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

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Summary

At the end of 2010, based on the results of the 2010 Census, the number of seats allocated to each state for the House of Representatives will be determined. 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 2000 apportionment, this could have meant a House of Representatives as small as 50 or as large as 9,380 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]

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[1] A similar, previous CRS report was authored by David C. Huckabee, 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 2000 could have been as small as 50 and as large as 9,380 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 on December 31 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., in 2000, 281,424,177 divided by 435) to identify the "ideal" sized congressional district (646,952 in 2000). 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.

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

[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 population of the 50 states. It excludes the population of the District of Columbia and U.S. territories and possessions.

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 2000 apportionment, the "ideal" size district of 646,952 had to be adjusted downward to between 645,684 and 645,930[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 twentieth 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 recomputations.[13]

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[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.

[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 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) (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 twenty-seven seats must be apportioned using the equal proportions formula. The 2000 apportionment populations for these states were 33,930,798 for California, 19,004,973 for New York, and 16,028,890 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
8	0.13363062	28	0.03636965	48	0.02105380
9	0.11785113	29	0.03509312	49	0.02061965

(...continued)

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]
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, $1/\sqrt{n(n-1)}$, 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 23,992,697.36 (0.70710681 x 33,930,798), while New York's claim to a second seat is 13,438,545.28 (0.70710681 x 19,004,973), and Florida's claim to a second seat is 11,334,136.81 (0.70710681 x 16,028890). 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	33,930,798	23,992,697.36
5	CA	3	0.40824829	33,930,798	13,852,190.28
6	NY	2	0.707106781	19,004,973	13,438,545.28
7	FL	2	0.707106781	16,028,890	11,334,136.81
8	CA	4	0.288675135	33,930,798	9,794,977.68
9	NY	3	0.40824829	19,004,973	7,758,747.74
10	CA	5	0.223606798	33,930,798	7,587,157.09
11	FL	3	0.40824829	16,028,890	6,543,766.94
12	CA	6	0.182574186	33,930,798	6,194,887.82
13	NY	4	0.288675135	19,004,973	5,486,263.14
14	CA	7	0.15430335	33,930,798	5,235,635.80
15	FL	4	0.288675135	16,028,890	4,627,141.98

House Size	State	Seat Assignment	Multiplier (M)	Population (P)	Priority Values (PxM)
16	CA	8	0.133630621	33,930,798	4,534,193.61
17	NY	5	0.223606798	19,004,973	4,249,641.15
18	CA	9	0.11785113	33,930,798	3,998,782.89
19	FL	5	0.223606798	16,028,890	3,584,168.76
20	CA	10	0.105409255	33,930,798	3,576,620.15
21	NY	6	0.182574186	19,004,973	3,469,817.47
22	CA	11	0.095346259	33,930,798	3,235,174.65
23	CA	12	0.087038828	33,930,798	2,953,296.89
24	NY	7	0.15430335	19,004,973	2,932,531.00
25	FL	6	0.182574186	16,028,890	2,926,461.54
26	CA	13	0.080064077	33,930,798	2,716,638.02
27	NY	8	0.133630621	19,004,973	2,539,646.34
28	CA	14	0.074124932	33,930,798	2,515,118.08
29	FL	7	0.15430335	16,028,890	2,473,311.42
30	CA	15	0.069006556	33,930,798	2,341,447.51

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 13,852,190.28 (0.40824829 x 33,930,798), while, as above, New York's claim to its second seat is 13,438,545.28 (0.70710681 x 19,004,973) and Florida's claim to its second seat is 11,334,136.81 (0.70710681 x 16,028890). 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 9,794,977.68 (0.288675135 x 33,930,798), while, as above, New York's claim to its second seat is 13,438,545.28 (0.70710681 x 19,004,973) and Florida's claim to its second seat is 11,334,136.81 (0.70710681 x 16,028890). 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 9,794,977.68 (0.288675135 x 33,930,798), while, having received its second seat, New York's claim to its third seat is 7,758,747.738 (0.40824829 x 19,004,973) and Florida's claim to its second seat is 11,334,136.81 (0.70710681 x 16,028890). 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 15 seats, New York would have eight, and Florida would have seven. Any other size House can be determined by picking points in the priority list and observing what the maximum size state delegation size would be for each state.

A priority listing for all 50 states based on the 2000 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]

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[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 645,684 and 645,930 divided into each state's 2000 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 (in 2000, 281,424,177 divided by 435, for an "ideal" district population of 646,952). 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 1990,[19] the state of Massachusetts would have been assigned 11 seats under the major fractions method, and the state of Oklahoma would have received 4 seats. Under this allocation, there would have been 1.8245 Representatives per million for Massachusetts residents and 1.5835 Representatives per million for Oklahoma residents. The absolute value[20] of the difference between these two numbers is 0.2410.

Under the equal proportion method of assigning seats in 1990, Massachusetts actually received 10 seats and Oklahoma 5. With 10 seats, Massachusetts received 1.6586 Representatives for each million persons, and Oklahoma, with 5 seats, received 1.9002 Representatives per million persons. The absolute value of the difference between these two numbers is 0.2415. 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).[21]

(...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 2000 apportionment population is not used in this example due to the fact that there was no difference in the apportionment of seats whether one used the method of major fractions or the method of equal proportions to allocate seats to the states in 2000.

[20] 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.

[21] 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 (continued...)

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 which 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).[22] 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,[23] (3) the number of states,[24] and (4) the method of apportionment[25]. 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

(...continued)

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).

[22] 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).

[23] 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 Royce Crocker, and, Royce Crocker, *Apportioning Representatives Among States by Citizen Populations Instead of Total State Populations*, CRS Congressional Distribution Memorandum, May 8, 2007.

[24] For information on the impact of adding states, see CRS Report RS22579, *District of Columbia Representation: Effect on House Apportionment*, by Royce Crocker, and CRS Report R41113, *Puerto Rican Statehood: Effects on House Apportionment*, by Royce Crocker.

[25] See CRS Archived CRS Report RL31074, *The House of Representatives Apportionment Formula: An Analysis of Proposals for Change and Their Impact on States*, by Royce Crocker.

of the major fractions apportionment. The equal proportions exercise, however, showed that the smaller states were persistently advantaged.[26]

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."[27]

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

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.[28]

[26] 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, 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 *Fair Representation*, p. 78.

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

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

An example using Massachusetts and Oklahoma 1990 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.[29] The equal proportions formula assigned 10 seats to Massachusetts and 6 to Oklahoma in 1990. When 11 seats are assigned to Massachusetts, and 5 are given to Oklahoma (using major fractions), Massachusetts has 1.824 Representatives per million persons and Oklahoma has 1.583 Representatives per million. The absolute difference between these numbers is .241 and the proportional difference between the two states' Representatives per million is 15.22%. When 10 seats are assigned to Massachusetts and 6 are assigned to Oklahoma (using equal proportions), Massachusetts has 1.659 Representatives per million and Oklahoma has 1.900 Representatives per million. The absolute difference between these numbers is .243 and the proportional difference is 14.53%.

Major fractions minimizes absolute differences, so in 1990, if this if this method had been required by law, Massachusetts and Oklahoma would have received 11 and 5 seats respectively because the absolute difference (0.241 Representatives per million) is smaller at 11 and 5 than it would be at 10 and 6 (0.243). Equal proportions minimizes differences on a proportional basis, so it assigned 10 seats to Massachusetts and 6 to Oklahoma because the proportional difference between a 10 and 6 allocation (14.53%) is smaller than would occur with an 11 and 5 assignment (15.22%).

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.[30]

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 which are, perhaps, appropriate to consider? One such goal might be the desirability of avoiding large districts, if possible. After the apportionment of 2000, five of the seven states with only one Representative (Alaska, Delaware, Montana, North Dakota, South Dakota, Vermont, and

[29] 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 by 1,000,000.

[30] 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."

Wyoming) have relatively large land areas. [31] The five Representatives of the larger states served 1.22% of the U.S. population, but also represented 27% of the U.S. total land area.

Arguably, an apportionment method that would potentially reduce the number of very large 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.[32]

The table that follows contains the priority listing used in apportionment following the 2000 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] 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.

[32] U.S. Census Bureau, Projections of the Total Population of States: 1995-2025, Series A, http://www.census.gov/population/projections/stpjpop.txt.

Appendix. 2000 Priority List for Apportioning Seats to the House of Representatives

Table A-1. 2000 Priority List for Apportioning Seats to the House of Representatives

Seat Sequence	State	Seat Number	Priority Value
51	California	2	23,992,697.36
52	Texas	2	14,781,355.91
53	California	3	13,852,190.28
54	New York	2	13,438,545.28
55	Florida	2	11,334,136.81
56	California	4	9,794,977.68
57	Illinois	2	8,795,730.95
58	Pennsylvania	2	8,697,887.17
59	Texas	3	8,534,019.81
60	Ohio	2	8,043,014.37
61	New York	3	7,758,747.74
62	California	5	7,587,157.09
63	Michigan	2	7,039,834.20
64	Florida	3	6,543,766.94
65	California	6	6,194,887.82
66	Texas	4	6,034,463.28
67	New Jersey	2	5,956,917.84
68	Georgia	2	5,803,207.68
69	North Carolina	2	5,704,706.29
70	New York	4	5,486,263.14
71	California	7	5,235,635.80
72	Illinois	3	5,078,217.63
73	Pennsylvania	3	5,021,727.50
74	Virginia	2	5,020,954.54
75	Texas	5	4,674,275.16
76	Ohio	3	4,643,636.51
77	Florida	4	4,627,141.98
78	California	8	4,534,193.61
79	Massachusetts	2	4,494,065.23
80	Indiana	2	4,306,833.25
81	New York	5	4,249,641.15
82	Washington	2	4,178,070.52

Seat Sequence	State	Seat Number	Priority Value
83	Michigan	3	4,064,450.17
84	Tennessee	2	4,030,534.82
85	California	9	3,998,782.89
86	Missouri	2	3,964,224.46
87	Texas	6	3,816,529.69
88	Wisconsin	2	3,798,019.01
89	Maryland	2	3,753,242.18
90	Arizona	2	3,635,011.81
91	Illinois	4	3,590,842.12
92	Florida	5	3,584,168.76
93	California	10	3,576,620.15
94	Pennsylvania	4	3,550,897.57
95	Minnesota	2	3,482,974.66
96	New York	6	3,469,817.47
97	New Jersey	3	3,439,228.12
98	Georgia	3	3,350,483.51
99	North Carolina	3	3,293,613.71
100	Ohio	4	3,283,546.87
101	California	11	3,235,174.65
102	Texas	7	3,225,556.30
103	Louisiana	2	3,168,030.01
104	Alabama	2	3,154,495.27
105	Colorado	2	3,048,961.00
106	California	12	2,953,296.89
107	New York	7	2,932,531.00
108	Florida	6	2,926,461.54
109	Virginia	3	2,898,849.45
110	Michigan	4	2,874,000.28
111	Kentucky	2	2,863,380.12
112	South Carolina	2	2,846,147.93
113	Texas	8	2,793,413.70
114	Illinois	5	2,781,454.35
115	Pennsylvania	5	2,750,513.43
116	California	13	2,716,638.02
117	Massachusetts	3	2,594,649.77
118	Ohio	5	2,543,424.47
119	New York	8	2,539,646.34

Seat Sequence	State	Seat Number	Priority Value
120	California	14	2,515,118.08
121	Indiana	3	2,486,551.34
122	Florida	7	2,473,311.42
123	Texas	9	2,463,559.32
124	Oklahoma	2	2,445,754.37
125	New Jersey	4	2,431,901.52
126	Oregon	2	2,424,346.00
127	Washington	3	2,412,210.14
128	Connecticut	2	2,410,905.32
129	Georgia	4	2,369,149.61
130	California	15	2,341,447.51
131	North Carolina	4	2,328,936.59
132	Tennessee	3	2,327,030.36
133	Missouri	3	2,288,746.06
134	Illinois	6	2,271,047.97
135	Pennsylvania	6	2,245,784.81
136	New York	9	2,239,757.55
137	Michigan	5	2,226,191.04
138	Texas	10	2,203,474.44
139	Wisconsin	3	2,192,787.30
140	California	16	2,190,223.59
141	Maryland	3	2,166,935.39
142	Florida	8	2,141,950.52
143	Arizona	3	2,098,675.05
144	Ohio	6	2,076,697.38
145	Iowa	2	2,073,182.64
146	California	17	2,057,356.83
147	Virginia	4	2,049,796.11
148	Mississippi	2	2,017,324.03
149	Minnesota	3	2,010,896.36
150	New York	10	2,003,300.05
151	Texas	11	1,993,117.62
152	California	18	1,939,694.62
153	Illinois	7	1,919,385.85
154	Kansas	2	1,904,821.22
155	Pennsylvania	7	1,898,034.59
156	Arkansas	2	1,894,857.38

Seat Sequence	State	Seat Number	Priority Value
157	Florida	9	1,889,022.80
158	New Jersey	5	1,883,742.82
159	Georgia	5	1,835,135.40
160	California	19	1,834,767.42
161	Massachusetts	4	1,834,694.45
162	Louisiana	3	1,829,062.98
163	Alabama	3	1,821,248.70
164	Texas	12	1,819,459.14
165	Michigan	6	1,817,677.37
166	New York	11	1,812,053.08
167	North Carolina	5	1,803,986.52
168	Colorado	3	1,760,318.46
169	Indiana	4	1,758,257.31
170	Ohio	7	1,755,129.63
171	California	20	1,740,613.21
172	Washington	4	1,705,690.15
173	Florida	10	1,689,593.36
174	Texas	13	1,673,658.98
175	Illinois	8	1,662,236.91
176	California	21	1,655,653.41
177	New York	12	1,654,170.58
178	Kentucky	3	1,653,173.28
179	Tennessee	4	1,645,458.95
180	Pennsylvania	8	1,643,746.17
181	South Carolina	3	1,643,224.27
182	Missouri	4	1,618,387.86
183	Virginia	5	1,587,765.24
184	Utah	2	1,581,595.64
185	California	22	1,578,603.59
186	Wisconsin	4	1,550,534.77
187	Texas	14	1,549,507.13
188	New Jersey	6	1,538,069.57
189	Michigan	7	1,536,217.77
190	Maryland	4	1,532,254.71
191	Florida	11	1,528,294.70
192	New York	13	1,521,615.62
193	Ohio	8	1,519,986.84

Seat Sequence	State	Seat Number	Priority Value
194	California	23	1,508,407.96
195	Georgia	6	1,498,381.78
196	Arizona	4	1,483,987.36
197	North Carolina	6	1,472,948.83
198	Illinois	9	1,465,955.16
199	Pennsylvania	9	1,449,647.86
200	California	24	1,444,190.67
201	Texas	15	1,442,512.63
202	Minnesota	4	1,421,918.45
203	Massachusetts	5	1,421,148.21
204	Nevada	2	1,415,650.40
205	Oklahoma	3	1,412,056.94
206	New York	14	1,408,742.32
207	Oregon	3	1,399,696.82
208	Florida	12	1,395,135.80
209	Connecticut	3	1,391,936.84
210	California	25	1,385,219.03
211	Indiana	5	1,361,940.26
212	Texas	16	1,349,347.01
213	Ohio	9	1,340,502.39
214	California	26	1,330,875.39
215	Michigan	8	1,330,403.61
216	Washington	5	1,321,221.91
217	New York	15	1,311,467.73
218	Illinois	10	1,311,190.15
219	New Jersey	7	1,299,906.04
220	Pennsylvania	10	1,296,604.46
221	Virginia	6	1,296,404.89
222	Louisiana	4	1,293,342.83
223	New Mexico	2	1,289,636.20
224	Alabama	4	1,287,817.30
225	Florida	13	1,283,338.28
226	West Virginia	2	1,282,039.04
227	California	27	1,280,635.44
228	Tennessee	5	1,274,567.02
229	Texas	17	1,267,490.81
230	Georgia	7	1,266,363.74

Seat Sequence	State	Seat Number	Priority Value
231	Missouri	5	1,253,597.85
232	North Carolina	7	1,244,868.97
233	Colorado	4	1,244,733.12
234	California	28	1,234,051.19
235	New York	16	1,226,765.73
236	Nebraska	2	1,212,949.05
237	Wisconsin	5	1,201,039.07
238	Ohio	10	1,198,981.79
239	Iowa	3	1,196,952.55
240	Texas	18	1,195,001.80
241	California	29	1,190,737.58
242	Florida	14	1,188,140.38
243	Maryland	5	1,186,879.39
244	Illinois	11	1,186,016.12
245	Michigan	9	1,173,305.70
246	Pennsylvania	11	1,172,822.87
247	Kentucky	4	1,168,970.04
248	Mississippi	3	1,164,702.57
249	South Carolina	4	1,161,935.03
250	Massachusetts	6	1,160,362.65
251	New York	17	1,152,345.75
252	California	30	1,150,361.79
253	Arizona	5	1,149,491.66
254	Texas	19	1,130,358.54
255	New Jersey	8	1,125,751.66
256	California	31	1,112,634.70
257	Indiana	6	1,112,019.56
258	Florida	15	1,106,098.49
259	Minnesota	5	1,101,413.30
260	Kansas	3	1,099,749.04
261	Georgia	8	1,096,703.17
262	Virginia	7	1,095,662.11
263	Arkansas	3	1,093,996.42
264	New York	18	1,086,441.99
265	Ohio	11	1,084,519.84
266	Illinois	12	1,082,679.64
267	Washington	6	1,078,773.17

Seat Sequence	State	Seat Number	Priority Value
268	North Carolina	8	1,078,088.15
269	California	32	1,077,303.91
270	Texas	20	1,072,352.27
271	Pennsylvania	12	1,070,635.90
272	Michigan	10	1,049,436.52
273	California	33	1,044,148.13
274	Tennessee	6	1,040,679.61
275	Florida	16	1,034,660.40
276	New York	19	1,027,671.24
277	Missouri	6	1,023,558.36
278	Texas	21	1,020,010.46
279	California	34	1,012,972.48
280	Louisiana	5	1,001,819.05
281	Oklahoma	4	998,475.04
282	Alabama	5	997,538.99
283	Illinois	13	995,920.42
284	New Jersey	9	992,819.64
285	Ohio	12	990,026.63
286	Oregon	4	989,735.11
287	Pennsylvania	13	984,841.79
288	Connecticut	4	984,247.98
289	California	35	983,604.69
290	Massachusetts	7	980,685.43
291	Wisconsin	6	980,644.29
292	New York	20	974,934.54
293	Texas	22	972,541.82
294	Florida	17	971,894.21
295	Maryland	6	969,082.96
296	Georgia	9	967,201.28
297	Colorado	5	964,166.13
298	California	36	955,891.94
299	North Carolina	9	950,784.38
300	Michigan	11	949,251.05
301	Virginia	8	948,871.22
302	Indiana	7	939,828.07
303	Arizona	6	938,556.01
304	California	37	929,698.14

Seat Sequence	State	Seat Number	Priority Value
305	Texas	23	929,295.88
306	New York	21	927,347.73
307	Illinois	14	922,043.14
308	Idaho	2	917,311.24
309	Florida	18	916,310.65
310	Utah	3	913,134.67
311	Pennsylvania	14	911,786.32
312	Washington	7	911,729.74
313	Ohio	13	910,692.05
314	Kentucky	5	905,480.30
315	California	38	904,901.72
316	Maine	2	903,492.25
317	South Carolina	5	900,031.00
318	Minnesota	6	899,300.19
319	Texas	24	889,733.07
320	New Jersey	10	888,004.88
321	New York	22	884,191.36
322	California	39	881,393.76
323	Tennessee	7	879,534.80
324	New Hampshire	2	875,691.64
325	Florida	19	866,743.10
326	Michigan	12	866,543.69
327	Georgia	10	865,091.12
328	Missouri	7	865,064.70
329	Hawaii	2	860,295.81
330	California	40	859,076.37
331	Illinois	15	858,375.45
332	Texas	25	853,401.98
333	North Carolina	10	850,407.40
334	Massachusetts	8	849,298.50
335	Pennsylvania	15	848,826.87
336	Iowa	4	846,373.27
337	New York	23	844,874.10
338	Ohio	14	843,137.00
339	California	41	837,861.34
340	Virginia	9	836,825.76
341	Wisconsin	7	828,795.70

Seat Sequence	State	Seat Number	Priority Value
342	Mississippi	4	823,569.09
343	Florida	20	822,264.71
344	Texas	26	819,922.10
345	Maryland	7	819,024.59
346	Louisiana	6	817,981.83
347	California	42	817,668.94
348	Nevada	3	817,326.14
349	Alabama	6	814,487.18
350	Indiana	8	813,914.98
351	New York	24	808,905.37
352	New Jersey	11	803,230.64
353	Illinois	16	802,936.71
354	California	43	798,426.97
355	Michigan	13	797,104.26
356	Pennsylvania	16	794,004.83
357	Arizona	7	793,224.61
358	Washington	8	789,581.11
359	Texas	27	788,970.41
360	Colorado	6	787,238.35
361	Ohio	15	784,917.83
362	Georgia	11	782,504.36
363	Florida	21	782,129.75
364	California	44	780,069.88
365	Kansas	4	777,640.01
366	New York	25	775,874.77
367	Arkansas	4	773,572.28
368	Oklahoma	5	773,415.44
369	North Carolina	11	769,222.44
370	Oregon	5	766,645.52
371	California	45	762,537.98
372	Connecticut	5	762,395.20
373	Tennessee	8	761,699.48
374	Texas	28	760,270.91
375	Minnesota	7	760,047.38
376	Illinois	17	754,227.71
377	Missouri	8	749,168.01
378	Massachusetts	9	749,010.87

Seat Sequence	State	Seat Number	Priority Value
379	Virginia	10	748,479.71
380	Pennsylvania	17	745,837.67
381	California	46	745,776.85
382	Florida	22	745,731.45
383	New York	26	745,436.37
384	New Mexico	3	744,571.81
385	Rhode Island	2	742,223.12
386	West Virginia	3	740,185.59
387	Kentucky	6	739,321.57
388	Michigan	14	737,975.14
389	South Carolina	6	734,872.24
390	Ohio	16	734,223.40
391	Texas	29	733,586.38
392	New Jersey	12	733,245.90
393	California	47	729,736.77
394	Indiana	9	717,805.54
395	Wisconsin	8	717,758.13
396	New York	27	717,296.48
397	California	48	714,372.17
398	Georgia	12	714,325.49
399	Florida	23	712,571.08
400	Illinois	18	711,092.70
401	Maryland	8	709,296.10
402	Texas	30	708,711.77
403	Pennsylvania	18	703,182.50
404	North Carolina	12	702,200.80
405	Nebraska	3	700,296.46
406	California	49	699,641.26
407	Washington	9	696,345.09
408	Louisiana	7	691,320.82
409	New York	28	691,204.19
410	Ohio	17	689,682.79
411	Alabama	7	688,367.30
412	Michigan	15	687,017.47
413	Arizona	8	686,952.66
414	California	50	685,505.64
415	Texas	31	685,468.97

Seat Sequence	State	Seat Number	Priority Value
416	Florida	24	682,234.86
417	Virginia	11	677,025.37
418	New Jersey	13	674,488.13
419	Illinois	19	672,626.36
420	California	51	671,929.93
421	Tennessee	9	671,755.80
422	Massachusetts	10	669,935.69
423	New York	29	666,943.80
424	Colorado	7	665,337.84
425	Pennsylvania	19	665,144.06
426	Texas	32	663,702.47
427	Missouri	9	660,704.08
428	California	52	658,881.50
429	Minnesota	8	658,220.34
430	Georgia	13	657,083.88
431	Iowa	5	655,597.91
432	Florida	25	654,376.69
433	Ohio	18	650,239.17
434	California	53	646,330.23
435	North Carolina	13	645,930.79
	Last seat assigned by current law		
436	Utah	4	645,683.72
437	New York	30	644,328.93
438	Texas	33	643,275.95
439	Michigan	16	642,646.00
440	Indiana	10	642,024.80
441	Montana	2	640,155.08
442	Illinois	20	638,109.39
443	Mississippi	5	637,933.87
444	California	54	634,248.22
445	Wisconsin	9	633,003.17
446	Oklahoma	6	631,491.06
447	Pennsylvania	20	631,011.06
448	Florida	26	628,704.79
449	Oregon	6	625,963.45
450	Maryland	9	625,540.36
451	Kentucky	7	624,840.77

Seat Sequence	State	Seat Number	Priority Value
452	New Jersey	14	624,454.66
453	Texas	34	624,069.34
454	New York	31	623,197.62
455	Washington	10	622,829.98
456	California	55	622,609.65
457	Connecticut	6	622,493.08
458	South Carolina	7	621,080.40
459	Virginia	12	618,036.78
460	Ohio	19	615,064.68
461	California	56	611,390.54
462	Georgia	14	608,341.46
463	Illinois	21	606,963.10
464	Massachusetts	11	605,979.63
465	Texas	35	605,976.51
466	Arizona	9	605,835.30
467	Florida	27	604,971.47
468	Michigan	17	603,660.80
469	New York	32	603,408.50
470	Kansas	5	602,357.36
471	Tennessee	10	600,836.66
472	California	57	600,568.61
473	Pennsylvania	21	600,211.24
474	Arkansas	5	599,206.51
475	Louisiana	8	598,701.40
476	North Carolina	14	598,015.71
477	Alabama	8	596,143.57
478	Missouri	10	590,951.69
479	California	58	590,123.15
480	Texas	36	588,903.32
481	New York	33	584,837.62
482	Ohio	20	583,501.59
483	Florida	28	582,965.09
484	New Jersey	15	581,335.66
485	Indiana	11	580,733.28
486	Minnesota	9	580,495.78
487	California	59	580,034.83
488	Illinois	22	578,716.61

Seat Sequence	State	Seat Number	Priority Value
489	Nevada	4	577,936.86
490	Colorado	8	576,199.47
491	Texas	37	572,765.91
492	Pennsylvania	22	572,278.96
493	California	60	570,285.65
494	Michigan	18	569,136.86
495	Virginia	13	568,511.15
496	New York	34	567,375.83
497	Georgia	15	566,335.08
498	Wisconsin	10	566,175.25
499	Washington	11	563,370.91
500	Florida	29	562,503.77

Notes: Prepared by CRS.

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