

Avoiding an Electoral Lost Decade: What Lessons Will We Learn In The 2011 Redistricting Cycle?

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Abstract

With the decennial redistricting cycle starting anew in 2011, there is an opportunity to learn from the lessons of the past cycle as legislators draw their own boundaries in most states, and independent commissions draw them in the others. While the use of commissions has been trumpeted as a way of improving electoral systems, there has been little effective difference between commission-based and legislative-based electoral maps in terms of the standards of electoral symmetry and responsiveness. I recommend that no matter which method is used by a state for drawing their legislative and congressional boundaries, states should bear these factors in mind as they redraw their maps in the coming year.

2011 marks the beginning of another decennial redistricting cycle, when the boundaries of electoral districts are redrawn. The architects of the new maps have historically been the very same legislators who occupy them, or in the case of Congressional district boundaries at the federal level, their counterparts from the same parties in the state house. There has been movement in recent years to remove any conflicts of interest by making the redistricting process as non-partisan as possible, but the first major push, constraints specified on the map by language in the redistricting protocols in state laws and constitutions, has easily been circumvented both by modern mapmaking tools as well as vague technical specifications on these constraints.

Another major avenue has been the establishment of non-partisan or bipartisan redistricting commissions, whose members are disinterested from the outcome of the map; at the very least, commissioners would not be allowed to run for office under the districts they design, and at a deeper level, they can be shown to have no reasonable fiducial connection to the map, such as a family member or business that would benefit. Beyond this, there are

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other standards that a purportedly neutral body may wish to respect, beyond simply legal requirements; the average distance from a constituent's home to their legislator's office is an example of a quantity that might be minimized.

Modern study of two-party electoral systems suggests that two distinct measures of fairness, both under the collective term "gerrymandering", are important to capture both in the hypothetical construction of the map and any elections that follow:

- In the partisan case, one party draws the map to favour their own party's candidates, leading to a "partisan bias" for that party.
- In the bipartisan case, incumbents agree to protect their own re-election prospects by creating safe districts. As a consequence, a change in the mood of general the electorate will not change many individual seat outcomes, known as low "responsiveness" ([Gelman and King, 1994b](#)).

Both types of gerrymandering can be conducted simultaneously: the majority party can solicit the cooperation of a number of minority legislators whose re-election prospects can be ensured, by drawing a map in which their likelihood of victory is high.

While there are strong philosophical reasons for commissions to be responsible for this – mainly, to prevent lawmakers from protecting their own jobs at the expense of a greater democracy – evaluating their performance has been a difficult task, due to both the small number of states using commissions to conduct their redistricting and the lack of uniform standards on what is considered to be a flawed map. By the same token, it's difficult to evaluate the choice to use a redistricting commission when the counterfactual scenario is unobservable, and the great diversity between states makes the idea of a matching counterpart nearly impossible. Indeed, looking at the election patterns after the last decennial census and redistricting, a clear pattern emerges:

- New electoral maps tend to be more responsive than the ones they replaced;
- Partisan bias is generally unchanged;
- These results were largely independent of whether the legislature or a commission drew the map.

While the concepts of each type of gerrymandering are clearly in the public consciousness, the translation of these concepts into simple metrics is relatively recent and do not appear to form the basis of the past round of redistricting efforts, especially in that the small number of commissions at the state level do not appear to produce maps that are functionally different from their legislatively drawn counterparts. More than that, it is difficult to establish how a redistricting commission model may come to be in any particular state.

These complications are especially important in light of California's passage of Proposition 11 in 2008, which established a commission to perform the decennial redistricting for the State Assembly and Senate, and Proposition 20 in 2010, which added the redistricting of federal

Congressional seats to the new commission's purview. Given California's influence over the rest of the country, the outcome of the redistricting process will be essential in determining whether the commission model will be used by other states during the next cycle in 2021.

My goal is to explain how these concepts are useful to understanding the consequences of legislative redistricting, in light of the commission-based method of redistricting. I therefore speculate as to why the results we observed in the 2001 redistricting cycle came about by examining the definition of each quantity, and how several redistricting commissions came to be, and recommend how the next set of redistricting can be improved, whether or not a commission conducts the process, but with the aim that a commission will find these reasons compelling.

Symmetry and Responsiveness, In Terms of Putative Election Outcomes

At the core of any measure of electoral fairness is the idea that it represents only one of many possible outcomes for each individual district as well as the entire system, and that these outcomes can be tied together through a well-chosen model. In particular, I consider the Gelman-King model ([Gelman and King, 1990, 1994a,b](#)) that established the model at work in this analysis, containing definitions of partisan symmetry and responsiveness as natural by-products. In particular, [Gelman and King \(1994a\)](#) includes a series of analysis on state legislative bodies to determine levels of partisan bias and electoral responsiveness over time, and estimated a positive and significant effect of redistricting on responsiveness in elections prior to 1994. The methods described are implemented in the R package `JudgeIt` ([Gelman et al., 2007](#)).

These standards are not mere academic concepts; the symmetry standard (minimizing partisan bias) has been endorsed by [King et al. \(2006\)](#), a 2005 brief to the Supreme Court, as a means of ensuring electoral fairness. In a follow-up, [Grofman and King \(2007\)](#) further establish the robustness of the partisan bias estimator and make their case that it is a viable legal option to indicate whether partisan gerrymandering has occurred, an option cleared as justiciable under *Davis v. Bandemer*.

The full mathematical definitions of these terms appear in the articles cited above. What is important to derive from the model is the nature of the **seats-votes curve**, or a model-based hypothetical outcome of the seat distribution in a legislative body given a particular share of the two-party vote. Having modelled the vote share for individual seats, the curve provides two further quantities which are well documented in the literature and easy to understand conceptually.

Electoral Responsiveness

This quantity measures the sensitivity of the system to the changing opinions of the electorate. Electoral responsiveness is defined as $d(ES|V)/dV$, the rate of change in the fraction of seats held by one party given a corresponding change in the average district vote; this is equivalent

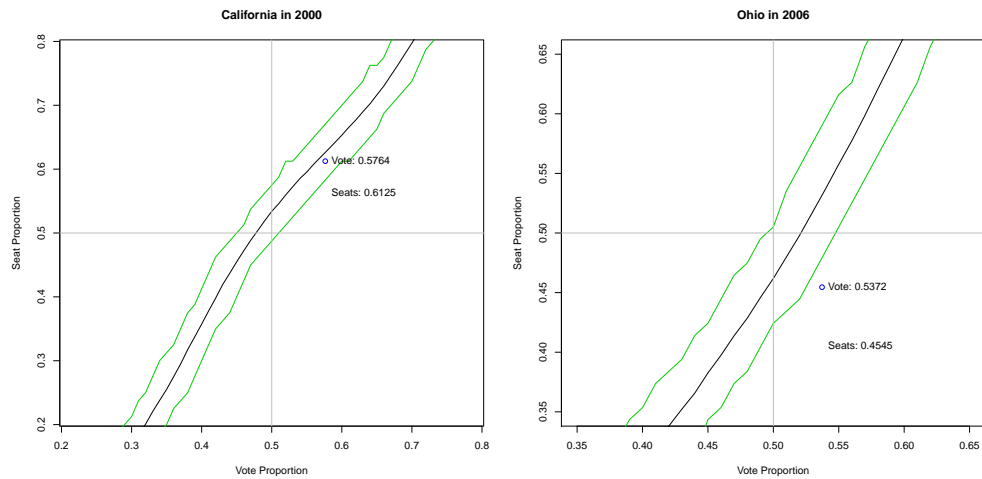


Figure 1: Seats-votes curves for the California electoral system in 2000 (left) and Ohio in 2006 (right). Simulating each election 100 times from the Gelman-King model, the black line gives the mean fraction of seats given each share of votes; the green lines represent the 2.5% and 97.5% quantiles for the result. Note that the “obvious” partisan bias in Ohio in 2006, as indicated by the minority share of seats that the Democrats received for their majority vote, is more severe than indicated by repeated simulation under the model, suggesting that corrections based on single results may be inadequate.

to the slope of the seats-votes curve at a desired point. Responsiveness has the benefit of being an adequate estimator of the total competitiveness of an district scheme: higher numbers suggest that more races can be overturned with minor changes in the average district vote.

There are two common choices for estimating responsiveness:

- **Observed Responsiveness**, or the slope of the seats-votes curve at the observed average district vote of the election under study. This is estimated by running hypothetical elections under the model, where the average district votes are one point lower and one higher ($\delta = -0.01$ and $\delta = 0.01$), then taking the difference in seats and dividing by $\Delta\bar{v} = 0.02$. Note that this quantity is sensitive to a change in the outcome of an election, hypothetical or realized, though could also be measured at other hypothetical outcome points or contingencies, such as the anticipated retirement of a legislator.
- **Split-Vote Responsiveness**, or the slope of the seats-votes curve at $V = 0.5$, or when each party has received half of the average district vote. This quantity is theoretically invariant to the outcome of the election, and estimated by setting $\delta = 0.45 - \bar{v}_{obs}$ and $\delta = 0.55 - \bar{v}_{obs}$ and calculating the difference in average seats won for Party 1.

Partisan Bias

Defined as the excess share of seats that one party would get if the vote were split evenly, or $2(E(S|V = 0.5) - 0.5)$, the quantity represents the difference in the number of seats received by one party from one-half given that the average district vote is split evenly. Noting that zero is the ideal level of bias, and that there is no inherent favorability toward a bias in one direction over the other, minimizing the absolute value of this quantity should be a desired outcome.

Partisan bias in this form is an adequate estimator of the symmetry of a system: a nonzero bias suggests that the seats in the body are not being divided equitably. Partisan bias is also a natural quantity to test whether a district map has been drawn for the benefit of one party to maintain its majority, despite an average district vote of less than half; this would appear to be the situation in Ohio in 2006, as seen in Figure 1.

Results from the 2001 Redistricting

Having defined these quantities for each state, I present the results for partisan bias and electoral responsiveness on a series of comparable states: those with biennial elections, single-member districts and redistricting maps that took effect in 2002. Figure 2 shows the mean estimate for split-vote responsiveness in 2004 and 2006 plotted against values in 2000; Figure 3 does the same for partisan bias.

For split-vote responsiveness (shown in Figure 2), the decennial redistricting in 2001 appears to have had an effect on increasing the competitiveness of state legislative races, with a rough mean increase of 0.2 in responsiveness in 2004 and 0.3 in 2006; the difference between these years appears to be driven by the leverage of a small number of states, combined

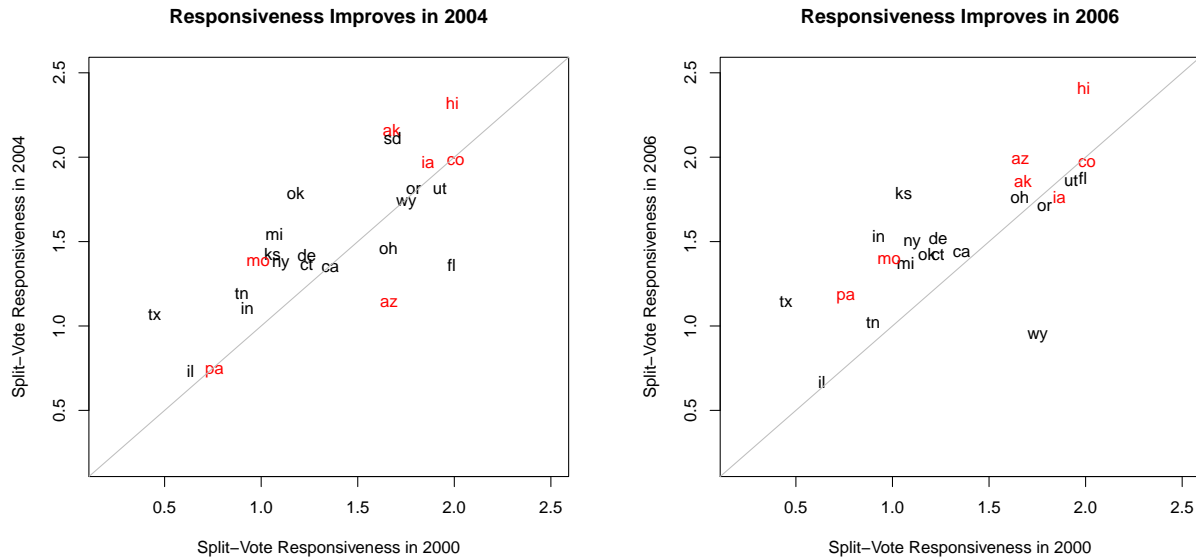


Figure 2: Split-vote electoral responsiveness before and after redistricting, in 2004 and 2006. An increase is reflected in states that lie above the diagonal, and on the whole, there is a net change in responsiveness. There is no obvious difference between commission states (red) and others (black).

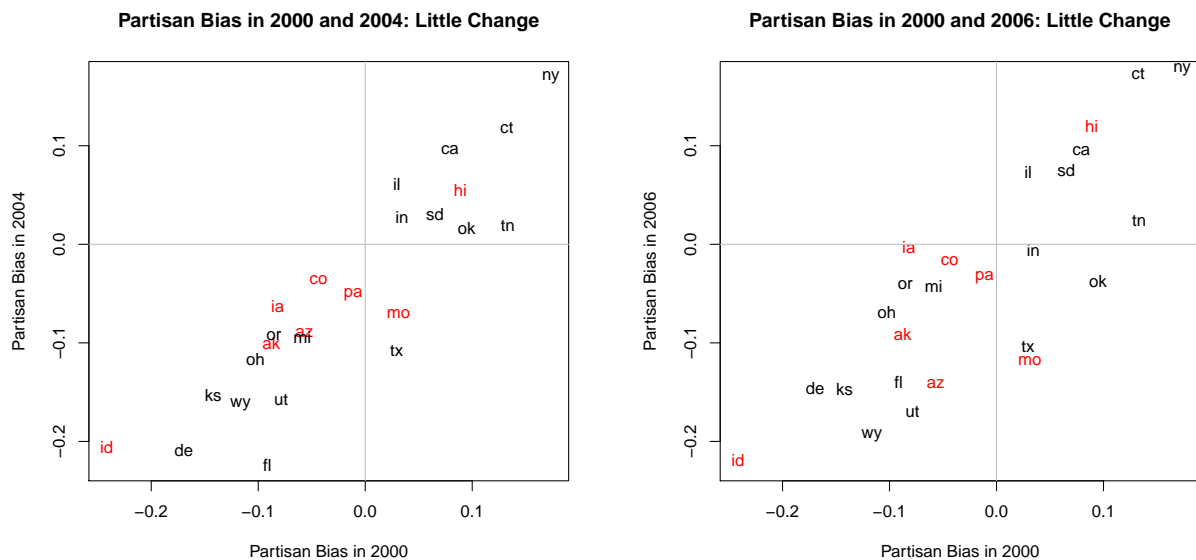


Figure 3: Partisan bias before and after redistricting, in 2004 and 2006. An improvement would be seen if states were closer to the horizontal axis than the vertical; this does not seem to be the case for commission states (in red) or others (in black).

with the impact of the 2004 Presidential election. However, there is no apparent pattern of relative increase for commission states, though this may be mitigated by the fact that these states had disproportionately high responsiveness before redistricting took place.

The situation for partisan bias (Figure 3) seems grim: no matter what method of redistricting was used, there was little improvement in the overall situation; partisan bias after redistricting remains roughly where it was beforehand, in both 2004 and 2006. Notably, states with commissions began with lower overall partisan bias than states without.

Why Don't Commissions Produce "Fairer" Maps?

Because there can be many different types of commission structures, and only a small number of redistricting cycles that have used them, it is nearly impossible to identify what elements will generally lead to the production of fairer maps, including the role of the commission. One can speculate on the roles each might have in general, but an examination of specific circumstances under which commissions have laboured proves more enlightening as to the factors that make electoral maps difficult to produce. To that end, I address the use of commissions in three states, Arizona, Iowa and Missouri, that had different beginnings, and (arguably) different results.

Arizona

The commission model was born with the enactment of Proposition 106, a 2000 amendment to the Arizona constitution calling for legislative and congressional redistricting to be conducted by a five member bipartisan commission. The composition of the commission was to be explicitly bipartisan, with two Republicans, two Democrats and an independent chair. In late 2001, after debate among commissioners, legislators and private citizens, the commission proposed plans for the Arizona Senate and Legislature (each district elects one senator and two representatives) and for the United States Congress.¹ Considering the single-member districts of the Senate alone illustrates several important issues:

1. "Competitiveness" was seen as a goal of the redistricting process, but defined in terms of likely election results and contested seat counts – more "competitive seats" (through a loose definition) rather than a single agreed-upon optimal measure with a margin of uncertainty attached.
2. Between the 1990 and 2000 census counts, there was a 41% growth in population, which meant that existing boundaries would be more difficult to respect for the same number of seats.
3. Both Hispanics and Natives were concerned with their representation as a group, and launched legal complaints throughout the districting process to ensure that their groups

¹Source: <http://www.azredistricting.org/>.

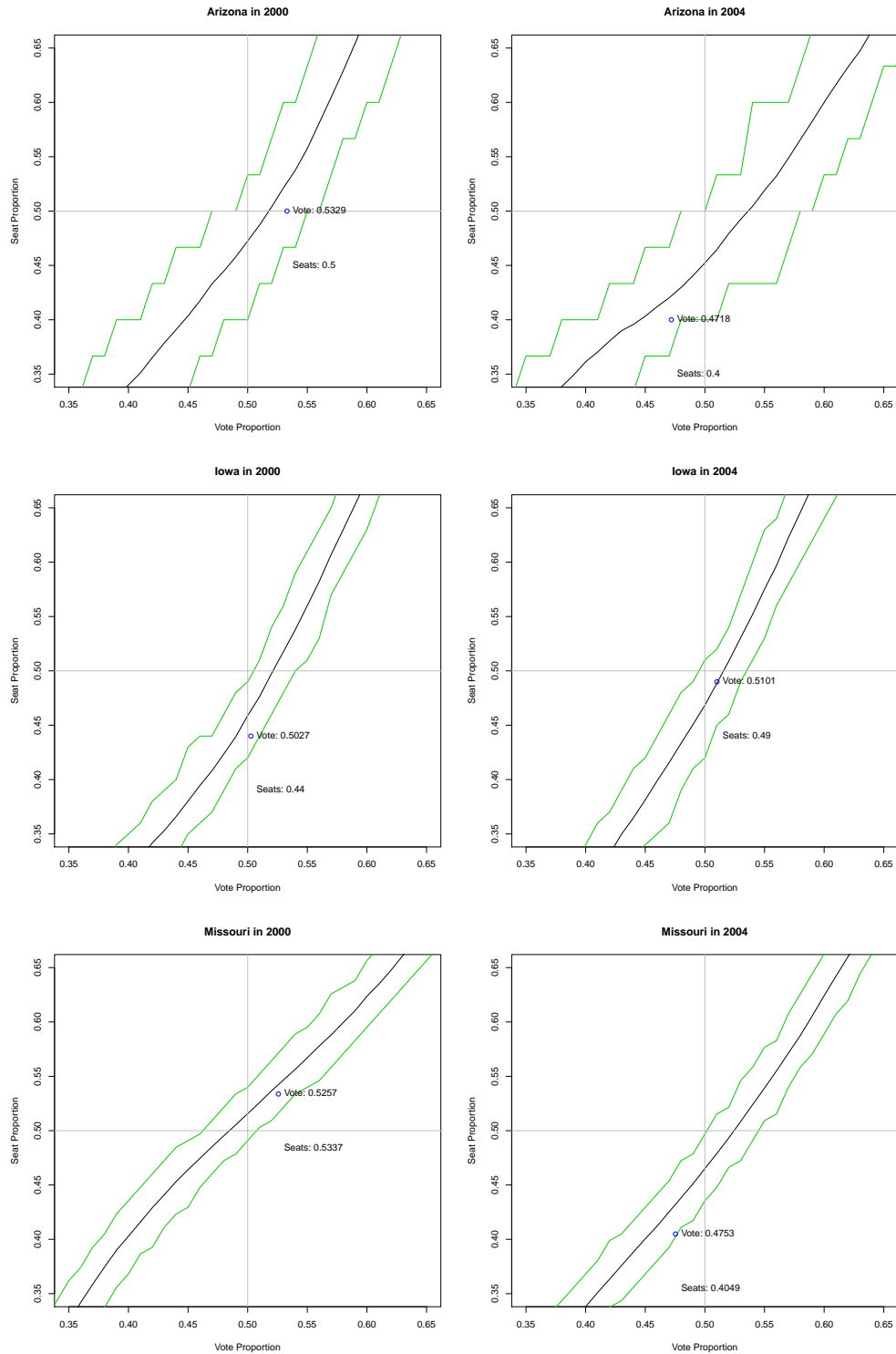


Figure 4: From left to right, comparing the seats-votes curves in 2000 and 2004, before and after the 2001 redistricting; from top to bottom, the states in consideration are Arizona (senate), Iowa and Missouri. While the net responsiveness increased in each case, the new maps produced outcomes that tended toward partisan bias.

were fairly represented, namely through the creation of majority-minority districts – districts in which a visible minority comprises a majority of voters – as prescribed in Section 2 of the Voting Rights Act. Because this was a legally binding requirement, possibly encouraging the creation of districts that overwhelmingly support one political party over the other, there is a definite risk of reduced competitiveness for the general election.

There was an obvious measure of competitiveness available to the commission in 2001 that was easily digestible: an approximate count of seats that may be in play in the short term, and one that is innately additive. Because partisan bias is defined as an aggregate to be minimized, no such measure was available to the commission that would generalize.

Iowa

Iowa's method of redistricting is unique, in that a commission is responsible for drawing three district maps, one of which is then selected by the legislature for implementation. The 2001 redistricting was the third time the system has been used in its current form. This system seems to work very well, in that the system in 2006 appears very responsive and unbiased (though the system is definitely biased in 2004, with an expected 46 seats in 100 for the Democrats given an evenly split vote.)

In those characteristics of the state that could make redistricting more challenging, Iowa is vastly different from Arizona:

- The previous maps were already quite competitive, and needed to be altered only slightly due to a population increase of 6%.
- The population is racially homogeneous at 95% Caucasian, greatly diminishing the likelihood of a Section 2 challenge under the Voting Rights Act.

Given that the new map will likely have only minor changes, it's unclear whether a commission would be necessary in 2011 to produce a new map that would be acceptable to the population and both major parties.

Without a conflict between competitiveness and majority-minority districts, or the complication of lawsuits pertaining to racial characteristics, there is more doubt about the true causal impact of the commission in the state compared to the counterfactual situation where the legislature would have had direct input into drawing the map.

Missouri

Missouri's addition to the analysis in 2001 comes about not because of intentional construction, but as a result of political disagreement at the legislative level. Redistricting is normally handled by bipartisan committees in the legislature; one in the senate, one in the house. In 2001, neither committee could agree on a district map by the deadline, and both were dissolved. The responsibility for each was transferred to the Appellate Apportionment

Commission, two bodies of six members each appointed by the state Supreme Court charged with creating district maps for the house and senate. The maps were completed in late December of that year and not subject to gubernatorial veto.

While the 2000 map was only marginally biased at the median vote, as shown in Figure 4, the observed responsiveness was roughly at 1, suggesting that the state's competitiveness was low relative to others.

The new map, as observed in 2004, was biased in favor of the Republican party, to a statistically and politically significant degree. Responsiveness, on the other hand, dramatically increased to almost 1.3, and the total competitiveness of the state rose with it.

The commission had access to various unapproved plans constructed by the legislative committees, as well as petitions from various legislative blocs and citizen committees. It is likely that rather than starting from the beginning of the process, the final maps selected took features from several of these submissions, and that the commission acted as an arbiter by selecting the plan with the fewest (if any) legal questions.

How Will California's New Commission Fare?

Results from the previous cycle suggest that the reduction of partisan bias may not be in the minds of redistricting nearly as much as competitiveness. Fortunately, there are reasons to be optimistic about California's prospects under a commission.

California's Senate districts are to be constructed so that they each contain two Assembly districts "to the extent practicable".² This means that when the maps are to be created, the evaluation of both the Senate and Assembly should be taken simultaneously, but this may also make the job easier to conduct assuming that there is a high correlation between voting behavior for each level of office.

Because the creation of majority-minority districts is also a priority, this suggests that the creation of a Senate district that allows minority considerations would suggest that two corresponding Assembly districts would follow with minimal difficulty. Whether or not there is coherency between the voting patterns of each particular minority in the Assembly and the Senate is a question left to the commission to investigate. If there is not, the need to create majority-minority districts may require the suspension of the nesting rule.

However, if the nesting rule can remain in place, this gives a relatively easy method to meet in terms of fairness at the lower level: if the Senate map can be constructed to have no measurable partisan bias, then a map can be drawn so that the outcomes of each Assembly district are identical to each other and their parent, which should also have a minimal partisan bias. The responsiveness of the Senate map can then be tuned as desired while maintaining an unbiased result at and around the evenly split vote, and the nested pair of Assembly districts can then be manipulated appropriately.

²This standard does not appear to have been in place in past redistricting cycles.

How Sensitive Is Too Sensitive?

During the election campaign that brought Proposition 11, for the creation of the redistricting commission, to the polls, one of the key claims of its proponents was that “99 percent of incumbent politicians were re-elected in the districts they had drawn for themselves”, emphasizing the insensitivity of the map to the changes of a district’s constituents even if the statewide vote share were to shift. While the statement is factually correct, it ignores several important conditions:

- Assembly members are limited to serve four terms, meaning that on average, a minimum of 20% seats are open in an election.
- The incumbency advantage, or the increase in vote share given to an incumbent, acts in concert with a favourable district map. This cannot be de-confounded without alternative specifications of district maps, since incumbents can be forced to run against each other after redistricting.
- This does not account for the fact that an incumbent can (theoretically) be defeated in a primary challenge, even if this does not happen often.

While reducing bias to zero is highly desirable, there may not be a “natural” value of responsiveness against which a map should be judged. A proportional representation system, for example, is designed to make the seat share for a party identically equal to the vote share they receive; a higher responsiveness will create a system where a small vote majority will allow one party to have a substantial seat majority (which may be more convenient for the party to govern), though to what degree this responsiveness is sought is a decision for the state to make.

Hypothetically, it would be possible to create a map that would be maximally responsive at 50% by setting every individual district to produce a statistical tie when the vote is split³. Letting alone the errors in estimation of each VTD – including the effect of a politician running in a district where only a fraction of a population may recognize his/her incumbency, possibly resulting in a lesser effect size – there is still the notion of *whether* the incumbency pattern would be properly predicted, or how that pattern would hold up in five subsequent elections.

How Will Other States React To California?

While it is difficult for me to speculate on the response of many other states, individual donors, or political action groups, financial opposition to Propositions 11 and 20 came from the Democratic Party, who have enjoyed an electoral advantage in the Assembly and Senate,

³One scenario: if the incumbency effect is equal to 5 percentage points, putting incumbent Democrats in districts with a mean Democratic vote share of 0.45, and incumbent Republicans in districts with a mean Democratic vote share of 0.55, would yield a map in which each seat was a toss-up, and each seat would be determined by a virtual coin flip if the vote were split.

which has allowed them to create maps favoring both their own bodies as well as their congressional delegation. The short-term loss of the electoral advantage, along with an expectation that the advantage would last at least an additional redistricting cycle, is enough incentive to maintain the status quo. No doubt, similar situations in other states exist, though with less total consequence to Congress in any other state.

Like Arizona, California is a state with population growth (though not nearly to the same degree), and the redistricting effort was proposed by the people rather than the courts. This gives the hope that the results of the redistricting will be respected to some degree, though the complications of California's ethnic heterogeneity may mean that various political organizations for each group will again be involved in litigation after the map is released. However, the commission can choose to hear the concerns of each group before the final draft is accepted.

If the effort is successful in producing maps that are responsive and unbiased, it may prove that the commission method can work in general, at least to the public. How that will be recognized, on the other hand, remains a matter of several factors:

- Will the district boundaries appear jagged or smooth? This will give the appearance of a fairly drawn map, largely due to the association of jagged boundary lines to both partisan and bipartisan gerrymandering, but may not actually indicate that one map is fairer than another.
- If the votes in the next several elections are close to parity, will there be a number of close elections leading to long recounts and court battles? While these cases are fairly standard in many elections, the additional expense of litigation may prove to be a sore point to other states wishing to adopt the method.
- If the votes in the next several elections are *far from* parity, how easy will it be to interpret the results in terms of fairness at the split vote? These methods will work best if the generalized uniform partisan swing assumption holds, which is not likely the case in a functionally one-party state like Idaho.
- What incentive will other states have to make the switch to any kind of commission model? The party without the advantage is the one that has the most to gain in the short term from a change, which would likely require a ballot measure or a negotiation; either may water down the effectiveness of the change.

Even if the commission produces some positive effects on the political system, it will not necessarily be the case that the Gelman-King measures will be the ones optimized (or even improved). The commissions from the previous redistricting cycle certainly did not improve on them, though this may be a case of a lack of awareness. The recognition by the Supreme Court of the symmetry standard, for example, can be added to the notion of competitive elections and may yet be manifested in the next round of district maps; at the very least, it will likely be known in the courtroom once the first district map is challenged legally.

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