

# Apportionment Matters: Fair Representation in the US House and Electoral College

Brian J. Gaines and Jeffery A. Jenkins

The 2000 presidential election made various electoral institutions—from ballot format to voting mechanisms—suddenly prominent in public debate. One institution that garnered little attention, but nonetheless affected the outcome, was apportionment. A few commentators, looking ahead to 2004, noticed that Bush would have won more comfortably had the apportionment based on the 2000 census already been in place for the 2000 election. Little attention, however, was paid to the method by which 1990 census data were used to generate the 1992–2000 apportionment, even though there are many ways to perform that allocation, the United States has used different methods over its history, and the precise algorithm turned out, in this instance, to matter. More generally, previous discussions of apportionment methods have neglected the point that allocation to states of US House seats simultaneously determines Electoral College weights. Since the Electoral College has built-in biases favoring small states, an apportionment method that partially offsets this bias might be justifiable. We revisit some criteria by which one might prefer one apportionment rule to another, in light of this double duty.

## Introduction

Apportionment of US House seats to states on the basis of population seems, to the uninitiated, a narrow and technical matter, unlikely to merit much attention or generate deep controversy. There is, to be sure, intense conflict surrounding the census itself, but those arguments are distinct from how population shares—once determined—should get rounded into whole numbers totaling 435. However, rounding is not simple, and states care a great deal about their apportionments. In pursuit of a second US House seat, Montana took its case all the way to the Supreme Court in 1992. In *United States Department of Commerce, et al. v. Montana*, the Court rejected the argu-

ment that the current apportionment algorithm violates the Constitution, but in doing so, it ruled that apportionment methods *are* justiciable, opening the door to future cases.

That dispute demonstrates one of the fundamental tensions in the process, stemming from the zero-sum nature of competition for seats between states. The method preferred by Montana would have increased its allocation from one seat to two, at the expense of Washington, which would have dropped from nine to eight seats. The disputed seat represented a potential 100 percent increase in its House delegation for Montana, but only an 11 percent loss for Washington; on the other hand, Washington deserved 8.53 seats and Montana 1.40, so Washington's fractional seat-share was greater than Montana's. Either way, citizens in one of the two states would end up “under-represented” relative to the ideal district population for the whole country (i.e., the total 1990 US population divided by 435). As long as the number of seats being allocated is fixed, as has been the case for the US House for decades, some such discrepancies are bound to arise in real data.

A second source of malapportionment, felt both in the House and the Electoral College, is population shifts between decennial censuses. At present, American law juxtaposes a fixation with achieving exactly equal populations across House districts within each state at the time of apportionment, and a curious insouciance about the

---

*Brian J. Gaines is Associate Professor in the Department of Political Science and the Institute of Government and Public Affairs at the University of Illinois (bjgaines@illinois.edu). His research is mostly focused on elections and public opinion. Jeffery A. Jenkins is Associate Professor in the Woodrow Wilson Department of Politics and Faculty Associate in the Miller Center of Public Affairs at the University of Virginia (jajenkins@virginia.edu). His research interests include Congress, American political development, and positive political theory. The authors are grateful for helpful suggestions from seminar audiences at the University of Illinois and Northwestern University.*

fact that all five elections held under the resulting electoral map involve ever-shifting populations (of voters, non-voters, and those ineligible to vote).<sup>1</sup> A complete census occurs only every ten years, and apportionments follow the census calendar, so that election years ending in 2 are the first to be run under a new allocation, which is based on a population count that is, at that point, two-years old. As the decade proceeds, House districts become increasingly unequal in population, even within states. Meanwhile, because presidential elections run on a four-year cycle, their Electoral College weights are out-of-date by two years (e.g. 1992), four years (2004), six years (1996), eight years (2008), or even a full decade (2000).

A third source of unavoidable malapportionment obtains not in the US House, but in the institution joined at the hip to the House, the Electoral College. Article II, Section 1 of the Constitution stipulates that each state receives “a number of electors, equal to the whole number of Senators and Representatives to which the State may be entitled in the Congress.” Hence, Electoral College representation is, by design, very highly correlated with US House representation, as it depends on the same allocation, but with two wrinkles. First, every state gains two additional electors by virtue of its US Senate delegation. Since the Senate is not apportioned by population, the Electoral College thereby inherits a small measure of disproportionality favoring small states at the expense of large states. Second, the District of Columbia, which does not return one of the 435 voting members of the US House, is nonetheless granted three electors by virtue of the Twenty-Third Amendment.<sup>2</sup>

Hereafter, we will reconsider criteria for the best apportionment method in light of the double duty done by this allocation. Most prior analyses of the pros and cons of various apportionment schemes have focused exclusively on the House itself.

Our analysis begins with a brief review the major methods of apportionment, using the 1990 census data and 2000 election for illustrative purposes. We then discuss whether the various sources of disproportional apportionments can be fruitfully addressed by different choices of apportionment method. “Creeping malapportionment” is shown to be equally problematic for all methods, largely due to the unpredictable nature of population growth. “Constitutional malapportionment,” therefore becomes the focus of the remainder of the analysis, with a particular eye on taking the link between bias in House apportionment and bias in Electoral College apportionment seriously. We turn to historical data to demonstrate a tradeoff in selecting one method over another, in terms of discrepancies between state population shares, House seat shares, and Electoral College shares (for convenience and brevity, hereafter, we will sometimes use the shorthand “error” for disproportionality in apportionment), and ultimately argue that the election of the president is sufficiently important

that one should also attach some weight to the Electoral College when assessing how fair are the main alternatives for integer-rounding from population shares.

## The Tricky Business of Rounding

The definitive account of almost all aspects of apportionment is, without a doubt, Balinski and Young.<sup>3</sup> That monograph collects formal mathematical analyses from their many journal articles (few of which first appeared in political science outlets) and supplements these with historical narrative on how US House seats have actually been doled out over the history of the nation. There are infinitely many algorithms for integer rounding, but only a few have played any important role in US apportionment.

An intuitive approach to allocating seats in proportion to population shares is simply to multiply each state’s proportion of the population by the total number of seats, and then round these “quotas” in the usual way—by referring to the decimal places (i.e., partial seats) and rounding down for values less than .5 and up for values equal to or greater than .5. A small complication in the case of House allocation is that every state is guaranteed one seat, so the rounding has to be constrained to prevent any state being allocated zero seats. However, even without that constraint, when the total number of seats is fixed, such rounding will not, in general, yield a sum equal to the total number available. To ensure that state allocations sum correctly, one must further constrain the rounding. Dividing the total population by the (fixed) number of seats yields the “natural divisor,” the ideal number of citizens per district on a national basis. Dividing a state’s population by that divisor again yields the quota. Strategies for constraining the sum often involve altering the divisor or the rounding rule. The main methods to have been used or considered in the American context are as follow (we indicate as well how the methods are known in the literature on how to allocate seats for proportional representation, PR).<sup>4</sup>

*Alexander Hamilton’s Method:* Compute the natural divisor, and allocate to each state its integer value (using 1 for those states with quotas less than 1). Assign the remaining  $k$  seats to the states with the  $k$  largest remainders. This method was used to apportion the US House five times, between 1850 and 1891. In the PR literature, it is referred to as the Hare method of greatest remainders, after Thomas Hare. Slight variations are the Droop and Imperiali methods, which use alternative divisors and quotas, but also allocate by largest remainders.

*Thomas Jefferson’s Method:* Find a divisor smaller than the natural one, such that when it is divided into state population, the integer portions of each state’s quota (using 1 for any state having 0) sum to the desired total. This method was used to apportion the

US House five times, between 1792 and 1832. In the PR literature, this method is attributed to Victor d'Hondt, and referred to as "the d'Hondt method."

*John Quincy Adams's Method:* Find a divisor such that 1+ the integer value of each state's quota sums to 435. It has not seen use in PR systems, perhaps because its use would encourage parties to divide.

*Daniel Webster's Method:* Choose a divisor such that conventional rounding of states' quotas leads to the desired sum (435). This method was used to apportion the US House four times, in 1842, 1901, 1911, and 1929. In the PR literature, this method is attributed to André Sainte-Laguë, and is referred to as "the Sainte-Laguë method" or, sometimes, "the method of major fractions."

*James Dean's Method:* Find a divisor such that the integers that make the average constituencies of the states closest to this divisor sum to the desired total (435). Give to each state its integer value. (Dean was a professor of mathematics from Vermont.)

*Joseph Hill's Method:* Minimize the percentage difference between all pairs of states. In other words, find a divisor such that no transfer of any one seat can reduce the percentage difference in representation between those two states. This method has been used to apportion US House seats since 1940. (Hill was a statistician at the Census Bureau.)

From the brief descriptions above, it is not immediately clear that these methods should perform differently. But they do tend to vary, as table 1 reveals, using the 1992–2000 apportionment and the 2000 election result as an illustration. Under the Hill method actually used to convert 1990 census population shares into whole numbers of seats, the states won by Bush in 2000 gave him a 271–267 Electoral College win.<sup>5</sup> At opposite extremes, the method invented by John Q. Adams would have increased Bush's margin from 4 to 10, while Jefferson's method would have flipped the result, giving Gore a 271–267 win. A Hamilton apportionment coupled with the actual 2000 vote would have produced the added drama of a rare Electoral College tie, which would very likely have been broken in Bush's favor given that 28 states had Republican majorities in their House delegations in the 107th Congress.<sup>6</sup> Generally, Jefferson's method favors large states substantially and Adams's method favors small states substantially.<sup>7</sup> For a sense of the magnitude of these biases, simply compare the possible seat allocations to big states like California, New York and Illinois and small states like Idaho, Montana, and New Mexico in table 1. Jefferson's is the friendliest and Adams's the least friendly of these six methods to the really large states; for small states, the opposite is true. Hamilton's approach is more prone than the others to some well-known "paradoxes," such as a state losing a seat in a reapportionment even while it has gained

population at a higher rate than other states whose seat counts hold constant.

Hill's method is now in use, but if one's goal is fairness to both large and small states, Webster's method has the least size-related bias. On that basis, Balinski and Young (1982: 86) endorse Webster's as the best method for apportioning legislative seats by population. Moreover, they laud it as the best method not just out of these six, but in a global sense, against all of the infinitely many possible algorithms. However, their notion of "fair" is based on the House delegation only. Because this apportionment is also put to use in the Electoral College, one might prefer to consider error and bias in both venues. Granted, Representatives in the US House perform actual representation on an ongoing, continuous basis, while electors are anonymous and arguably anachronistic ciphers who perform exactly one duty. But the President is obviously an important representative, so the role played by apportionment in his (or her) election also merits some attention in assessing fairness.

## Creeping Malapportionment

As noted earlier, creeping malapportionment due to constantly shifting populations sits oddly with jurisprudence emphasizing the necessity of exact equality of the population (as of the most recent count) across districts within states. Courts have not demanded frequent revision of districts, presumably because both processes—counting people and drawing boundaries—are arduous and rife with conflict. In particular, drawing and redrawing congressional districts is logistically demanding, politically explosive, and inherently litigious. Lawsuits have become a natural concomitant of electoral boundaries, with every state's map facing some legal challenges, many of which drag on for years, sometimes right through a decade to the next census. Of course, none of these difficulties associated with drawing districts arise with respect to the Electoral College, so it would be possible, in principle, to adjust each state's Electoral College weights afresh for each presidential election, to keep pace with (estimated) state population shares.<sup>8</sup> Such a plan almost certainly could not pass constitutional muster without an amendment. Even if the phrase "may be entitled" in the Article II language quoted above were to be interpreted as emphasizing *entitlement* as against current apportionment, the population estimates produced biennially by the Census Bureau have never been accorded the same legal status as the official census counts.

An alternative means of acknowledging ever-changing population shares would be to incorporate forecasts into the apportionment procedure explicitly, allocating seats according to current and expected population shares. Such an approach, however, would even more clearly violate the Constitution. But while it is infeasible to introduce

**Table 1**  
**Electoral College representation sensitive to apportionment method, 1990 Census**

State (2000 winner)	Apportionment Algorithm					
	Hamilton	Jefferson	Adams	Webster	Dean	Hill*
1. ME (Gore)	4	4	<b>5</b>	4	4	4
2. MA (Gore)	<b>13</b>	<b>13</b>	12	<b>13</b>	12	12
3. RI (Gore)	4	<b>3</b>	4	4	4	4
4. DE (Gore)	3	3	<b>4</b>	3	3	3
5. NJ (Gore)	<b>16</b>	<b>16</b>	15	15	15	15
6. NY (Gore)	33	<b>35</b>	<b>32</b>	33	33	33
7. PA (Gore)	23	23	<b>22</b>	23	23	23
8. IL (Gore)	22	<b>23</b>	<b>21</b>	22	22	22
9. MI (Gore)	18	<b>19</b>	18	18	18	18
10. OH (Bush)	21	21	<b>20</b>	21	21	21
11. WI (Gore)	11	<b>10</b>	11	11	11	11
12. KS (Bush)	6	6	<b>7</b>	6	6	6
13. NE (Bush)	5	<b>4</b>	5	5	5	5
14. ND (Bush)	3	3	<b>4</b>	3	3	3
15. SD (Bush)	3	3	<b>4</b>	3	3	3
16. FL (Bush)	25	25	<b>24</b>	25	25	25
17. LA (Bush)	9	9	<b>10</b>	9	9	9
18. MS (Bush)	<b>6</b>	<b>6</b>	7	7	7	7
19. NC (Bush)	14	14	<b>13</b>	14	14	14
20. TX (Bush)	32	<b>33</b>	<b>31</b>	32	32	32
21. KY (Bush)	8	8	<b>9</b>	8	8	8
22. OK (Bush)	<b>7</b>	<b>7</b>	8	<b>7</b>	8	8
23. TN (Bush)	11	<b>10</b>	11	11	11	11
24. AZ (Bush)	8	8	<b>9</b>	8	8	8
25. ID (Bush)	4	<b>3</b>	4	4	4	4
26. MT (Bush)	3	3	<b>4</b>	3	<b>4</b>	3
27. NM (Gore)	5	<b>4</b>	5	5	5	5
28. CA (Gore)	54	<b>56</b>	<b>52</b>	54	54	54
29. WA (Gore)	11	<b>10</b>	11	11	<b>10</b>	11
vs. actual*	+2 G	+4 G	+3 B	+1 G	+1 B	—
2000 E.C. winner	tie	Gore	Bush	Bush	Bush	Bush
	269–269	271–267	274–264	270–268	272–266	271–267

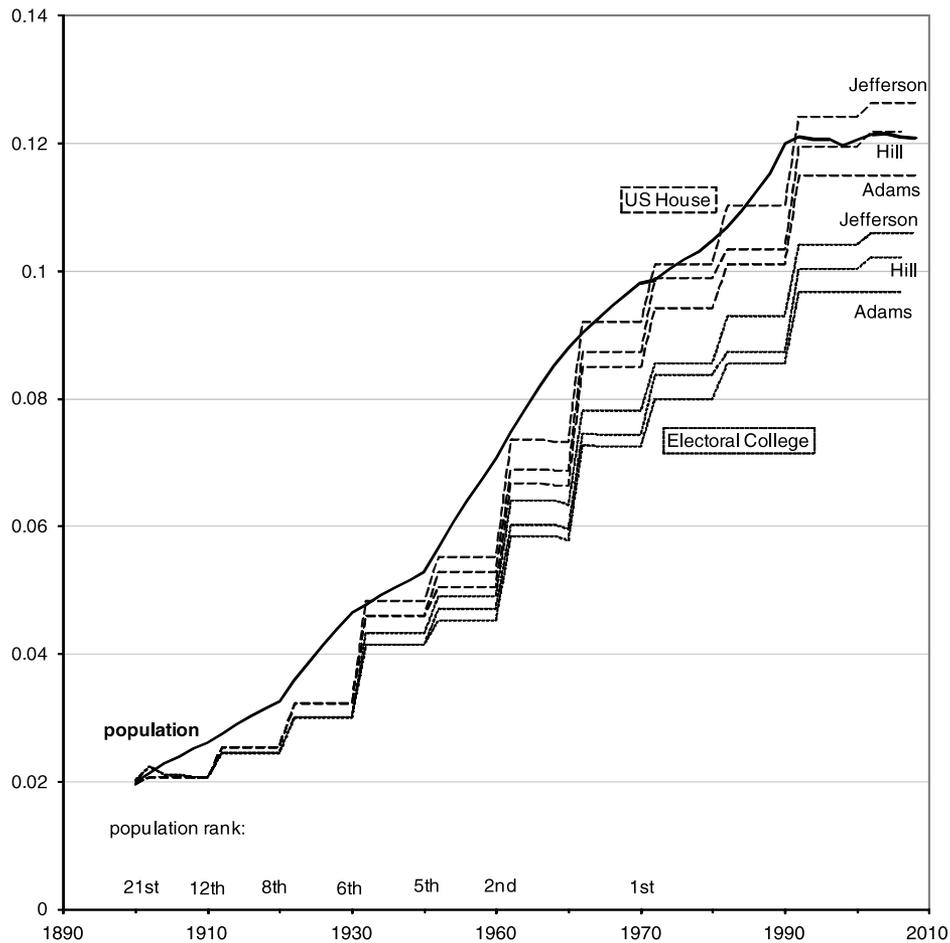
Note: “Sensitive to apportionment method” means that the six methods shown here do not all agree. **Bold** indicates discrepancy from the actual apportionment. There are infinitely many integer-rounding algorithms, and consideration of other methods would entail adding more states to the table. Note also that the figures above are based on resident populations and overseas military and federal civilian employees (plus dependents); although the latter population represent only about 0.4% of the total, omitting them would have resulted in a few seats changing hands under the Webster and Hamilton methods. In the early 1990s Massachusetts succeeded in a district court, but lost in the Supreme Court, in an effort to have this population excluded from apportionment totals (Ernst 1994, 1221).

into the apportionment process any formal forecasts of population growth on the basis of factors such as demographic traits and past state-specific trends, apportionments based solely on populations at a given moment can implicitly incorporate some sensitivity to anticipated changes in population to the degree that (a) apportionment methods tend to discriminate between large and small states; and (b) large and small states tend to differ in terms of subsequent growth. Condition (a) is not in doubt.<sup>9</sup> But what about (b)?

The main problem created by the infrequency of apportionment, from the point of view of fair allocations, is

that states that grow most quickly end up under-represented later in the life of a given apportionment, while states that grow comparatively slowly (or even shrink) accrue a representation bonus as time passes. The examples of California and New York, however, illustrate that large states can be fast or slow growers, either falling further and further behind or catching up to a fair share. Figures 1 and 2 demonstrate this. Figure 1 shows California’s tremendous growth over the first half of the last century, as it rose from 21st place in 1900 (housing about 2 percent of the national population) to 2nd by 1950 (about 7 percent of the population). As it grew

**Figure 1**  
**California's shares of US population, House seats, and Electors, 1900–2008**



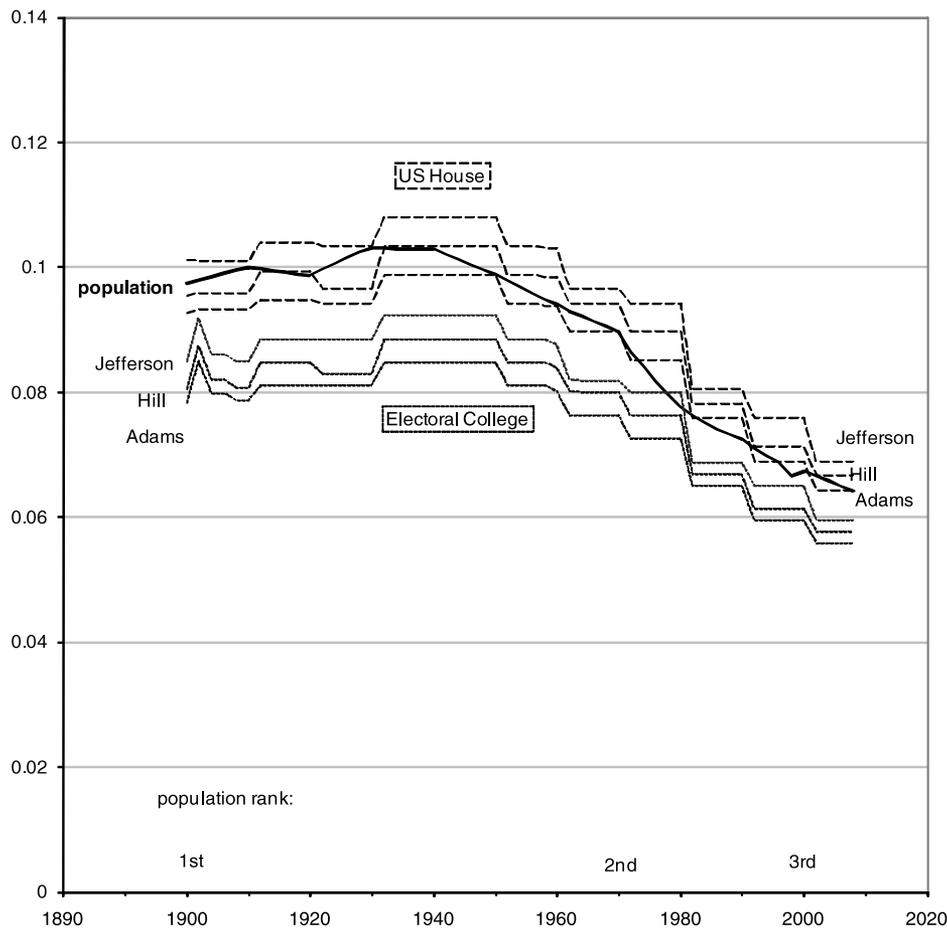
The population series features linear interpolation between full-census years until 1980.

larger, the state became more dramatically under-represented in both the House and the College. In other words, its population share exceeded its shares of seats in these institutions by widening margins. The figure shows hypothetical apportionments under the Adams, Jefferson, and Hill methods, and only the Jefferson method would have created any lasting representation bonus for this mammoth state, particularly in the last decade, when the Golden State's growth finally slowed. By contrast, New York's pattern is frequent over-representation in the House, as a consequence of comparatively slow population growth. Like California, New York enjoys less Electoral College clout than it merits on population grounds, but it tends to catch up in between reapportionment periods.

So although the tendencies of the different methods to favor or disfavor small or large states are well understood, that does not mean that it is clear which methods would best anticipate population drift. Figure 3 shows the rela-

tionship between state populations and subsequent growth, for 1930–2000. The 397 data points are states (plus District of Columbia after 1970), with log of the census-year population plotted on the horizontal axis and population growth over the subsequent decade (as a proportion of the census population) plotted on the vertical axis. Both OLS and second-order polynomial regression lines are fitted to the scatter plot. There is a slight tendency for smaller states to grow more, evident in the negative slope of the OLS line. The non-linear regression, though, curves back up at high values of log(population), since many of the cases of big states are also states growing by more than the average amount (i.e., sun-belt states in recent decades, like California since 1960, Texas and Florida since 1980). On the whole, the relationship is quite weak: adjusted  $R^2$  statistics for the models are only 0.024 (OLS) and 0.051 (P2). A state's current population is simply not a very good predictor of its relative short-term population growth, and, hence, whether it is more likely to gain or lose in

**Figure 2**  
**New York's shares of US population, House seats, and Electors, 1900–2008**



representation as state populations shift over the life of an apportionment. Insofar as state size is an important factor, one might argue that the best forward-looking apportionment method should slightly favor small states, to accommodate their tendency to out-grow bigger states; but, clearly, the desirable amount of bias to introduce on this account is small. In short, population growth is sufficiently unpredictable that apportionment techniques provide little leverage for addressing the single largest source of error in states' political weights.

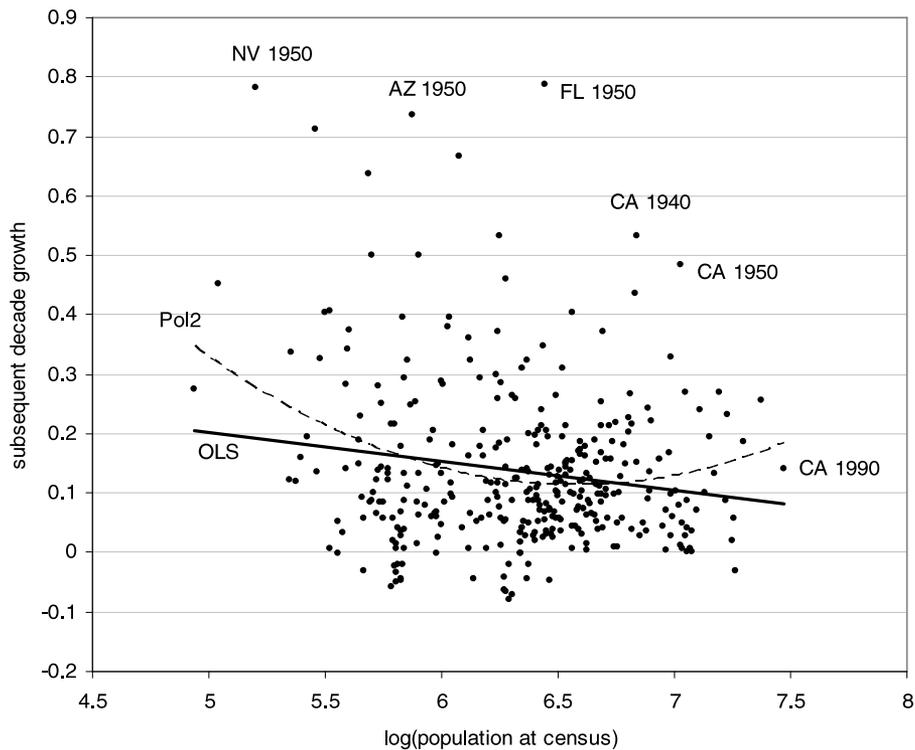
### Constitutional Malapportionment

After shifting populations, the other sources of error in apportionment are, in some respects, deliberate. Certainly, representation for District of Columbia in the Electoral College and the minimum threshold of one US House seat per state are rules explicitly added to the constitutional provisions on political representation, with full knowledge of their implications. The final ingredient in

malapportionment is the small-state bias in the Electoral College. In one view, this feature is also a deliberate design, not a flaw that calls for remedy. A different take is that the exaggeration of small states' influence by virtue of Electoral College weights is accidental and unfortunate. Edwards, for instance, argues that the College's violation of political equality constitutes a "fundamental threat to American democracy" and that "a central theme of American history" has been gradual democratization of those constitutional compromises that involved violations of political equality.<sup>10</sup>

Of course, Edwards makes those arguments as part of a broad assault on the Electoral College, in support of the argument that the whole institution should be scrapped. We wish to evaluate a smaller claim, that the apportionment method can be enlisted to reduce the extent of small-state bias. Others have demonstrated that the Jefferson method has a pronounced bias in favor of large states; but the remaining question is how to compare the performance of methods in terms of the two

**Figure 3**  
**State size and population growth, 1930–2000**



venues for malapportionment, the House and Electoral College.

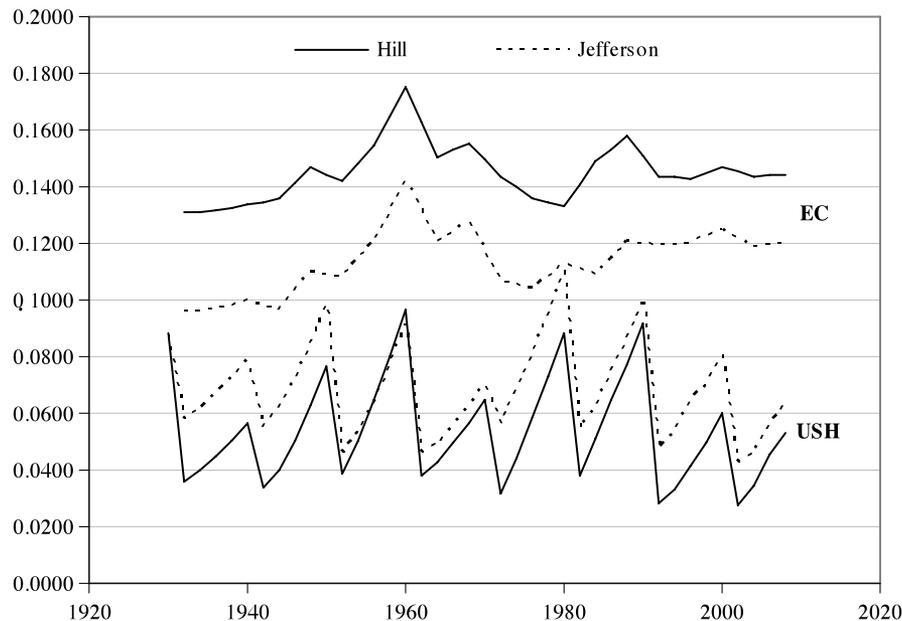
In figure 4, we plot four series showing how the US House and Electoral College delegations of the states vary from “pure proportionality” under the Jefferson and Hill algorithms. To clarify, consider the alternative USH values for the year 2000, and take California as an example. The Hill method of apportionment (implemented from 1992 to 2000 on the basis of 1990 census data) gave California 52 US House seats, corresponding to 0.11954 of the total of 435 seats available. According to the 2000 census, California’s total apportionment population was 29, 839, 250, representing 0.11983 of the national total. Subtracting this pure proportion from the Hill-generated proportion gives us an error—in this case, 0.00029. The data points in figure 4 show the sum (of the absolute value) of such deviations over 50 states (or over 50 states plus District of Columbia for the Electoral College after 1960) for each apportionment method with respect to the House and Electoral College. Greater total errors or higher levels of malapportionment, therefore, are reflected by points further away from the baseline (x-axis).

The figure reveals several interesting contrasts. It succinctly depicts the nature of a tradeoff inherent in picking one method (Hill) over another (Jefferson). Whereas Hill’s algorithm generally produces less error in House-delegation

size, it does so at the cost of higher Electoral College error. Jefferson’s method, slanted towards large states, has the potential merit that it reduces the small-state skew in the Electoral College. In other words, the gap between the top lines reflects the fact that Jefferson’s method offsets the Senate-based bonus to small states in its allocation of House seats and House-based electors. Should one prefer to buy a reduction in College error (represented by the gap between the top series) at the cost of the increased House error (the gap between the lower series)? We take no definite position on this question, which necessarily involves the difficult task of weighing the relative importance of accurate voter representation in electing a president compared with designing legislative representation. Our contention is not that everyone must agree that the College error should count equally with House error, only that there is a clear tradeoff.

The reader might assume that a good method of apportionment should deliver 0 disproportionality, at least temporarily, and thus wonder why none of the lines in figure 4 ever dip down to touch the x-axis. But note that the error calculations in figure 4 use a standard of pure proportionality, an odd baseline insofar as it makes no concessions to the indivisibility of people. US House seats must be counted in integers, so one might prefer to calibrate error against the optimal apportionment that respects

**Figure 4**  
**Disproportionality in the US House and Electoral College under Jefferson and Hill apportionments, 1930–2008**



this whole-number constraint. Fractional electors, by contrast, are not a logistical impossibility. For example, under the “automatic plan,” the Electoral College would be retained, but human electors would cease to play any role.<sup>11</sup> The proposal strikes many opponents of the College as too modest, aimed mainly at avoiding the potential for “faithless electors,” individuals pledged to support a particular slate who spring the surprise of voting otherwise.<sup>12</sup> A constitutional amendment automating the vote by electors *and* permitting fractional electors would ensure a more proportional (or even fully proportional) set of Electoral College weights. An amendment could also dictate reapportionment of the College immediately prior to each presidential election, to ensure continuous conformity with population shares. Changes via a constitutional amendment, however, are very unlikely to occur given the great difficulty of mustering the necessary level of super-majority support. By contrast, a change to Jefferson’s method of apportionment could be implemented comparatively easily, by statute.

## Conclusion

Given the results in table 1, a proposal to switch to Jefferson’s apportionment method put forth soon after the 2000 election would probably have appeared to be yet another argument that Gore somehow “really won.” Gore supporters emphasized his having won more popular vote as one of the prongs in their attacks on the Supreme Court’s

*Bush v Gore* decision and in their outraged analyses of the butterfly ballot episode. With the passage of time, we hope that the simple point made here can safely be regarded as distinct and independent from the 2000 outcome. Indeed, to some an argument focused on small and big states, rather than, say, “red” and “blue” ones, might seem abstract and puzzling. But apportionment is strictly driven by size and the mathematics of rounding, and general arguments that are not short-term partisan ploys masquerading as such revolve around size. We are not big-staters, advocating that Jefferson’s method is fairest or necessarily fairer than Hill’s method. Our modest goal is to sketch the first part of an argument in favor of an apportionment method that offsets the built-in small-state bias of the Electoral College. Should that bias be respected and preserved, dampened, or completely eliminated? The answer to that question involves political values, and possibly a theory of how the compromises underlying the Electoral College system were reached. We hope to kick off such a debate, but we certainly do not pretend to have concluded it.

## Notes

- 1 Yet another point of considerable controversy is whether seats should be apportioned on the basis of population, resident population, eligible-voter population, and so on. Article I, section 2 specified that states’ “respective numbers” be used, and elaborated with the infamous 3/5 rule for slaves and exception

of “Indians not taxed.” The Fourteenth Amendment dropped the former, while the latter was ruled obsolete in an administrative decision by the Solicitor of the Department of the Interior in 1940 (see [http://thorpe.ou.edu/sol\\_opinions/p976-1000.html](http://thorpe.ou.edu/sol_opinions/p976-1000.html), accessed July 2008). At present, the dominant argument concerns whether aliens—legal and illegal—ought to be counted.

- 2 The District of Columbia does, of course, return a member to the US House, but the basis for this non-voting delegate (like those from the insular territories of Puerto Rico, Guam, the Virgin Islands, and American Samoa) is statutory, not constitutional. The apportionment of delegates is entirely independent of apportionment of Representatives.
- 3 Balinski and Young 1982.
- 4 Please see the References section for the original source for each method, marked with asterisks.
- 5 The actual vote was 271–266, since one of the Gore delegates abstained in protest.
- 6 Electoral College ties are broken by the newly elected House, on a majority basis, using a one-vote-per-state method in which any state whose delegation ties automatically abstains.
- 7 Balinski and Young 1982, 73–77.
- 8 One caveat obtains here. States that use congressional districts for the awarding of electors might have to revise their laws to accommodate the potential for a discrepancy between number of Members of Congress and number of electors. At present, only Maine and Nebraska do not use winner-take-all to award electors, instead allocating their House-based electors on the basis of congressional-district plurality (of presidential vote) and their Senate-based electors on the basis of statewide plurality (of presidential vote).
- 9 Balinski and Young 1982; Schuster et al. 2003.
- 10 Edwards 2004, 31–33.
- 11 Hardaway 1994, 147–148.
- 12 There have been eight instances of electors deviating from voting as they were pledged to do in the Twentieth Century, none of them decisive. Opponents of the Electoral College, however, like to note some evidence for occasional unsuccessful cabals and plots by electors to orchestrate coordinated shifts amongst their rank (e.g., Edwards 2004, 21–24).

## References

\*Adams, John Quincy. 1977 [1832]. Letter to Daniel Webster. In *The Papers of Daniel Webster*, ed. Charles M. Wiltse. Hanover, NH: University Press of New England.

Balinski, Michel L. and H. Peyton Young. 1982. *Fair Representation: Meeting the Ideal of One Man, One Vote*. New Haven, CT: Yale University Press.

\*Dean, James. 1832. Letter to Daniel Webster. Reproduced in *Register of Debates*, 22-1, Appendix, 4/5/1832, 98–99.

Edwards, George C., III. 2004. *Why the Electoral College Is Bad for America*. New Haven, CT: Yale University Press.

Ernst, Lawrence R. 1994. Apportionment methods for the House of Representatives and the Court challenges. *Management Science* 40 (10): 1207–27.

\*Hamilton, Alexander. 1966 [1792]. Letter to George Washington. In *The Papers of Alexander Hamilton*, ed. Harold C. Syrett. New York and London: Columbia University Press.

Hardaway, Robert M. 1994. *The Electoral college and the Constitution: The Case for Preserving Federalism*. Westport, CT: Praeger.

\*Hill, Joseph. 1911. Letter to William C. Huston, Chairman of the House Committee on Census. Reproduced in *Apportionment of Representatives*. H. Rept. 12, 62nd Congress, 1st Session, April 25, 1911.

\*d’Hondt, Victor. 1878. *La representation proportionnelle des parties par un directeur*. Ghent.

\*Jefferson, Thomas. 1990 [1792]. Opinion on Apportionment Bill. In *The Papers of Thomas Jefferson*, ed. Charles T. Cullen. Princeton, NJ: Princeton University Press.

Kesterlman, P. 2005. Apportionment and proportionality: A measured view. *Voting Matters* 20: 12–22.

Loosemore, John, and Victor J. Hanby. 1971. The theoretical limits of maximum distortion: Some analytic expressions for electoral systems. *British Journal of Political Science* 1 (4): 467–77.

\*Sainte-Laguë, André. 1910. La Représentation et la méthode des moindres carrés. *Comptes Rendus de l’Académie des Sciences* 151: 377–78.

Schuster, Karsten, Friedrich Pukelsheim, Mathias Drton, and Norman R. Draper. 2003. Seat biases of apportionment methods for proportional representation. *Electoral Studies* 22 (4): 651–76.

Seelye, Katherine Q. 2003. “Shifts in States May Give Bush Electoral Edge.” *New York Times*, December 2.

*United States Department of Commerce, et al., Appellants v Montana et al.* 1992. 118 L Ed 2d 87 [No. 91-860].

\*Webster, Daniel. 1832. Committee report. Reproduced in *Register of Debates*, 22-1, Appendix, 4/5/1832, 92–111.