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The U.S. House of Representatives Apportionment Formula in Theory and Practice

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Summary

On December 21, 2010, the number of seats allocated to each state for the House of Representatives was announced. This allocation likely will determine representation to the House for the next five Congresses.

The Constitution requires that states be represented in the House of Representatives in accord with their population. It also requires that each state have at least one Representative, and that there be no more than one Representative for every 30,000 persons. For the 2010 apportionment, this could have meant a House of Representatives as small as 50 or as large as 10,306 Representatives.

Apportioning seats in the House of Representatives among the states in proportion to state population as required by the Constitution appears on the surface to be a simple task. In fact, however, the Constitution presented Congress with issues that provoked extended and recurring debate. How many Representatives should the House comprise? How populous should congressional districts be? What is to be done with the practically inevitable fractional entitlement to a House seat that results when the calculations of proportionality are made? How is fairness of apportionment to be best preserved? Apportioning the House can be viewed as a system with four main variables: (1) the size of the House, (2) the population of the states, (3) the number of states, and (4) the method of apportionment.

Over the years since the ratification of the Constitution, the number of Representatives has varied, but in 1941 Congress resolved the issue by fixing the size of the House at 435 members. How to apportion those 435 seats, however, continued to be an issue because of disagreement over how to handle fractional entitlements to a House seat in a way that both met constitutional and statutory requirements and minimized inequity.

The intuitive method of apportionment is to divide the United States population by 435 to obtain an average number of persons represented by a member of the House. This is sometimes called the *ideal size* congressional district. Then a state's population is divided by the ideal size to determine the number of Representatives to be allocated to that state. The quotient will be a whole number plus a remainder—say 14.489326. What is Congress to do with the 0.489326 fractional entitlement? Does the state get 14 or 15 seats in the House? Does one discard the fractional entitlement? Does one round up at the arithmetic mean of the two whole numbers? At the geometric mean? At the harmonic mean? Congress has used, or at least considered, several methods over the years.

Every method Congress has used or considered has its advantages and disadvantages, and none has been exempt from criticism. Under current law, however, seats are apportioned using the equal proportions method, which is not without its critics. Some charge that the equal proportions method is biased toward small states. They urge Congress to adopt either the major fractions or the Hamilton-Vinton method as more equitable alternatives. A strong mathematical case can be made for either equal proportions or major fractions. Deciding between them is a policy matter based on whether minimizing the differences in district sizes in absolute terms (through major fractions) or proportional terms (through equal proportions) is most preferred by Congress.

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The U.S. House of Representatives Apportionment Formula in Theory and Practice[1]

Introduction

One of the fundamental issues before the framers at the Constitutional Convention in 1787 was the allocation of representation in Congress between the smaller and larger states.[2] The solution ultimately adopted, known as the Great (or Connecticut) Compromise, resolved the controversy by creating a bicameral Congress with states represented equally in the Senate, but in proportion to population in the House.

The Constitution provided the first apportionment of House seats: 65 Representatives were allocated among the states based on the framers' estimates of how seats might be apportioned following a census.[3] House apportionments thereafter were to be based on Article 1, section 2, as modified by the Fourteenth Amendment:

> *Amendment XIV, section 2.* Representatives shall be apportioned among the several States according to their respective numbers....
>
> *Article 1, section 2.* The number of Representatives shall not exceed one for every thirty Thousand, but each State shall have at least one Representative....

From its beginning in 1789, Congress was faced with questions about how to apportion the House of Representatives—questions that the Constitution did not answer. How populous should a congressional district be on average? How many Representatives should the House comprise? Moreover, no matter how one specified the ideal population of a congressional district or the number of Representatives in the House, a state's ideal apportionment would, as a practical matter, always be either a fraction, or a whole number and a fraction—say, 14.489326. Thus, another question was whether that state would be apportioned 14 or 15 representatives? Consequently, these two major issues dominated the apportionment debate: how populous a congressional district ought to be (later re-cast as how large the House ought to be), and how to treat fractional entitlements to Representatives.[4]

[1] A similar, previous CRS report was authored by (name redacted), who retired in 2005. While the current report is modified by the current author, Mr. Huckabee's contribution, in a large part, remains. Of course, any errors that may appear are due solely to the current author.

[2] In part, this debate over the apportionment of power in the early years of this country came from the 10-year experience with the unicameral congress provided for under the Articles of Confederation, which assigned one vote to each state delegation in Congress. For a thorough discussion, see Charles A. Kromkowski, *Recreating the American Republic*, (Cambridge University Press, Cambridge, U.K., 2002), esp., pp. 261-307.

[3] A major controversy occurred even over the fixed, short-term apportionment of seats among the delegates at the Constitutional Convention. See Kromkowski, pp. 287-294.

[4] Thomas Jefferson recommended discarding the fractions. Daniel Webster and others argued that Jefferson's method was unconstitutional because it discriminated against small states. Webster argued that an additional Representative should be awarded to a state if the fractional entitlement was 0.5 or greater—a method that decreased the size of the house by 17 members in 1832. Congress subsequently used a "fixed ratio" method proposed by Rep. Samuel Vinton following the census of 1850 through 1900, but this method led to the paradox that Alabama lost a seat even though the size of the House was increased in 1880. Subsequently, mathematician W.F. Willcox proposed the "major fractions" (continued...)

The questions of how populous a congressional district should be and how many Representatives should constitute the House have received little attention since the number of Representatives was last increased from 386 to 435 after the 1910 Census.[5] The problem of fractional entitlement to Representatives, however, continued to be troublesome. Various methods were considered and some were tried, each raising questions of fundamental fairness. The issue of fairness could not be perfectly resolved: inevitable fractional entitlements and the requirement that each state have at least one representative lead to inevitable disparities among the states' average congressional district populations. Congress, which sought an apportionment method that would minimize those disparities, continued this debate until 1941, when it enacted the "equal proportions" method—the apportionment method still in use today (for a full explanation of this method, see below).

In light of the lengthy debate on apportionment, this report has four major purposes:

1. summarize the constitutional and statutory requirements governing apportionment;
2. explain how the current apportionment formula works in theory and in practice;
3. summarize challenges to it on grounds of inequity; and
4. explain the reasoning underlying the choice of the equal proportions method over its chief alternative, the method of major fractions.

Constitutional and Statutory Requirements

The process of apportioning seats in the House is constrained both constitutionally and statutorily. As noted previously, the Constitution defines both the maximum and minimum size of the House. There can be no fewer than one Representative per state, and no more than one for every 30,000 persons.[6]

The Apportionment Act of 1941, in addition to specifying the apportionment method, sets the House size at 435, requires an apportionment every 10 years, and mandates administrative procedures for apportionment. The President is required to transmit to Congress "a statement

(...continued)

method, which was used following the census of 1910. This method, too, had its critics; and in 1921 Harvard mathematician E.V. Huntington proposed the "equal proportions" method and developed formulas and computational tables for all of the other known, mathematically valid apportionment methods. A committee of the National Academy of Sciences conducted an analysis of each of those methods—smallest divisors, harmonic mean, equal proportions, major fractions, and greatest divisors—and recommended that Congress adopt Huntington's equal proportions method. For a review of this history, see U.S. Congress, House, Committee on Post Office and Civil Service, Subcommittee on Census and Statistics, *The Decennial Population Census and Congressional Apportionment*, 91st Congress, 2nd session. H. Report 91-1314 (Washington: GPO, 1970), Appendix B, pp. 15-18. Also, see Michel L. Balinski and H. Peyton Young, *Fair Representation*, 2nd edition, (Brookings Institution Press, Washington, 2001).

[5] Article I, Section 2 defines both the maximum and minimum size of the House, but the actual House size is set by law. There can be no fewer than one Representative per state, and no more than one for every 30,000 persons. Thus, the House after 2010 could be as small as 50 and as large as 10,306 Representatives.

[6] The actual language in of Article 1, section 2 pertaining to this minimum size reads as follows: "The number of Representatives shall not exceed one for every thirty Thousand, but each State shall have at least one Representative." This clause is sometime misread to be a requirement that districts can be no larger than 30,000 persons, rather than as it should be read, as a minimum-size population requirement.

showing the whole number of persons in each state" and the resulting seat allocation within one week after the opening of the first regular session of Congress following the census.[7]

The Census Bureau has been assigned the responsibility of computing the apportionment. As a matter of practice, the Director of the Bureau reports the results of the apportionment at the end of December of the census year. Once received by Congress, the Clerk of the House of Representatives is charged with the duty of sending to the governor of each state a "certificate of the number of Representatives to which such state is entitled" within 15 days of receiving notice from the President.[8]

The Apportionment Formula

The Formula in Theory

An intuitive way to apportion the House is through simple rounding (a method never adopted by Congress). First, the U.S. apportionment population[9] is divided by the total number of seats in the House (e.g., 309,183,463 divided by 435, in 2010) to identify the "ideal" sized congressional district (708,377 in 2010). Then, each state's population is divided by the "ideal" district population. In most cases this will result in a whole number and a fractional remainder, as noted earlier. Each state will definitely receive seats equal to the whole number, and the fractional remainders will either be rounded up or down (at the .5 "rounding point").

There are two fundamental problems with using simple rounding for apportionment, given a House of fixed size. First, it is possible that some state populations might be so small that they would be "entitled" to less than half a seat. Yet, the Constitution requires that every state must have at least one seat in the House. Thus, a method that relies entirely on rounding will not comply with the Constitution if there are states with very small populations. Second, even a method that assigns each state its constitutional minimum of one seat, and otherwise relies on rounding at the .5 rounding point, might require a "floating" House size because rounding at .5 could result in either fewer or more than 435 seats. Thus, this intuitive way to apportion fails because, by definition, it does not take into account the constitutional requirement that every state have at least one seat in the House and the statutory requirement that the House size be fixed at 435.

The current apportionment method (the method of equal proportions established by the 1941 act) satisfies the constitutional and statutory requirements. Although an equal proportions apportionment is not normally computed in the theoretical way described below, the method can be understood as a modification of the rounding scheme described above.

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7 55 Stat. 761. (1941) Sec. 22 (a). [Codified in 2 U.S.C. 2(a).] In other words, after the 2010 Census, this report is due in January 2010. Interestingly, while the Constitution requires a census every ten years, it does not require that an apportionment of seats to the House of Representatives must occur. This became a statutory requirement with the passage of the Apportionment Act of 1941.

8 Ibid., Sec. 22 (b).

9 The apportionment population is the resident population of the 50 states. It excludes the population of the District of Columbia and U.S. territories and possessions, but since 1970, excepting 1980, it has included the overseas federal and military employees and their families.

First, the "ideal" sized district is found (by dividing the apportionment population by 435) to serve as a "trial" divisor.

Then each state's apportionment population is divided by the "ideal" district size to determine its number of seats. Rather than rounding up any remainder of .5 or more, and down for less than .5, however, equal proportions rounds at the geometric mean of any two successive numbers. A geometric mean of two numbers is the square root of the product of the two numbers.[10] If using the "ideal" sized district population as a divisor does not yield 435 seats, the divisor is adjusted upward or downward until rounding at the geometric mean will result in 435 seats.

For example, for the 2010 apportionment, the "ideal" size district of 708,377 had to be adjusted upward to between 709,063 and 710,231[11] to produce a 435-member House. Because the divisor is adjusted so that the total number of seats will equal 435, the problem of the "floating" House size is solved. The constitutional requirement of at least one seat for each state is met by assigning each state one seat automatically regardless of its population size.

The Formula in Practice: Deriving the Apportionment from a Table of "Priority Values"

Although the process of determining an apportionment through a series of trials using divisions near the "ideal" sized district as described above works, it is inefficient because it requires a series of calculations using different divisors until the 435 total is reached. Accordingly, the Census Bureau determines apportionment by computing a "priority" list of state claims to each seat in the House.

During the early 20th century, Walter F. Willcox, a Cornell University mathematician, determined that if the rounding points used in an apportionment method are divided into each state's population (the mathematical equivalent of multiplying the population by the reciprocal of the rounding point), the resulting numbers can be ranked in a priority list for assigning seats in the House.[12]

Such a priority list does not assume a fixed House size because it ranks each of the states' claims to seats in the House so that any size House can be chosen easily without the necessity of extensive re-computations.[13]

[10] The geometric mean of 1 and 2 is the square root of 2, which is 1.4142. The geometric mean of 2 and 3 is the square root of 6, which is 2.4495. Geometric means are computed for determining the rounding points for the size of any state's delegation size. Equal proportions rounds at the geometric mean (which varies) rather than the arithmetic mean (which is always halfway between any pair of numbers). Thus, a state which would be entitled to 10.4871 seats before rounding will be rounded down to 10 because the geometric mean of 10 and 11 is 10.4881. The rationale for choosing the geometric mean rather than the arithmetic mean as the rounding point is discussed below in the section analyzing the equal proportions and major fractions formulas.

[11] Any number in this range divided into each state's population and rounded at the geometric mean will produce a 435-seat House, with the provision that each state receives at least one seat.

[12] U.S. Congress, House Committee on Post Office and Civil Service, Subcommittee on the Census and Statistics, *The Decennial Population Census and Congressional Apportionment*, 91st Congress, 2nd session, H. Report 91-1814, (Washington: GPO, 1970), p. 16.

[13] The 435 limit on the size of the House is a statutory requirement. The House size was first fixed at 435 by the Apportionment Act of 1911 (37 Stat. 13). The Apportionment Act of 1929 (46 Stat. 26), as amended by the Apportionment Act of 1941 (54 Stat. 162), provided for "automatic reapportionment" rather than requiring the (continued...)

The traditional method of constructing a priority list to apportion seats by the equal proportions method involves first computing the reciprocals[14] of the geometric means (the "rounding points") between every pair of consecutive whole numbers (representing the seats to be apportioned). It is then possible to multiply by decimals rather than divide by fractions (the former being a considerably easier task). For example, the reciprocal of the geometric mean between 1 and 2 (1.41452) is 1/1.414452 or .70710678, which becomes the "multiplier" for the priorities for rounding to the second seat for each state. These reciprocals for all pairs (1 to 2, 2 to 3, 3 to 4, etc.) are computed for each "rounding point." They are then used as multipliers to construct the "priority list." **Table 1**, below, provides a list of multipliers used to calculate the "priority values" for each state in an equal proportions apportionment, allowing for the allocation of up to 60 seats to each state.

In order to construct the "priority list," each state's apportionment population is multiplied by each of the multipliers. The resulting products are ranked in order to show each state's claim to seats in the House. For example, (see **Table 2**, below) assume that there are three states in the Union (California, New York, and Florida) and that the House size is set at 30 Representatives. The first seat for each state is assigned by the Constitution; so the remaining 27 seats must be apportioned using the equal proportions formula. The 2010 apportionment populations for these states were 37,341,989 for California, 19,421,055 for New York, and 18,900,773 for Florida.

Once the priority values are computed, they are ranked with the highest value first. The resulting ranking is numbered and seats are assigned until the total is reached. By using the priority rankings instead of the rounding procedures described earlier in this paper under "The Formula in Theory," it is possible to see how an increase or decrease in the House size will affect the allocation of seats without the necessity of additional calculations.

Table 1. Multipliers for Determining Priority Values for Apportioning the House by the Equal Proportions Method

Seat Assignment	Multiplier[a]	Seat Assignment	Multiplier[a]	Seat Assignment	Multiplier[a]
1	Constitution	21	0.04879500	41	0.02469324
2	0.70710678	22	0.04652421	42	0.02409813
3	0.40824829	23	0.04445542	43	0.02353104
4	0.28867513	24	0.04256283	44	0.02299002
5	0.22360680	25	0.04082483	45	0.02247333
6	0.18257419	26	0.03922323	46	0.02197935
7	0.15430335	27	0.03774257	47	0.02150662

(...continued)

Congress to pass a new apportionment law each decade. This requirement to "automatically reapportion" every 10 years was needed because the Constitution, ironically, while requiring a census every 10 years makes no such requirement for apportionments. Thus, the fact that no apportionment was carried out after the 1920 census in no way violated the Constitution or any statutory requirement at the time. By authority of section 9 of PL 85-508 (72 Stat. 345) and section 8 of PL 86-3 (73 Stat. 8), which admitted Alaska and Hawaii to statehood, the House size was temporarily increased to 437 until the reapportionment resulting from the 1960 Census when it returned to 435.

[14] A reciprocal of a number is that number divided into one.

Seat Assignment	Multiplier[a]	Seat Assignment	Multiplier[a]	Seat Assignment	Multiplier[a]
8	0.13363062	28	0.03636965	48	0.02105380
9	0.11785113	29	0.03509312	49	0.02061965
10	0.10540926	30	0.03390318	50	0.02020305
11	0.09534626	31	0.03279129	51	0.01980295
12	0.08703883	32	0.03175003	52	0.01941839
13	0.08006408	33	0.03077287	53	0.01904848
14	0.07412493	34	0.02985407	54	0.01869241
15	0.06900656	35	0.02898855	55	0.01834940
16	0.06454972	36	0.02817181	56	0.01801875
17	0.06063391	37	0.02739983	57	0.01769981
18	0.05716620	38	0.02666904	58	0.01739196
19	0.05407381	39	0.02597622	59	0.01709464
20	0.05129892	40	0.02531848	60	0.01680732

a. Table by CRS, calculated by determining the reciprocal of the geometric mean of successive numbers, 1/√n (n-1), where "n" is the number of seats to be allocated to the state.

More specifically, for this example in **Table 2**, the computed priority values (column six) for each of the three states are ordered from largest to smallest. By constitutional provision, seats one to three are given to each state. The next determination is the fourth seat in the hypothesized chamber. California's claim to a second seat, based on its priority value, is 26,404,773.64 (0.70710681 x 37,341,989), while New York's claim to a second seat is 13,732,759.69 (0.70710681 x 19,421,055), and Florida's claim to a second seat is 13,364,864.76 (0.70710681 x 18,900,773). Based on the priority values, California has the highest claim for its second seat and is allocated the fourth seat in the hypothesized chamber.

Table 2. Priority Rankings for Assigning Thirty Seats in a Hypothetical Three-State House Delegation

House Size	State	Seat Assignment	Multiplier (M)	Population (P)	Priority Values (PxM)
4	CA	2	0.707106781	37,341,989	26,404,773.64
5	CA	3	0.40824829	37,341,989	15,244,803.15
6	NY	2	0.707106781	19,421,055	13,732,759.69
7	FL	2	0.707106781	18,900,773	13,364,864.76
8	CA	4	0.288675135	37,341,989	10,779,703.70
9	CA	5	0.223606798	37,341,989	8,349,922.58
10	NY	3	0.40824829	19,421,055	7,928,612.50
11	FL	3	0.40824829	18,900,773	7,716,208.27
12	CA	6	0.182574186	37,341,989	6,817,683.24
13	CA	7	0.15430335	37,341,989	5,761,994.00

House Size	State	Seat Assignment	Multiplier (M)	Population (P)	Priority Values (PxM)
14	NY	4	0.288675135	19,421,055	5,606,375.67
15	FL	4	0.288675135	18,900,773	5,456,183.19
16	CA	8	0.133630621	37,341,989	4,990,033.18
17	CA	9	0.11785113	37,341,989	4,400,795.61
18	NY	5	0.223606798	19,421,055	4,342,679.92
19	FL	5	0.223606798	18,900,773	4,226,341.33
20	CA	10	0.105409255	37,341,989	3,936,191.25
21	CA	11	0.095346259	37,341,989	3,560,418.95
22	NY	6	0.18257419	19,421,055	3,545,783.30
23	FL	6	0.182574186	18,900,773	3,450,793.24
24	NY	7	0.15430335	19,421,055	2,996,733.85
25	FL	7	0.15430335	18,900,773	2,916,452.59
26	NY	8	0.133630621	19,421,055	2,595,247.64
27	FL	8	0.133630621	18,900,773	2,525,722.03
28	NY	9	0.11785113	19,421,055	2,288,793.28
29	FL	9	0.11785113	18,900,773	2,227,477.46
30	NY	10	0.10540926	19,421,055	2,047,158.95

Notes: The Constitution requires that each state have at least one seat. Consequently, the first three seats assigned are not included in the table. Table prepared by CRS.

Next, the fifth seat's allocation is determined. California's claim to a third seat, based on the computed priority value, is 15,244,803.17 (0.40824829 x 37,341,989), while, as above, New York's claim to its second seat is 13,732,759.69 (0.70710681 x 19,421,055) and Florida's claim to its second seat is 13,364,864.76 (0.70710681 x 18,900,773). Again, California has a higher priority value, and is allocated its third seat, the fifth seat in the hypothesized chamber.

Next the sixth seat's allocation is determined in the same fashion. California's claim to a fourth seat, based on the computed priority value, is 10,779,703.70 (0.288675135 x 37,341,989), while, as above, New York's claim to its second seat is 13,732,759.69 (0.70710681 x 19,421,055) and Florida's claim to its second seat is 13,364,864.76 (0.70710681 x 18,900,773). As New York's priority value is higher than either California's or Florida's, it is allocated its second seat, the sixth seat in the hypothesized chamber.

Next, the seventh seat's allocation is determined. Again, California's claim to a fourth seat, based on the computed priority value, is 10,779,703.70 (0.288675135 x 37,341,989), while, having received its second seat, New York's claim to its third seat is 7,928,612.50(0.40824829 x 19,421,055) and Florida's claim to its second seat is 13,364,864.76 (0.70710681 x 18,900,773). As Florida's priority value is higher than either of the other states, Florida is, finally, allocated its second seat, the seventh seat in the hypothesized chamber. This same process is continued until all 30 seats in this hypothesized House are allocated to the three states.

From **Table 2**, then, we see that if the United States were made up of three states and the House size were to be set at 30 members, California would have 11 seats, New York would have 10, and

Florida would have 9. Any other size House can be determined by picking points in the priority list and observing what the maximum size state delegation would be for each state.

A priority listing for all 50 states based on the 2010 Census is in the **Appendix** to this report. It shows priority rankings for the assignment of seats in a House ranging in size from 51 to 500 seats.

Challenges to the Current Formula

The equal proportions rule of rounding at the geometric mean results in differing rounding points, depending on which numbers are chosen. For example, the geometric mean between 1 and 2 is 1.4142, and the geometric mean between 49 and 50 is 49.49747. **Table 3**, below, shows the "rounding points" for assignments to the House using the equal proportions method for a state delegation size of up to 60. The rounding points are listed between each delegation size because they are the thresholds that must be passed in order for a state to be entitled to another seat. The table illustrates that, as the delegation size of a state increases, larger fractions are necessary to entitle the state to additional seats.

The fact that higher rounding points are necessary for states to obtain additional seats has led to charges that the equal proportions formula favors small states at the expense of large states. In *Fair Representation*, a 1982 study of congressional apportionment, authors M.L. Balinski and H.P. Young concluded that if "the intent is to eliminate any systematic advantage to either the small or the large, then only one method, first proposed by Daniel Webster in 1832, will do."[15] This method, called the Webster method in *Fair Representation*, is also referred to as the major fractions method (major fractions uses the concept of the adjustable divisor as does equal proportions, but rounds at the arithmetic mean [.5] rather than the geometric mean.) Balinski and Young's conclusion in favor of major fractions, however, contradicts a report of the National Academy of Sciences (NAS) prepared at the request of House Speaker Nicholas Longworth in 1929. The NAS concluded that "the method of equal proportions is preferred by the committee because it satisfies ... [certain tests], and because it occupies mathematically a neutral position with respect to emphasis on larger and smaller states."[16]

[15] *Fair Representation*, pp. 3-4. (An earlier major work in this field was written by Laurence F. Schmeckebier, *Congressional Apportionment* (Washington: The Brookings Institution, 1941). Daniel Webster proposed this method to overcome the large-state bias in Jefferson's discarded fractions method. Webster's method was used three times, in the reapportionments following the 1840, 1910, and 1930 Censuses.

[16] "Report of the National Academy of Sciences Committee on Apportionment" in *The Decennial Population Census and Congressional Apportionment*, Appendix C, p. 21.

Table 3. Rounding Points for Assigning Seats Using the Equal Proportions Method of Apportionment

Size of Delegation	Round Up At	Size of Delegation	Round Up At	Size of Delegation	Round Up At	Size of Delegation	Round Up At
1	1.41421	16	16.49242	31	31.49603	46	46.49731
2	2.44949	17	17.49286	32	32.49615	47	47.49737
3	3.46410	18	18.49324	33	33.49627	48	48.49742
4	4.47214	19	19.49359	34	34.49638	49	49.49747
5	5.47723	20	20.49390	35	35.49648	50	50.49752
6	6.48074	21	21.49419	36	36.49658	51	51.49757
7	7.48331	22	22.49444	37	37.49667	52	52.49762
8	8.48528	23	23.49468	38	38.49675	53	53.49766
9	9.48683	24	24.49490	39	39.49684	54	54.49771
10	10.48809	25	25.49510	40	40.49691	55	55.49775
11	11.48913	26	26.49528	41	41.49699	56	56.49779
12	12.49000	27	27.49545	42	42.49706	57	57.49783
13	13.49074	28	28.49561	43	43.49713	58	58.49786
14	14.49138	29	29.49576	44	44.49719	59	59.49790
15	15.49193	30	30.49590	45	45.49725	60	60.49793

Notes: Any number between 709,063 and 710,231 divided into each state's 2010 population will produce a House size of 435 if rounded at these points, which are the geometric means of each pair of successive numbers. Table prepared by CRS.

A bill that would have changed the apportionment method to another formula called the "Hamilton-Vinton" method was introduced in 1981.[17] The fundamental principle of the Hamilton-Vinton method is that it ranks fractional remainders. In order to reapportion the House using Hamilton-Vinton, each state's population would be divided by the "ideal" sized congressional district (309,183,463 divided by 435, in 2010, for an "ideal" district population of 708,377). Any state with fewer residents than the "ideal" sized district would receive a seat because the Constitution requires each state to have at least one House seat. The remaining states in most cases have a claim to a whole number and a fraction of a Representative. Each such state receives the whole number of seats it is entitled to. The fractional remainders are rank-ordered from highest to lowest until 435 seats are assigned. For the purpose of this analysis, we will concentrate on the differences between the equal proportions and major fractions methods because the Hamilton-Vinton method is subject to several mathematical anomalies.[18]

[17] H.R. 1990, 97th Congress was introduced by Representative Floyd Fithian and was cosponsored by 10 other members of the Indiana delegation. Changing to the Hamilton-Vinton method would have kept Indiana from losing a seat. Hearings were held, but no further action was taken on the measure. U.S. Congress, House Committee on Post Office and Civil Service, Subcommittee on Census and Population, *Census Activities and the Decennial Census*, hearing, 97th Cong., 1st sess., June 11, 1981, (Washington: GPO, 1981). Since that time no other bill has been introduced to change the formula.

[18] The Hamilton-Vinton method (used after the 1850-1900 censuses) is subject to the "Alabama paradox" and various other population paradoxes. The Alabama paradox was so named in 1880 when it was discovered that Alabama would have lost a seat in the House if the size of the House had been increased from 299 to 300. Another paradox, known as (continued...)

Equal Proportions or Major Fractions: An Analysis

Prior to the passage of the Apportionment Act of 1941 (2 U.S.C. 2(a)), the two contending methods considered by Congress were the equal proportions method (Hill-Huntington) and the method of major fractions (Webster). Each of the major competing methods—equal proportions (currently used) and major fractions—can be supported mathematically. Choosing between them is a policy decision, rather than a matter of conclusively proving that one approach is mathematically better than the other. A major fractions apportionment results in a House in which each citizen's share of his or her Representative is as equal as possible on an absolute basis. In the equal proportions apportionment now used, each citizen's share of his or her Representative is as equal as possible on a proportional basis. From a policy standpoint, a case can be made for either method of computing the apportionment of seats by arguing that one measure of fairness is preferable to the other.

The Case for Major Fractions

As noted above, a major fractions apportionment results in a House in which each person's share of his or her Representative is as equal as possible on an absolute basis. As an example, in 2010, the state of North Carolina would have been assigned 14 seats under the major fractions method, and the state of Rhode Island would have received 1 seat. Under this allocation, there would have been 1.4636 Representatives per million for North Carolina residents and 0.9476 Representatives per million for Rhode Island residents. The absolute value[19] of the difference between these two numbers is 0.5160.

Under the equal proportion method of assigning seats in 2010, North Carolina actually received 13 seats and Rhode Island 2. With 13 seats, North Carolina received 1.3590 Representatives for each million persons, and Rhode Island, with 2 seats, received 1.8953 Representatives per million persons. The absolute value of the difference between these two numbers is 0.5363. As this example shows, using the major fractions method produces a difference in the share of a Representative between the states that is smaller, in an absolute sense, than is the difference produced by the equal proportions method.

In addition, it can be argued that the major fractions minimization of absolute size differences among districts more closely reflects the "one person, one vote" principle established by the Supreme Court in its series of redistricting cases (*Baker* v. *Carr*, 369 U.S. 186 (1964) through *Karche*r v. *Daggett*, 462 U.S.725 (1983).[20]

(...continued)

the population paradox, has been variously described, but in its modern form (with a fixed size House) it works in this way: two states may gain population from one census to the next. State "A," which is gaining population at a rate faster than state "B," may lose a seat to state "B." There are other paradoxes of this type. Hamilton-Vinton is subject to them, whereas equal proportions and major fractions are not.

[19] The absolute value of a number is its magnitude without regard to its sign. For example, the absolute value of -8 is 8. The absolute value of the expression (4-2) is 2. The absolute value of the expression (2-4) is also 2.

[20] Major fractions best conforms to the spirit of these decisions if the population discrepancy is measured on an absolute basis, as the courts have done in the recent past. The Supreme Court has never applied its "one person, one vote" rule to apportioning seats of the House of Representatives among states (as opposed to redistricting within states). Thus, no established rule of law is being violated. Arguably, no apportionment method can meet the "one person, one vote" standard required by the Supreme Court for districts within states unless the size of the House is increased significantly (thereby making districts less populous).

Although the "one person, one vote" rules have not been applied by the courts to apportioning seats *among* states, the method of major fractions can reduce the range between the smallest and largest district sizes more than the method of equal proportions—one of the measures that the courts have applied to within-state redistricting cases. Although this range would have not changed in 2000 or 1990, if the method of major fractions had been used in 1980, the smallest average district size in the country would have been 399,592 (one of Nevada's two districts). With the method of equal proportions it was 393,345 (one of Montana's two districts). In both cases the largest district was 690,178 (South Dakota's single seat).[21] Thus, in 1980, shifting from equal proportions to major fractions as a method of apportionment would have improved the 296,833 difference between the largest and smallest districts by 6,247 persons. It can be argued, because the equal proportions rounding points ascend as the number of seats increases, rather than staying at .5, that small states may be favored in seat assignments at the expense of large states. It is possible to demonstrate this by using simulation techniques.

The House has been reapportioned only 21 times since 1790. The equal proportions method has been used in five apportionments and the major fractions method in three. Eight apportionments do not provide sufficient historical information to enable policy makers to generalize about the impact of using differing methods. Computers, however, can enable reality to be simulated by using random numbers to test many different hypothetical situations. These techniques (such as the "Monte Carlo" simulation method) are a useful way to observe the behavior of systems when experience does not provide sufficient information to generalize about them.

Apportioning the House can be viewed as a system with four main variables: (1) the size of the House, (2) the population of the states,[22] (3) the number of states,[23] and (4) the method of apportionment.[24] A 1984 exercise prepared for the Congressional Research Service (CRS) involving 1,000 simulated apportionments examined the results when two of these variables were changed—the method and the state populations. In order to further approximate reality, the state populations used in the apportionments were based on the Census Bureau's 1990 population projections available at that time. Each method was tested by computing 1,000 apportionments and tabulating the results by state. There was no discernible pattern by size of state in the results of the major fractions apportionment. The equal proportions exercise, however, showed that the smaller states were persistently advantaged.[25]

[21] Nevada had two seats with a population of 799,184. Montana was assigned two seats with a population of 786,690. South Dakota's single seat was required by the Constitution (with a population of 690,178). The vast majority of the districts based on the 1980 census (323 of them) fell within the range of 501,000 to 530,000).

[22] For varying the definition of the population, see CRS Report RS22124, *Potential House Apportionment Following the 2010 Census Based on Census Bureau Population Projections*, by (name redacted), and, CRS Report R41636, *Apportioning Seats in the U.S. House of Representatives Using the 2010 Estimated Citizen Population: 2012* , by (name redacted).

[23] For information on the impact of adding states, see CRS Report RS22579, *District of Columbia Representation: Effect on House Apportionment*, by (name redacted), and CRS Report R41113*Puerto Rican Statehood: Effects on House Apportionment*, by (name redacted).

[24] See CRS Report R41382, *The House of Representatives Apportionment Formula: An Analysis of Proposals for Change and Their Impact on States*, by (name redacted).

[25] H.P. Young and M.L. Balinski, *Evaluation of Apportionment Methods*, Prepared under a contract for the Congressional Research Service of the Library of Congress. (Contract No. CRS84-15), Sept. 30, 1984. This document is available to Members of Congress and congressional staff from the author of this report. Comparing equal proportions and major fractions using the state populations from the 19 actual censuses taken since 1790, reveals that the small states would have been favored 3.4% of the time if equal proportions had been used for all the apportionments. Major fractions would have also favored small states, in these cases, but only .06% of the time. See (continued...)

Another way of evaluating the impact of a possible change in apportionment methods is to determine the odds of an outcome being different than the one produced by the current method—equal proportions. If equal proportions favors small states at the expense of large states, would switching to major fractions, a method that appears not to be influenced by the size of a state, increase the odds of the large states gaining additional representation? Based on the simulation model prepared for CRS, this appears to be true. The odds of any of the 23 largest states gaining an additional seat in any given apportionment range from a maximum of 13.4% of the time (California) to a low of .2% of the time (Alabama). The odds of any of the 21 multi-districted smaller states losing a seat range from a high of 17% (Montana, which then had two seats) to a low of 0% (Colorado), if major fractions were used instead of equal proportions.

In the aggregate, switching from equal proportions to major fractions "could be expected to shift zero seats about 37% of the time, to shift 1 seat about 49% of the time, 2 seats 12% of the time, and 3 seats 2% of the time (and 4 or more seats almost never), and, these shifts will always be from smaller states to larger states."[26]

In summary, then, the method of major fractions minimizes the absolute differences in the share of a representative between congressional districts across states. In addition, it appears that the method of major fractions does not favor large or small states over the long term.

The Case for Equal Proportions, the Current Method

Support for the equal proportions formula primarily rests on the belief that minimizing the proportional differences among districts is more important than minimizing the absolute differences. Laurence Schmeckebier, a proponent of the equal proportions method, wrote in *Congressional Apportionment* in 1941, that

> Mathematicians generally agree that the significant feature of a difference is its relation to the smaller number and not its absolute quantity. Thus the increase of 50 horsepower in the output of two engines would not be of any significance if one engine already yielded 10,000 horsepower, but it would double the efficiency of a plant of only 50 horsepower. It has been shown ... that the relative difference between two apportionments is always least if the method of equal proportions is used. Moreover, the method of equal proportions is the only one that uses relative differences, the methods of harmonic mean and major fraction being based on absolute differences. In addition, the method of equal proportions gives the smallest relative difference for both average population per district and individual share in a representative. No other method takes account of both these factors. Therefore the method of equal proportions gives the most equitable distribution of Representatives among the states.[27]

An example using the North Carolina and Rhode Island 2010 populations illustrates the argument for proportional differences. The first step in making comparisons between the states is to standardize the figures in some fashion. One way of doing this is to express each state's representation in the House as a number of Representatives per million residents.[28] The equal

(...continued)

Fair Representation, p. 78.

[26] Young and Balinski, *Evaluation of Apportionment Methods*, p. 13.

[27] Schmeckebier, *Congressional Apportionment*, p. 60.

[28] Representatives per million is computed by dividing the number of Representatives assigned to the state by the state's population (which gives the number of Representatives per person) and then multiplying the resulting dividend (continued...)

proportions formula assigned 13 seats to North Carolina and 2 to Rhode Island in 2010. If the major fractions method had been used, then 14 seats would have been assigned to North Carolina, and 1 would have been given to Rhode Island. Under this scenario, North Carolina has 1.4636 Representatives per million persons and Rhode Island has 0.9476 Representatives per million. The absolute difference between these numbers is 0.5160 and the proportional difference between the two states' Representatives per million is 54.45%. When 13 seats are assigned to North Carolina and 2 are assigned to Rhode Island (using equal proportions), North Carolina has 1.3590 Representatives per million and Rhode Island has 1.8953 Representatives per million. The absolute difference between these numbers is .0.5363 and the proportional difference is 39.46%.

Major fractions minimizes absolute differences, so in 2010, if this method had been required by law, North Carolina and Rhode Island would have received 14 and 1 seats respectively because the absolute difference (0.5160 Representatives per million) is smaller at 14 and 1 than it would be at 13 and 2 (0.5363). Equal proportions minimizes differences on a proportional basis, so it assigned 13 seats to North Carolina and 2 to Rhode Island because the proportional difference between a 13 and 2 allocation (39.46%) is smaller than would occur with a 14 and 1 assignment (54.45%).

The proportional difference versus absolute difference argument could also be cast in terms of the goal of "one person, one vote," as noted above. The courts' use of absolute difference measures in state redistricting cases may not necessarily be appropriate when applied to the apportionment of seats among states. The courts already recognize that the rules governing redistricting in state legislatures differ from those in congressional districting. If the "one person, one vote" standard were ever to be applied to apportionment of seats among states—a process that differs significantly from redistricting within states—proportional difference measures might be accepted as most appropriate.[29]

If the choice between methods were judged to be a tossup with regard to which mathematical process is fairest, are there other representational goals that equal proportions meets that are, perhaps, appropriate to consider? One such goal might be the desirability of avoiding large districts, if possible. After the apportionment of 2010, five of the seven states with only one Representative (Alaska, Delaware, Montana, North Dakota, South Dakota, Vermont, and Wyoming) have relatively large land areas.[30] The five Representatives of the larger states will serve 1.22% of the U.S. population, but also will represent 27% of the U.S. total land area.

(...continued)

by 1,000,000.

[29] Montana argued in Federal court in 1991 and 1992 that the equal proportions formula violated the Constitution because it "does not achieve the greatest possible equality in number of individuals per Representative" *Department of Commerce* v. *Montana* 503 U.S. 442 (1992). Writing for a unanimous court, Justice Stevens however, noted that absolute and relative differences in district sizes are identical when considering deviations in district populations *within* states, but they are different when comparing district populations *among* states. Justice Stevens noted, however, "although common sense" supports a test requiring a "good faith effort to achieve precise mathematical equality *within* each State ... the constraints imposed by Article I, §2, itself make that goal illusory for the nation as a whole." He concluded "that Congress had ample power to enact the statutory procedure in 1941 and to apply the method of equal proportions after the 1990 census."

[30] The total area of the U.S. is 3,795,951 square miles. The area and (rank) among all states in area for the seven single district states in this scenario are as follows: Alaska−664,988 (1), Delaware−2,489 (49), Montana−147,039 (4), North Dakota−70,698 (19), South Dakota−77,116 (17), Vermont−9,616 (45), Wyoming−97,812 (10), Source: U.S. Department of Commerce, U.S. Census Bureau, *Statistical Abstract of the United States, 2010*, (Washington: GPO, 2010), Table 346: Land and Water Area of the States and Other Entities: 2008, p. 215.

Arguably, an apportionment method that would potentially reduce the number of very large (with respect to area size) districts would serve to increase representation in those states. Very large districts limit the opportunities of constituents to see their Representatives, may require more district based offices, and may require toll calls for telephone contact with the Representatives' district offices. Switching from equal proportions to major fractions may increase the number of states represented by only one member of Congress, although it is impossible to predict this outcome with any certainty using Census Bureau projections for 2025.[31]

The table that follows contains the priority listing used in apportionment following the 2010 Census. **Table A-1** shows where each state ranked in the priority of seat assignments. The priority values listed beyond seat number 435 show which states would have gained additional representations if the House size had been increased.

[31] U.S. Census Bureau, Projections of the Total Population of States: 1995-2025, Series A, http://www.census.gov/population/projections/stpjpop.txt. If the major fractions method had been used to apportion the House in 2010, the number of states with a single Representative would have increased by one, from seven to eight, with the addition of Rhode Island.

Appendix. 2010 Priority List for Apportioning Seats to the House of Representatives

Table A-1. 2010 Priority List for Apportioning Seats to the House of Representatives

Seat Sequence	State	Seat Number	Priority Value
51	California	2	26,404,773.64
52	Texas	2	17,867,469.72
53	California	3	15,244,803.17
54	New York	2	13,732,759.69
55	Florida	2	13,364,864.76
56	California	4	10,779,703.70
57	Texas	3	10,315,788.45
58	Illinois	2	9,096,490.33
59	Pennsylvania	2	9,004,937.68
60	California	5	8,349,922.58
61	Ohio	2	8,180,161.26
62	New York	3	7,928,612.50
63	Florida	3	7,716,208.27
64	Texas	4	7,294,363.97
65	Michigan	2	7,008,577.96
66	Georgia	2	6,878,427.88
67	California	6	6,817,683.24
68	North Carolina	2	6,764,028.61
69	New Jersey	2	6,227,843.68
70	California	7	5,761,994.00
71	Virginia	2	5,683,537.63
72	Texas	5	5,650,190.03
73	New York	4	5,606,375.67
74	Florida	4	5,456,183.19
75	Illinois	3	5,251,861.14
76	Pennsylvania	3	5,199,003.20
77	California	8	4,990,033.18
78	Washington	2	4,775,353.02
79	Ohio	3	4,722,818.31
80	Massachusetts	2	4,638,368.75
81	Texas	6	4,613,360.84
82	Indiana	2	4,597,312.72

Seat Sequence	State	Seat Number	Priority Value
83	Arizona	2	4,534,463.66
84	Tennessee	2	4,508,110.49
85	California	9	4,400,795.61
86	New York	5	4,342,679.92
87	Missouri	2	4,250,756.86
88	Florida	5	4,226,341.33
89	Maryland	2	4,094,098.06
90	Michigan	3	4,046,404.37
91	Wisconsin	2	4,029,257.07
92	Georgia	3	3,971,262.19
93	California	10	3,936,191.25
94	North Carolina	3	3,905,213.74
95	Texas	7	3,899,001.55
96	Minnesota	2	3,758,186.98
97	Illinois	4	3,713,626.63
98	Pennsylvania	4	3,676,250.41
99	New Jersey	3	3,595,647.23
100	Colorado	2	3,567,304.21
101	California	11	3,560,418.95
102	New York	6	3,545,783.30
103	Florida	6	3,450,793.24
104	Alabama	2	3,396,221.14
105	Texas	8	3,376,634.39
106	Ohio	4	3,339,536.85
107	South Carolina	2	3,285,200.43
108	Virginia	3	3,281,391.98
109	California	12	3,250,202.96
110	Louisiana	2	3,220,137.41
111	Kentucky	2	3,076,343.00
112	New York	7	2,996,733.85
113	California	13	2,989,751.88
114	Texas	9	2,977,911.62
115	Florida	7	2,916,452.59
116	Illinois	5	2,876,562.82
117	Michigan	4	2,861,239.97
118	Pennsylvania	5	2,847,611.33
119	Georgia	4	2,808,106.42

Seat Sequence	State	Seat Number	Priority Value
120	California	14	2,767,972.38
121	North Carolina	4	2,761,403.12
122	Washington	3	2,757,051.35
123	Oregon	2	2,721,375.40
124	Massachusetts	3	2,677,963.45
125	Texas	10	2,663,525.12
126	Oklahoma	2	2,662,173.59
127	Indiana	3	2,654,259.74
128	Arizona	3	2,617,973.81
129	Tennessee	3	2,602,758.81
130	New York	8	2,595,247.64
131	Ohio	5	2,586,794.12
132	California	15	2,576,842.05
133	New Jersey	4	2,542,506.54
134	Connecticut	2	2,532,593.45
135	Florida	8	2,525,722.03
136	Missouri	3	2,454,175.62
137	California	16	2,410,415.03
138	Texas	11	2,409,249.13
139	Maryland	3	2,363,728.62
140	Illinois	6	2,348,703.70
141	Wisconsin	3	2,326,292.66
142	Pennsylvania	6	2,325,064.91
143	Virginia	4	2,320,294.52
144	New York	9	2,288,793.28
145	California	17	2,264,190.66
146	Florida	9	2,227,477.46
147	Michigan	5	2,216,306.95
148	Texas	12	2,199,333.49
149	Georgia	5	2,175,149.88
150	Minnesota	3	2,169,790.27
151	Iowa	2	2,159,353.50
152	North Carolina	5	2,138,973.66
153	California	18	2,134,699.43
154	Ohio	6	2,112,108.56
155	Mississippi	2	2,105,933.70
156	Arkansas	2	2,069,156.37

Seat Sequence	State	Seat Number	Priority Value
157	Colorado	3	2,059,584.05
158	New York	10	2,047,158.95
159	Kansas	2	2,025,021.59
160	Texas	13	2,023,092.56
161	California	19	2,019,223.51
162	Florida	10	1,992,316.41
163	Illinois	7	1,985,016.93
164	New Jersey	5	1,969,417.09
165	Pennsylvania	7	1,965,038.50
166	Alabama	3	1,960,809.19
167	Utah	2	1,959,226.72
168	Washington	4	1,949,529.71
169	Nevada	2	1,915,857.74
170	California	20	1,915,603.62
171	South Carolina	3	1,896,711.35
172	Massachusetts	4	1,893,606.11
173	Indiana	4	1,876,845.06
174	Texas	14	1,873,019.76
175	Louisiana	3	1,859,147.20
176	New York	11	1,851,724.94
177	Arizona	4	1,851,187.04
178	Tennessee	4	1,840,428.40
179	California	21	1,822,102.49
180	Michigan	6	1,809,607.05
181	Florida	11	1,802,118.00
182	Virginia	5	1,797,292.41
183	Ohio	7	1,785,057.53
184	Kentucky	3	1,776,127.46
185	Georgia	6	1,776,002.44
186	North Carolina	6	1,746,464.68
187	Texas	15	1,743,686.50
188	California	22	1,737,306.56
189	Missouri	4	1,735,364.22
190	Illinois	8	1,719,075.09
191	Pennsylvania	8	1,701,773.26
192	New York	12	1,690,385.87
193	Maryland	4	1,671,408.53

Seat Sequence	State	Seat Number	Priority Value
194	California	23	1,660,053.90
195	Florida	12	1,645,101.13
196	Wisconsin	4	1,644,937.31
197	Texas	16	1,631,069.37
198	New Jersey	6	1,608,022.32
199	California	24	1,589,380.60
200	Oregon	3	1,571,186.82
201	New York	13	1,554,928.84
202	Ohio	8	1,545,905.17
203	Oklahoma	3	1,537,006.64
204	Minnesota	4	1,534,273.41
205	Texas	17	1,532,122.89
206	Michigan	7	1,529,397.10
207	California	25	1,524,480.32
208	Illinois	9	1,516,081.72
209	Florida	13	1,513,272.94
210	Washington	5	1,510,099.22
211	Georgia	7	1,500,996.02
212	Pennsylvania	9	1,500,822.95
213	North Carolina	7	1,476,032.05
214	Virginia	6	1,467,483.11
215	Massachusetts	5	1,466,780.99
216	California	26	1,464,673.31
217	Connecticut	3	1,462,193.51
218	New Mexico	2	1,461,782.76
219	Colorado	4	1,456,345.85
220	Indiana	5	1,453,797.93
221	Texas	18	1,444,499.31
222	New York	14	1,439,584.37
223	Arizona	5	1,433,923.31
224	Tennessee	5	1,425,589.71
225	California	27	1,409,382.55
226	Florida	14	1,401,018.51
227	Alabama	4	1,386,501.48
228	Texas	19	1,366,359.56
229	Ohio	9	1,363,360.21
230	New Jersey	7	1,359,026.91

Seat Sequence	State	Seat Number	Priority Value
231	California	28	1,358,115.01
232	Illinois	10	1,356,024.72
233	Missouri	5	1,344,207.35
234	Pennsylvania	10	1,342,376.85
235	South Carolina	4	1,341,177.46
236	New York	15	1,340,180.12
237	Michigan	8	1,324,496.74
238	West Virginia	2	1,315,087.80
239	Louisiana	4	1,314,615.59
240	California	29	1,310,446.91
241	Florida	15	1,304,277.25
242	Georgia	8	1,299,900.68
243	Texas	20	1,296,242.49
244	Nebraska	2	1,295,295.88
245	Maryland	5	1,294,667.48
246	North Carolina	8	1,278,281.25
247	Wisconsin	5	1,274,162.96
248	California	30	1,266,011.99
249	Kentucky	4	1,255,911.77
250	New York	16	1,253,623.71
251	Iowa	3	1,246,703.32
252	Virginia	7	1,240,249.59
253	Washington	6	1,232,990.85
254	Texas	21	1,232,972.55
255	Illinois	11	1,226,570.51
256	California	31	1,224,492.06
257	Florida	16	1,220,039.65
258	Ohio	10	1,219,426.44
259	Mississippi	3	1,215,861.39
260	Pennsylvania	11	1,214,225.55
261	Massachusetts	6	1,197,621.66
262	Arkansas	3	1,194,627.99
263	Minnesota	5	1,188,443.07
264	Indiana	6	1,187,021.04
265	California	32	1,185,609.34
266	New York	17	1,177,574.43
267	New Jersey	8	1,176,951.83

Seat Sequence	State	Seat Number	Priority Value
268	Texas	22	1,175,593.20
269	Arizona	6	1,170,793.48
270	Kansas	3	1,169,146.76
271	Michigan	9	1,168,096.33
272	Tennessee	6	1,163,989.12
273	California	33	1,149,120.28
274	Georgia	9	1,146,404.65
275	Florida	17	1,146,027.70
276	Utah	3	1,131,160.07
277	Colorado	5	1,128,080.64
278	North Carolina	9	1,127,338.10
279	Texas	23	1,123,318.20
280	Illinois	12	1,119,700.56
281	California	34	1,114,810.42
282	Idaho	2	1,112,631.81
283	Oregon	4	1,110,996.86
284	New York	18	1,110,227.82
285	Pennsylvania	12	1,108,431.21
286	Nevada	3	1,106,120.98
287	Ohio	11	1,103,012.72
288	Missouri	6	1,097,540.70
289	Oklahoma	4	1,086,827.82
290	California	35	1,082,490.18
291	Florida	18	1,080,485.28
292	Texas	24	1,075,495.29
293	Virginia	8	1,074,087.65
294	Alabama	5	1,073,979.42
295	Maryland	6	1,057,091.57
296	California	36	1,051,991.36
297	New York	19	1,050,170.38
298	Michigan	10	1,044,777.12
299	Washington	7	1,042,067.46
300	Wisconsin	6	1,040,349.70
301	South Carolina	5	1,038,871.59
302	New Jersey	9	1,037,973.95
303	Connecticut	4	1,033,926.94
304	Texas	25	1,031,578.85

Seat Sequence	State	Seat Number	Priority Value
305	Illinois	13	1,029,974.71
306	Georgia	10	1,025,375.49
307	California	37	1,023,164.20
308	Florida	19	1,022,036.75
309	Pennsylvania	13	1,019,608.41
310	Louisiana	5	1,018,296.86
311	Massachusetts	7	1,012,175.04
312	North Carolina	10	1,008,321.85
313	Ohio	12	1,006,908.25
314	Indiana	7	1,003,215.88
315	New York	20	996,279.10
316	California	38	995,874.90
317	Texas	26	991,108.90
318	Arizona	7	989,501.09
319	Tennessee	7	983,750.36
320	Kentucky	5	972,825.08
321	Minnesota	6	970,359.71
322	California	39	970,003.60
323	Florida	20	969,589.20
324	Hawaii	2	966,517.39
325	Texas	27	953,694.98
326	Illinois	14	953,571.29
327	New York	21	947,650.45
328	Virginia	9	947,256.27
329	California	40	945,442.56
330	Michigan	11	945,036.46
331	Pennsylvania	14	943,973.96
332	Maine	2	942,625.67
333	New Hampshire	2	934,402.72
334	New Jersey	10	928,392.12
335	Missouri	7	927,591.19
336	Georgia	11	927,487.03
337	Ohio	13	926,220.87
338	Florida	21	922,263.29
339	California	41	922,094.69
340	Colorado	6	921,073.99
341	Texas	28	919,003.48

Seat Sequence	State	Seat Number	Priority Value
342	North Carolina	11	912,061.43
343	New York	22	903,549.25
344	Washington	8	902,456.89
345	California	42	899,872.28
346	Maryland	7	893,405.44
347	Illinois	15	887,726.56
348	Texas	29	886,747.63
349	Iowa	4	881,552.37
350	Florida	22	879,343.54
351	Wisconsin	7	879,255.98
352	Pennsylvania	15	878,791.93
353	California	43	878,695.85
354	Alabama	6	876,900.53
355	Massachusetts	8	876,569.30
356	Indiana	8	868,810.44
357	New York	23	863,371.20
358	Michigan	12	862,696.31
359	Oregon	5	860,574.46
360	Mississippi	4	859,743.83
361	California	44	858,493.24
362	Ohio	14	857,513.90
363	Arizona	8	856,933.08
364	Texas	30	856,679.60
365	Tennessee	8	851,952.80
366	South Carolina	6	848,235.10
367	Virginia	10	847,251.77
368	Georgia	12	846,675.94
369	Arkansas	4	844,729.55
370	New Mexico	3	843,960.67
371	Oklahoma	5	841,853.21
372	Florida	23	840,241.85
373	New Jersey	11	839,762.27
374	California	45	839,198.79
375	North Carolina	12	832,594.37
376	Louisiana	6	831,435.90
377	Illinois	16	830,392.16
378	Texas	31	828,584.07

Seat Sequence	State	Seat Number	Priority Value
379	Kansas	4	826,711.60
380	New York	24	826,615.00
381	Pennsylvania	16	822,034.58
382	California	46	820,752.61
383	Minnesota	7	820,103.63
384	Florida	24	804,470.32
385	Missouri	8	803,317.54
386	California	47	803,099.96
387	Texas	32	802,273.07
388	Connecticut	5	800,876.37
389	Utah	4	799,850.96
390	Ohio	15	798,302.00
391	Washington	9	795,892.17
392	Kentucky	6	794,308.35
393	Michigan	13	793,565.19
394	New York	25	792,861.25
395	California	48	786,190.69
396	Nevada	4	782,145.65
397	Illinois	17	780,017.61
398	Georgia	13	778,828.59
399	Colorado	7	778,449.60
400	Texas	33	777,581.81
401	Maryland	8	773,711.81
402	Massachusetts	9	773,061.46
403	Pennsylvania	17	772,167.04
404	Florida	25	771,620.83
405	California	49	769,978.84
406	New Jersey	12	766,594.56
407	Virginia	11	766,368.06
408	Indiana	9	766,218.79
409	North Carolina	13	765,875.43
410	New York	26	761,756.45
411	Wisconsin	8	761,458.01
412	West Virginia	3	759,266.29
413	Arizona	9	755,743.94
414	California	50	754,422.10
415	Texas	34	754,365.16

Seat Sequence	State	Seat Number	Priority Value
416	Tennessee	9	751,351.75
417	Nebraska	3	747,839.42
418	Ohio	16	746,743.14
419	Rhode Island	2	746,172.31
420	Florida	26	741,349.31
421	Alabama	7	741,116.21
422	California	51	739,481.57
423	Illinois	18	735,407.66
424	Michigan	14	734,698.60
425	New York	27	733,000.49
426	Texas	35	732,494.84
427	Pennsylvania	18	728,006.06
428	California	52	725,121.34
429	Georgia	14	721,055.17
430	South Carolina	7	716,889.51
431	Florida	27	713,363.71
432	Washington	10	711,867.60
433	Texas	36	711,857.03
434	California	53	711,308.24
435	Minnesota	8	710,230.58
	Last seat assigned by current law		
436	North Carolina	14	709,062.86
437	Missouri	9	708,459.48
438	New York	28	706,336.94
439	New Jersey	13	705,164.44
440	Montana	2	703,158.30
441	Louisiana	7	702,691.59
442	Oregon	6	702,656.11
443	Ohio	17	701,443.04
444	Virginia	12	699,595.12
445	California	54	698,011.59
446	Illinois	19	695,626.00
447	Texas	37	692,350.39
448	Massachusetts	10	691,447.19
449	Pennsylvania	19	688,624.80
450	Florida	28	687,414.47
451	Oklahoma	6	687,370.27

Seat Sequence	State	Seat Number	Priority Value
452	Indiana	10	685,326.92
453	California	55	685,202.95
454	Michigan	15	683,967.17
455	Iowa	5	682,847.53
456	Maryland	9	682,349.68
457	New York	29	681,545.42
458	Arizona	10	675,957.93
459	Colorado	8	674,157.13
460	Texas	38	673,884.38
461	California	56	672,855.94
462	Tennessee	10	672,029.43
463	Wisconsin	9	671,542.85
464	Kentucky	7	671,313.08
465	Georgia	15	671,265.83
466	Mississippi	5	665,954.71
467	Florida	29	663,287.10
468	Ohio	18	661,326.84
469	California	57	660,946.04
470	North Carolina	15	660,101.60
471	Illinois	20	659,928.77
472	New York	30	658,435.43
473	Texas	39	656,377.90
474	Arkansas	5	654,324.70
475	Connecticut	6	653,912.82
476	Pennsylvania	20	653,286.84
477	New Jersey	14	652,855.41
478	California	58	649,450.45
479	Washington	11	643,908.47
480	Virginia	13	643,533.91
481	Idaho	3	642,378.28
482	Alabama	8	641,825.47
483	Florida	30	640,796.22
484	Kansas	5	640,368.05
485	Michigan	16	639,792.71
486	Texas	40	639,758.04
487	California	59	638,347.91
488	Delaware	2	637,016.24

Seat Sequence	State	Seat Number	Priority Value
489	New York	31	636,841.48
490	Missouri	10	633,665.42
491	Georgia	16	627,911.69
492	Illinois	21	627,717.47
493	California	60	627,618.61
494	Minnesota	9	626,364.50
495	Ohio	19	625,552.57
496	Massachusetts	11	625,437.52
497	Texas	41	623,959.11
498	Pennsylvania	21	621,399.74
499	South Carolina	8	620,844.52
500	Indiana	11	619,901.52

Notes: Prepared by CRS.

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