Reference: 68 Stan. L. Rev. XX, 2016.

The NJ state delegation of 2000 had 13 seats, 7 Democratic/other and 6 Republican. The average Democratic share of the two-party total vote was 55.7% (raw).

Analysis of Intents

If a political party wishes to create for itself an advantage, it will pack its opponents to win overwhelmingly in a small number of districts, while distributing its own votes more thinly. To test for a lopsided advantage, one can compare each party's winning margins and see if they are systematically different. This is done using the two-sample t-test. In this test, the party with the *smaller* set of winning margins has the advantage.

First Test of Intents: Probing for lopsided win margins (the two-sample t-test): The difference between the two parties' win margins does not meet established standards for statistical significance. The probability that this difference or larger could have arisen by partisan-unbiased mechanisms is 0.14.
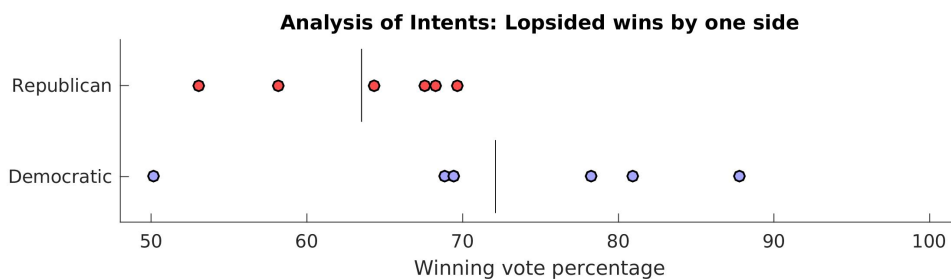
Second Test of Intents: Probing for consistent advantages for one party (mean-median difference and/or chi-square test): The choice of test depends on whether the parties are closely matched (mean-median difference) or one party is dominant (chi-square test of variance).
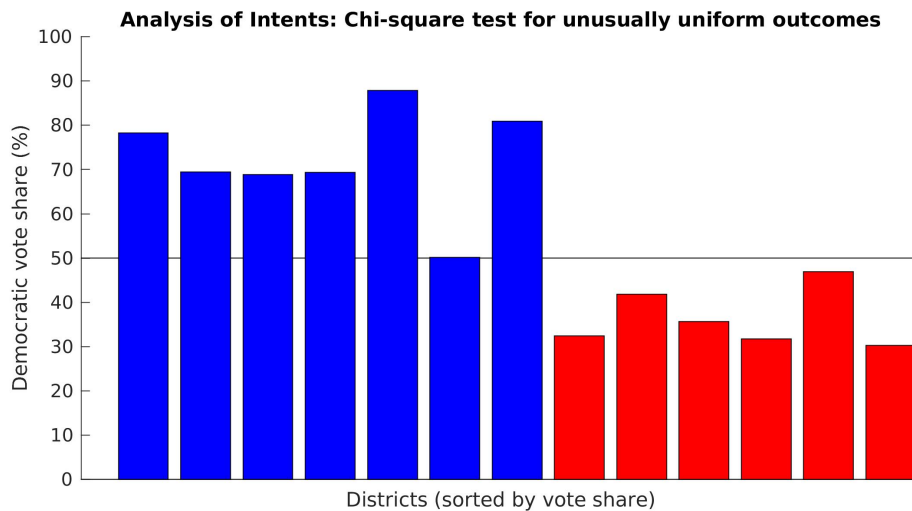
When the parties are closely matched in overall strength, a partisan advantage will be evident in the form of a difference between the mean (a.k.a. average) vote share and the median vote share, calculated across all districts. Partisan gerrymandering arises not from single districts, but from patterns of outcomes. Thus a single lopsided district may not be an offense - indeed, single-district gerrymandering is permitted by Supreme Court precedent. Rather, it is combinations of outcomes that confer undue advantage to one party or the other.

The mean-median difference is 5.6% in a direction of advantage to the Republican Party. The mean-median difference would reach this value in 10.1% of situations by a partisan-unbiased process. This difference is not statistically significant (p>0.05).

Analysis of Intents: Mean-median difference in vote share

NJ

Democratic Party vote share (%)
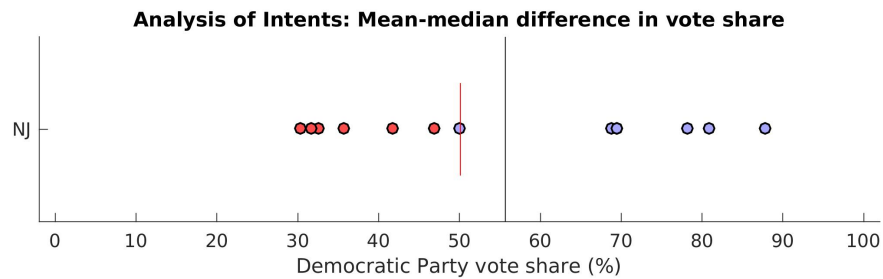
When one party is dominant statewide, it gains an overall advantage by spreading its strength as uniformly as possible across districts. The statistical test to detect an abnormally uniform pattern is the chi-square test, in which the vote share of the majority party-controlled seats are compared with nationwide patterns.

The standard deviation of the Democratic majority's winning vote share is 12.1%. At a national level, the standard deviation is 20.8%. This difference is not statistically significant (p>0.05).

Analysis of Intents: Chi-square test for unusually uniform outcomes

Democratic vote share (%)

Districts (sorted by vote share)

Test of effects: How many extra seats did either party gain relative to party-neutral sampling? (fantasy delegations): It is possible to estimate how the state's delegation would be composed if votes were distributed according to natural variations in districting. This is done by drawing districts at random from a large national sample, and then examining combinations whose vote totals are similar to the actual outcome. In the following simulations, the "fantasy delegations" were drawn from a partisan-symmetric distribution. Consequently, these simulations ignore population clustering and show what would occur in a fully partisan-symmetric situation.

Analysis of Effects: 1000000 Simulated delegations
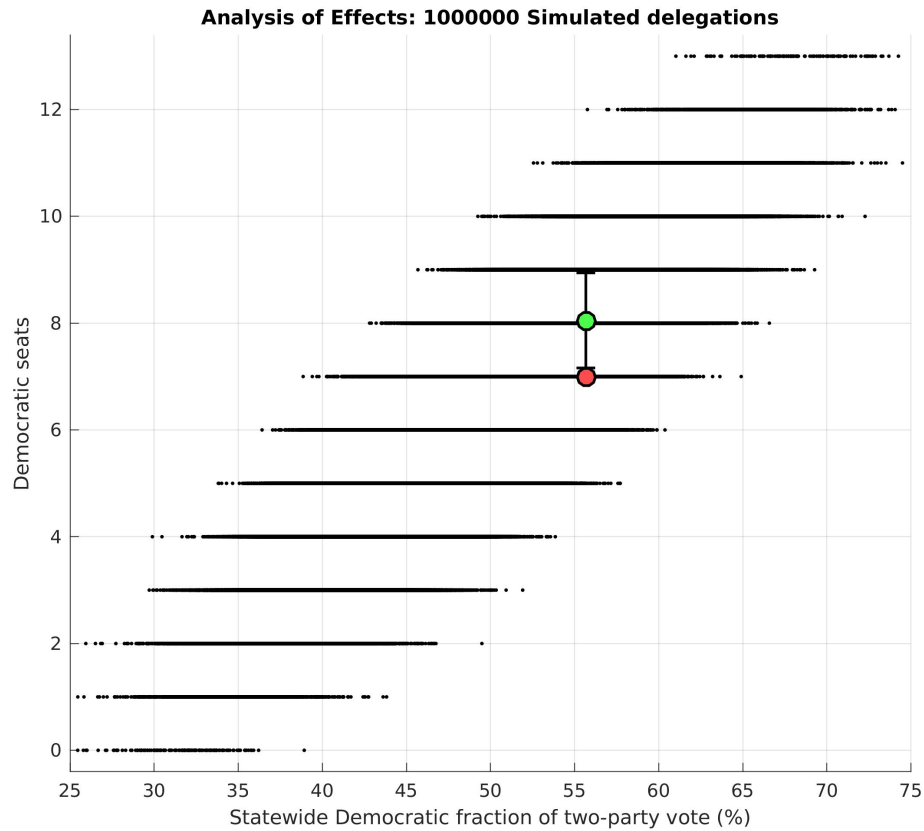
In this election, the average Democratic vote share across all districts was 55.7%, and Democrats won 7 seats. 8615 fantasy delegations with the same vote share had an average of 8.1 Democratic seats (green symbol), with a standard deviation of 0.9 seats (see error bar). The actual outcome (red symbol) was therefore advantageous to Republicans. However, this advantage was not statistically significant.

The above calculations are based on Samuel S.-H. Wang, "Three Tests for Practical Evaluation of Partisan Gerrymandering," 68 Stan. L. Rev. XX (2016). For further information, contact sswang@princeton.edu.