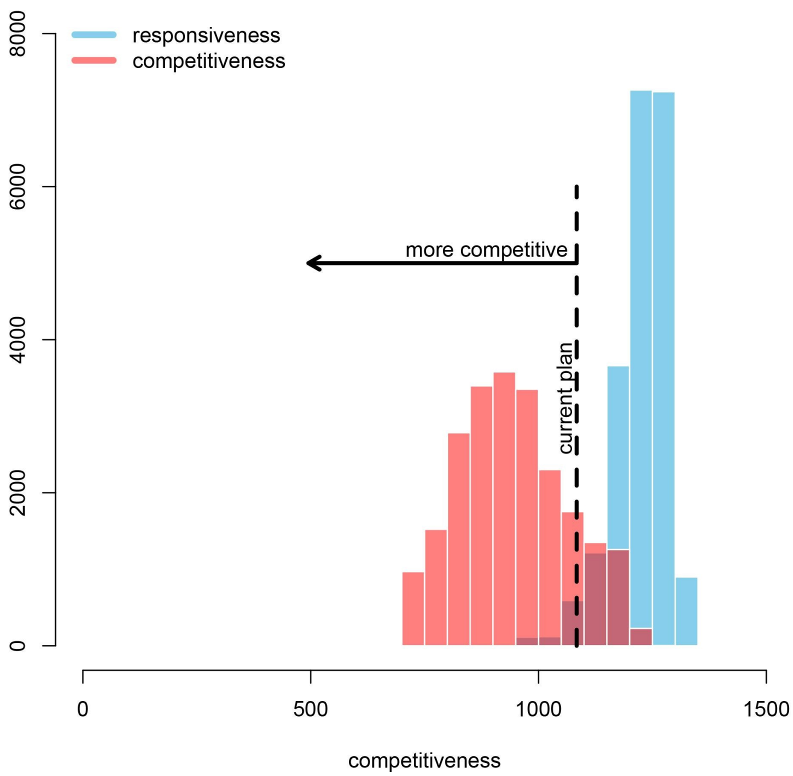


Figure 3c. Responsiveness v. EG

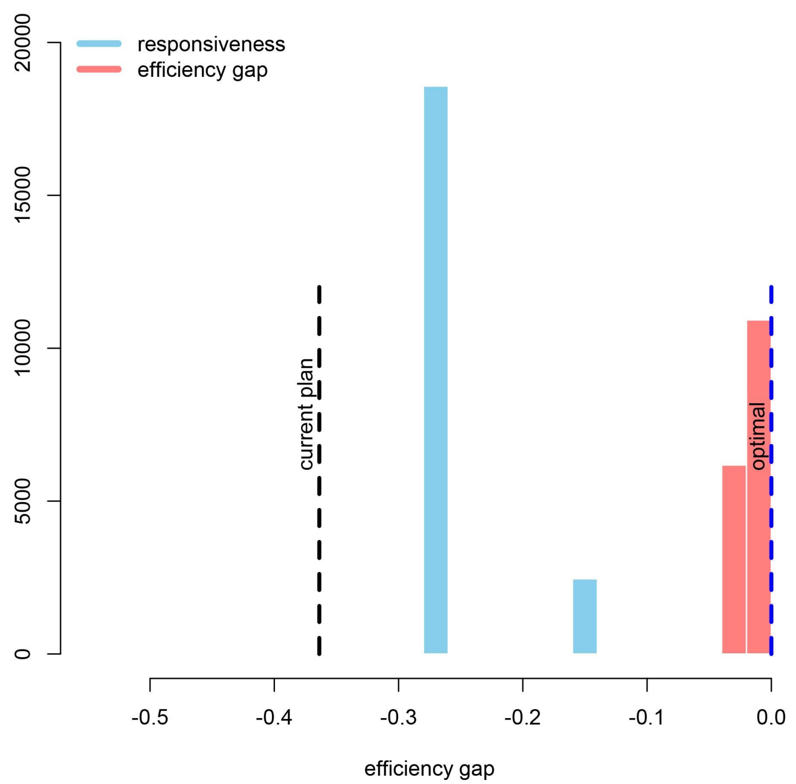
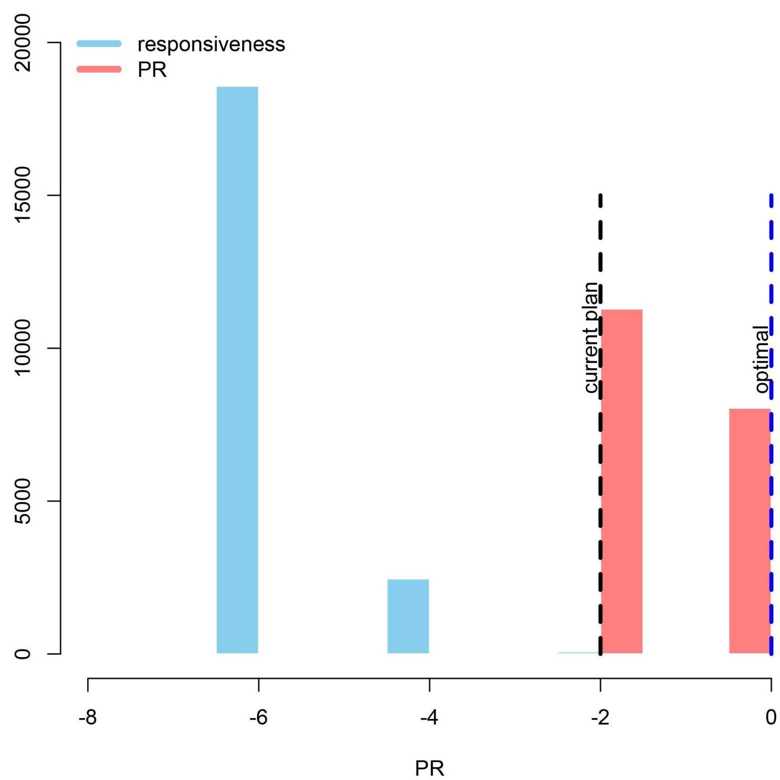


Figure 3d. Responsiveness v. Proportional Representation



IV. PROPORTIONAL REPRESENTATION

Figure 4. Comparing Proportional Representation Against Other Measures

Figure 4a. Proportional Representation v. Bias

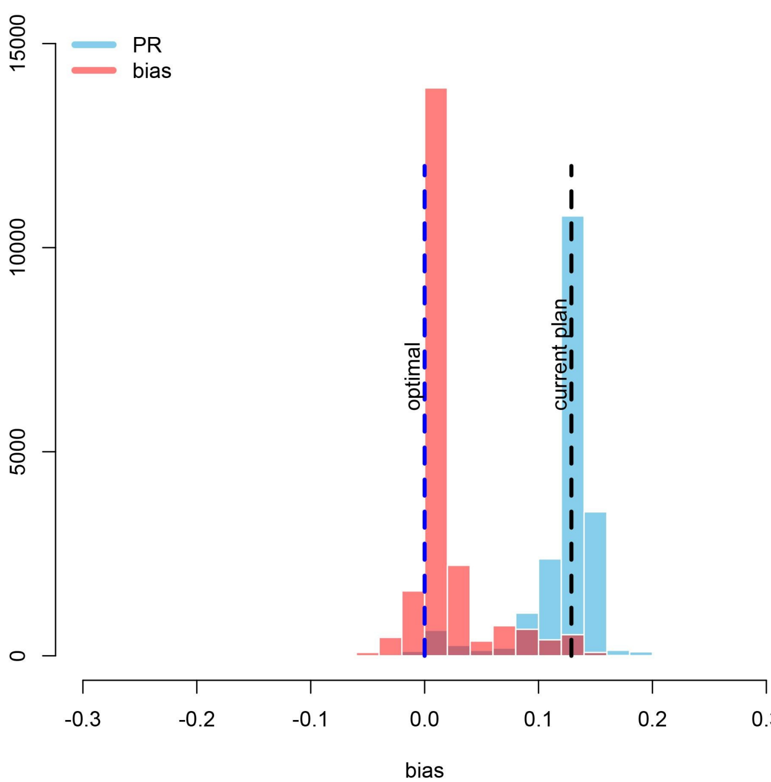


Figure 4b. Proportional Representation v. Competitiveness

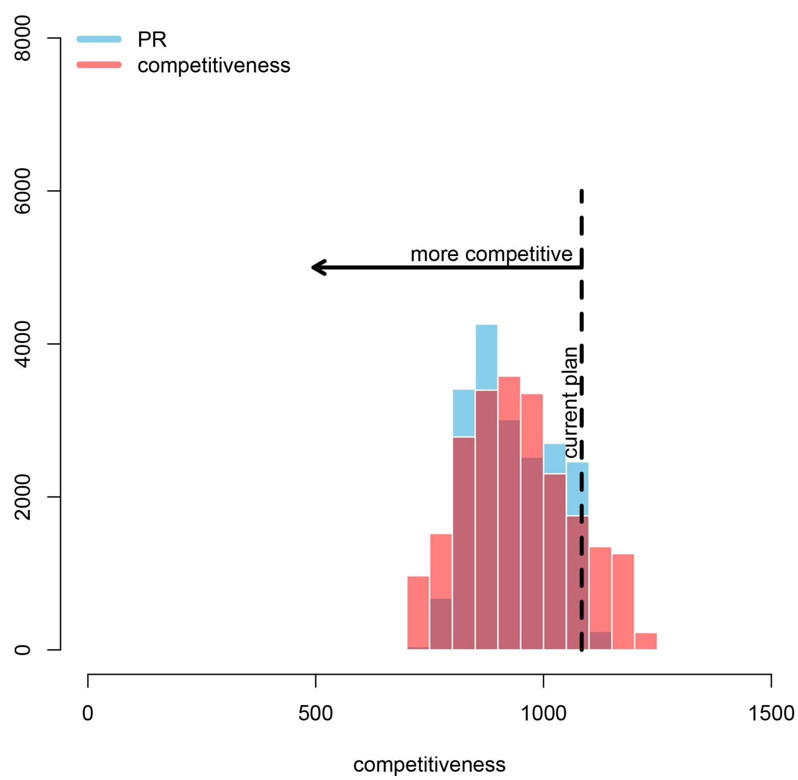


Figure 4c. Proportional Representation v. Responsiveness

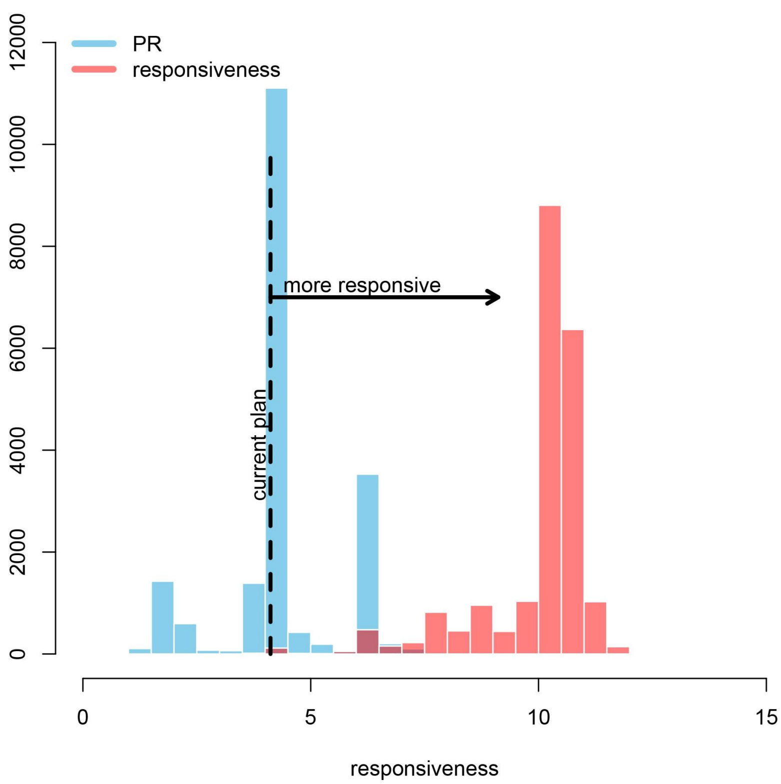


Figure 4d. Proportional Representation v. EG