

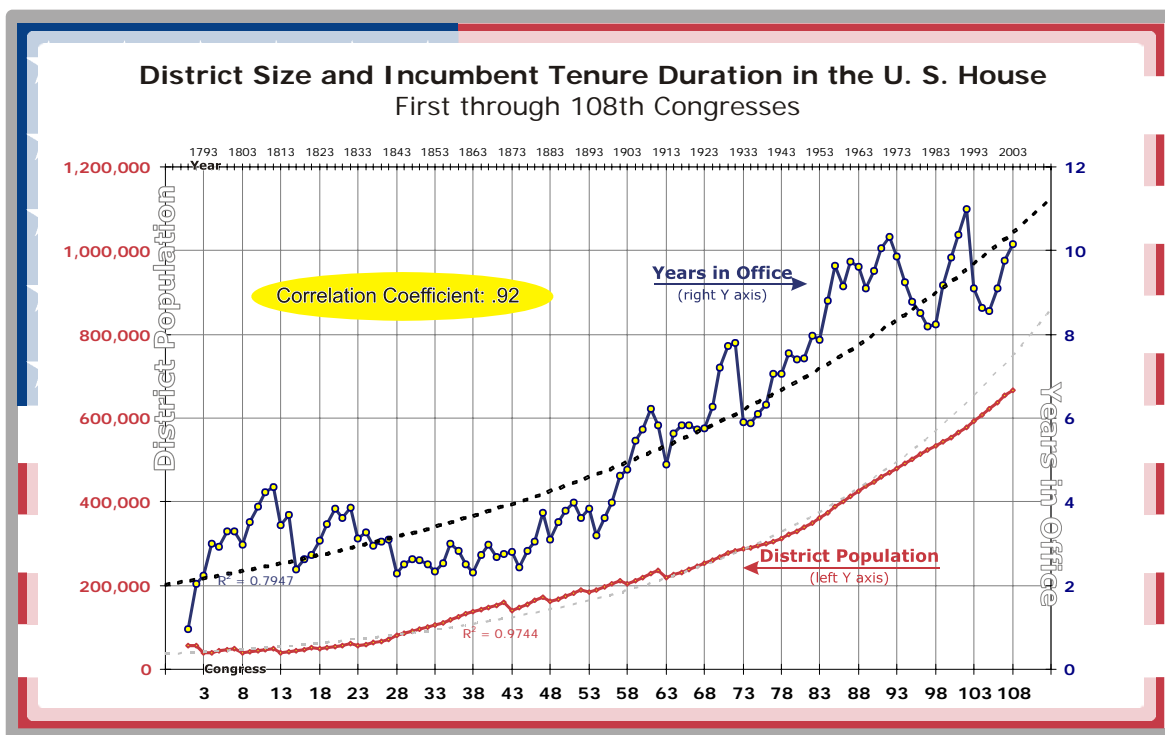
*Correlation between*  
**District Population Size**  
*and*  
**Incumbency Tenure Duration**  
*in the*  
**U. S. House of Representatives**

*By Congress and by State*

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**First through 108<sup>th</sup> Congress**

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**Quantitative Historical Analysis #10**

<http://www.thirty-thousand.org/pages/QHA-10.htm>

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## 1. OVERVIEW

### 1.1. Purpose

The various factors that increase an incumbent's likelihood of winning reelection are collectively known as the "incumbency advantage." The identity and relative significance of each of the factors which comprise it is a matter of ongoing debate. Nonetheless, the reality of incumbency advantage is evidenced by high reelection rates which, in the U.S. House of Representatives, has been below 90% *only twice* since 1967. In the field of political studies, many theories have been offered to explain the phenomenon of incumbency advantage.<sup>1</sup> However, one likely causal factor that appears to have been overlooked is the conspicuous increase in congressional district population size over time.

An analysis of the data from the first 108 Congresses reveals that there is an extremely high correlation between the *population size of congressional districts* and *incumbency tenure in office* for members of the U.S. House of Representatives.<sup>2</sup> It is further argued that there is, in fact, a *causal* relationship between growing district population size and high reelection rates.

"Continuous tenure in office", or *tenure*, refers to the total span of time served by any Representative without interruption. This analysis uses *tenure* rather than *reelection rates* because the available reelection data for the 18<sup>th</sup> and 19<sup>th</sup> centuries is too incomplete to support reliable historical analyses.<sup>3</sup> In any case, there is a high correlation between tenure and reelection rates, especially where the reelection data is complete.<sup>4</sup> Consequently, tenure provides a satisfactory proxy for reelection rates. Moreover, tenure reflects the *cumulative* effect of one or more incumbent reelections whereas reelection rates describe each election as an isolated event.

This report does *not* draw any conclusions regarding the benefits or detriments of high reelection rates. On the one hand, some voters will prefer to *reelect* a competent Representative whom they believe to be effectively representing his or her constituency and making valuable contributions to the national legislature. On the other hand, it can be very difficult (if not impossible) for a well-qualified candidate to unseat a mediocre incumbent.

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<sup>1</sup> For a review of the literature in this area see: Beth, Richard S. "Incumbency Advantage" and Incumbency Resources: Recent Articles. *Congress and the Presidency*, v. 9, Winter 1981-82. p. 119-136; and Beth, Richard S. Recent Research on "Incumbency Advantage" in House Elections: Part II. *Congress and the Presidency*, v. 11, Autumn 1984. p. 211-224.

<sup>2</sup> This analysis was first presented at the annual meeting of the Georgia Political Science Association in November of 2006.

<sup>3</sup> See the "Reelection Rates of Incumbents in the U. S. House" at <http://www.thirty-thousand.org/pages/QHA-08.htm>.

<sup>4</sup> See the "Duration of Representatives' Incumbency in the U. S. House" at <http://www.thirty-thousand.org/pages/QHA-09.htm>.

## 1.2. Data Source

This analysis utilizes an extensive amount of data which are described by the reports listed below:

1. “The Population Size of U. S. House Districts”  
<http://www.thirty-thousand.org/pages/QHA-03.htm>
2. “The Duration of Representatives’ Incumbency in the U. S. House”  
<http://www.thirty-thousand.org/pages/QHA-09.htm>

Please see those reports for a full description of the source data and the methodology by which they were produced. Produced by *Thirty-Thousand.org* (TTO), the reports are available from the links indicated above.

## 1.3. Methodology

This analysis calculated the correlation coefficient<sup>5</sup> between the *average population size of Congressional districts* and the *average tenure of Representatives*. This was done for the total U.S., and each state, for the time frame beginning with the first Congress (1789-1791) and ending with the 108<sup>th</sup> Congress (2003-2005).

### 1.3.1 District Population Size

“District population size” is the *average* number of inhabitants *per* Representative for any given state. Annual district population data (starting in 1789) is provided by the above-referenced report entitled “The Population Size of U. S. House Districts”.

### 1.3.2 Average Tenure

“Tenure” refers to the uninterrupted duration of the Representative’s service in office beginning with his or her initial date of service. The *average tenure* data is provided by the above-referenced report entitled “Duration of Representatives’ Incumbency in the U. S. House”. A brief description of how average tenure durations were calculated is provided here. First, consider the example of a Representative who is elected to his fifth *consecutive* term. He begins that Congress with eight years of tenure and, assuming he completes the fifth Congress, ends it with ten years of tenure. Therefore, during the Representative’s fifth Congress his *average* tenure is *nine* years (the average of 8 and 10).

The average tenure for each Congress was calculated by averaging all of the Representatives’ tenures (by state and total U.S.).<sup>6</sup> As indicated by the example above,

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<sup>5</sup> The calculation was made using the Pearson product-moment “CORREL” function of Microsoft’s “Excel” spreadsheet application.

<sup>6</sup> The data used for this analysis is the *entire* population of Representatives elected to the House (not a sampling thereof). TTO’s congressional

the average tenure for any given congress approximates the midpoint of that Congress and, consequently, the value will tend to be approximately one year shorter than a tenure calculated at the close of the same Congress. However, for the purposes of making *relative* comparisons across Congresses, over time, the mid-point value is statistically more reliable than simply taking the end-point (or any other single point) value.<sup>7</sup>

### 1.3.3 Analysis

At the aggregate level, this analysis consists of calculating the correlation between the two data vectors (tenure and district size) for the United States for the first 108 Congresses.

In order to further evaluate the size-tenure correlation hypothesis the data are also disaggregated to the state level. The primary *advantage* of calculating the state-level size-tenure correlations is that, in many cases, the size of a given state's Congressional delegation is not changed by the decennial reapportionment. Consequently, the size of the state's delegation may remain constant for at least two or three decades. The primary *disadvantage* of the disaggregated correlations is that the small number of Representatives (for any given state) produces statistically unreliable results, especially in the event of involuntary retirements (e.g., death).

The state-by-state correlations are provided in Appendix 2.

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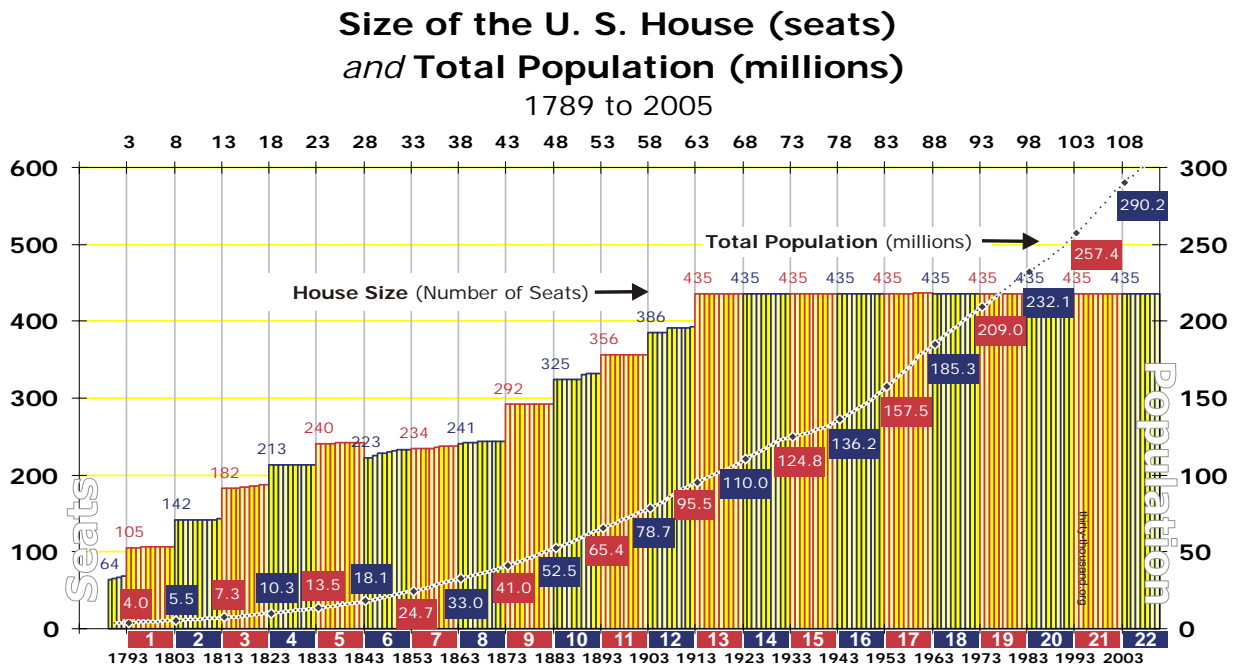
database contains every instance of a Representative being elected to a Congress. Specifically, there are 10,508 Representatives across 36,223 instances of a Representative being elected to Congress. The individual tenure durations range from zero to 53 years.

<sup>7</sup> Because Representatives do not always serve the entirety of the term to which they were elected, it is necessary to use the incumbents' average tenure (over the two-year Congressional term) rather than their tenure at any single point in time. This average is determined by first calculating the aggregate average tenure (by state or total U.S.) as of the 1<sup>st</sup> and the 16<sup>th</sup> of every month during the Congress. All of those values are then averaged to arrive at the average tenure duration for each Congress.

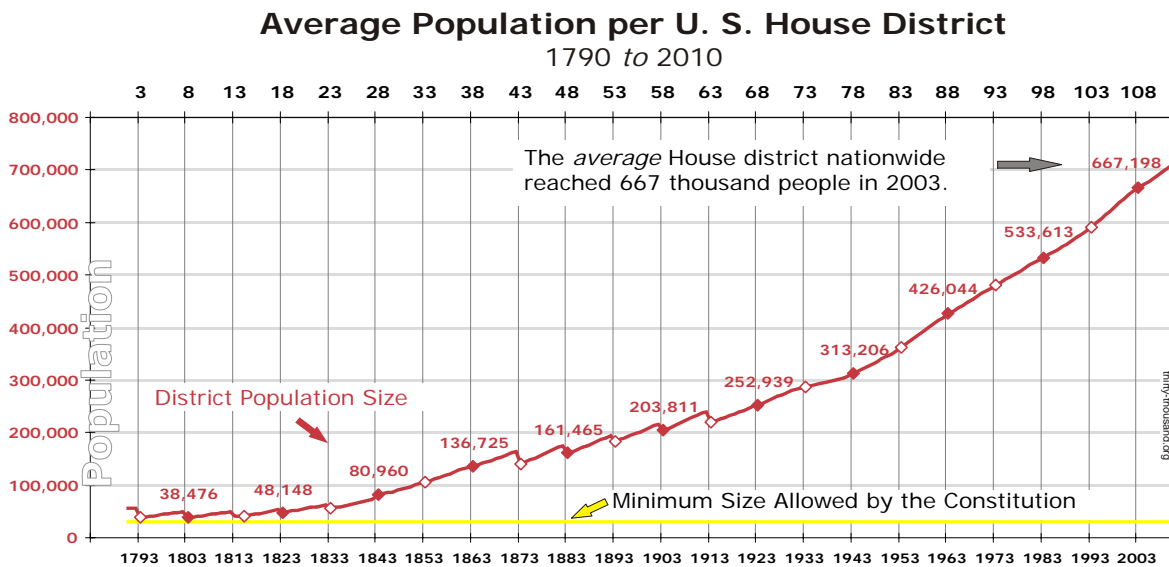
## 2. ILLUSTRATIONS

### 2.1. District Population Size

The vertical bar chart below illustrates the total number of House memberships over time (against the left Y axis).<sup>8</sup> Also shown is a line graph depicting the total population in *millions* (plotted against the right Y axis).



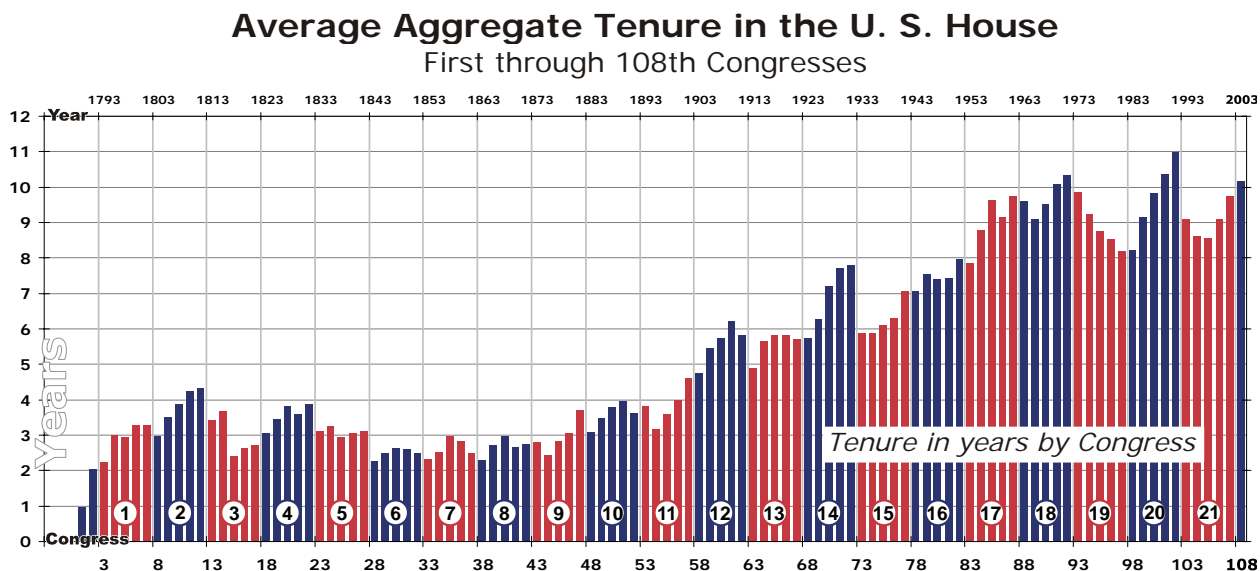
Dividing the number of memberships by the total population (for each Congress) provides the total number of inhabitants per Representatives, as illustrated below.



<sup>8</sup> The charts in this section are from "The Population Size of U. S. House Districts" (<http://www.thirty-thousand.org/pages/QHA-03.htm>).

## 2.2. Incumbency Tenure

The chart below indicates the *average tenure in office* of all Representatives from the first Congress through to the 108<sup>th</sup>.<sup>9</sup>



Apparent in this chart is the historical trend of increasing tenure over time. For example, the average continuous tenure in office of all Representatives serving during the eighth Congress was approximately 3 years. In contrast, the average tenure during the 102<sup>nd</sup> Congress was approximately 11 years.

There are, however, relatively brief periods during which the average tenure *declines*. Each decline is then followed by a resumption of the underlying upward trend (eventually exceeding the previous maximum). These transitory declines can be attributed largely to prevailing political upheavals that temporarily overwhelm the size-tenure relationship. This can occur whenever unusually high levels of citizen dissatisfaction reduces reelection rates. A survey of these overwhelming events is outside the scope of this report but, to illustrate the point, consider the period between 1973 and 1983 when, as shown in the chart, a dramatic decline in tenure occurred. Not coincidentally, this was also a period of considerable political turmoil.<sup>10</sup> To put this decline into context, however, the lowest reelection rate during this same period was 88% (in 1972 for the 93<sup>rd</sup> Congress). For the remainder of that period reelection rates managed to remain above 90%.<sup>11</sup>

<sup>9</sup> This chart is from the "Duration of Representatives' Incumbency in the U. S. House" (<http://www.thirty-thousand.org/pages/QHA-09.htm>).

<sup>10</sup> To wit: the resignation of President Nixon in August of 1974 (to be succeeded by President Ford until January 1977); the American War in Vietnam came to a humiliating close in 1975; during President Carter's administration (1977 to 1981) there was a historically high level of "stagflation" followed by the occurrence of the "Iran hostage crisis" (November 1979 to January 1981). And, of course, nobody who survived the era can forget the atrocious fashions and banal popular music.

<sup>11</sup> Complete reelection rate data is available from "Reelection Rates of Incumbents in the U. S. House" (<http://www.thirty-thousand.org/pages/QHA-08.htm>).

### 2.3. Population Size and Incumbency Duration

The chart below contains two graphs: one for the *average district population* (nationwide) and one for the *average tenure in office*.

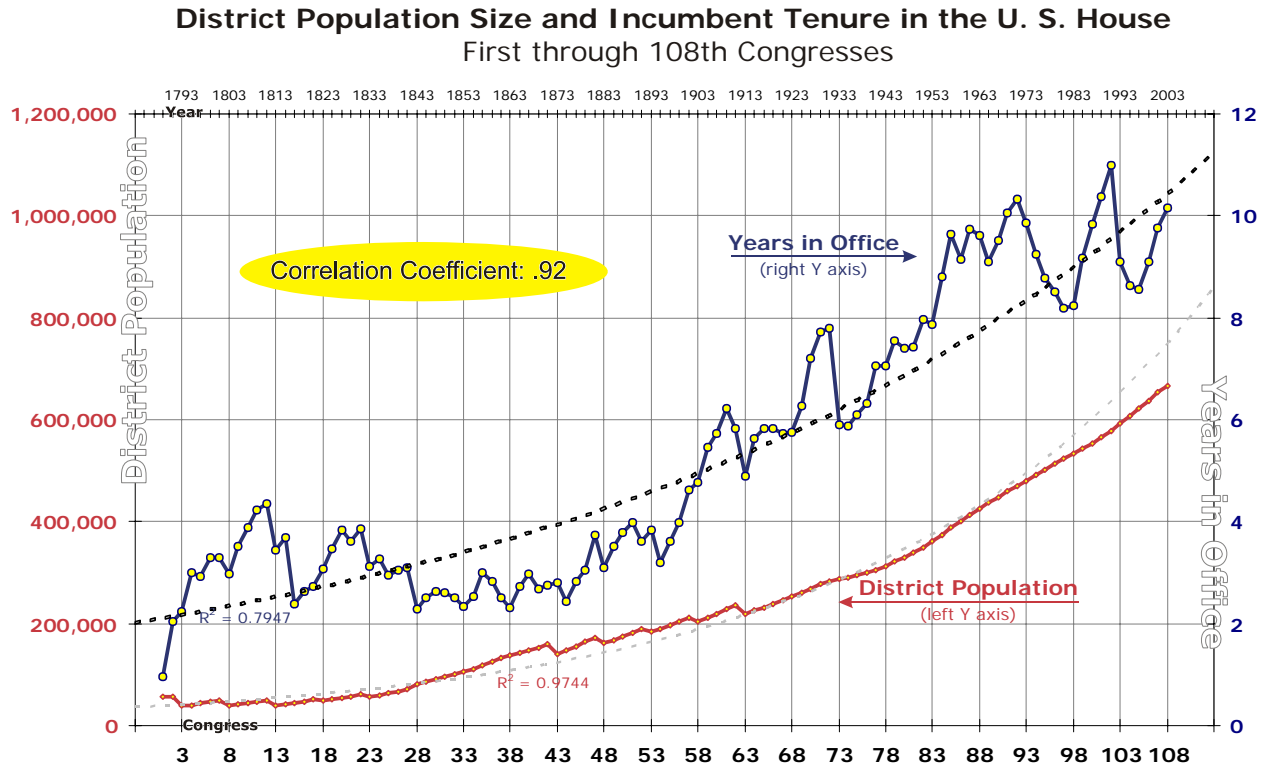


Chart A — Tenure vs. Reelected Incumbent Prevalence

The apparent relationship between population and tenure is evident from viewing the chart, especially since 1867 (i.e., after the Confederacy’s War of Secession). In order to help illustrate this point, the underlying trend line (dashed lines) is shown for each of the data sets.

Though the tenure data appears to be somewhat erratic, the coefficient of correlation between district population and tenure is .92; this is an extremely significant correlation. Note that this is the correlation between the two underlying data sets themselves (not their respective trend lines).

### 3. SIZE-TENURE CORRELATIONS BY STATE

The table below provides a summary of the correlations, by state, that resulted from this analysis.

	Since Admission to the Union				Since 1913			
	Year	Congress	Correl.	n=	Year	Congress	Correl.	n=
United States	1789	1st	0.92	10,492	1913	63rd	0.81	2,697
Alabama	1819	16th	0.68	179	1913	63rd	0.19	72
Alaska	1959	86th	0.95	4				
Arizona	1913	63rd	0.37	29	1913	63rd	0.37	29
Arkansas	1835	24th	0.44	92	1913	63rd	0.08	51
California	1851	31st	0.95	334	1913	63rd	0.86	141
Colorado	1875	44th	0.27	61	1913	63rd	-0.05	48
Connecticut	1789	1st	0.47	214	1913	63rd	0.53	74
Delaware	1789	1st	0.42	61	1913	63rd	0.57	21
Florida	1845	29th	0.79	106	1913	63rd	0.57	87
Georgia	1789	1st	0.55	954	1913	63rd	-0.34	62
Hawaii	1959	86th	0.05	9				
Idaho	1889	51st	-0.10	30	1913	63rd	-0.32	25
Illinois	1817	15th	0.91	450	1913	63rd	0.84	96
Indiana	1815	14th	0.87	309	1913	63rd	0.71	74
Iowa	1847	30th	0.64	179	1913	63rd	0.31	79
Kansas	1861	37th	0.30	113	1913	63rd	-0.08	64
Kentucky	1791	2nd	0.80	338	1913	63rd	0.46	43
Louisiana	1811	12th	0.73	154	1913	63rd	0.40	67
Maine	1821	17th	0.12	155	1913	63rd	-0.07	38
Maryland	1789	1st	0.75	278	1913	63rd	0.39	58
Massachusetts	1789	1st	0.84	413	1913	63rd	0.50	43
Michigan	1837	25th	0.90	260	1913	63rd	0.73	103
Minnesota	1857	35th	0.70	128	1913	63rd	0.54	87
Mississippi	1817	15th	0.76	123	1913	63rd	0.37	46
Missouri	1821	17th	0.86	298	1913	63rd	0.70	76
Montana	1889	51st	0.32	32	1913	63rd	0.24	25
Nebraska	1867	40th	0.56	91	1913	63rd	0.44	57
Nevada	1863	38th	0.29	31	1913	63rd	0.18	19
New Hampshire	1789	1st	0.35	143	1913	63rd	-0.14	27
New Jersey	1789	1st	0.83	309	1913	63rd	0.58	72
New Mexico	1913	63rd	0.52	26	1913	63rd	0.50	25
New York	1789	1st	0.92	1,420	1913	63rd	0.75	47
North Carolina	1789	1st	0.63	321	1913	63rd	-0.32	64
North Dakota	1889	51st	0.45	27	1913	63rd	0.39	21
Ohio	1803	8th	0.90	635	1913	63rd	0.80	63
Oklahoma	1907	60th	0.32	78	1913	63rd	0.28	76
Oregon	1859	36th	0.57	60	1913	63rd	0.04	39
Pennsylvania	1789	1st	0.88	1,012	1913	63rd	0.74	60
Rhode Island	1789	1st	0.57	72	1913	63rd	0.31	23
South Carolina	1789	1st	0.67	213	1913	63rd	0.14	50
South Dakota	1889	51st	-0.03	35	1913	63rd	-0.20	25
Tennessee	1795	4th	0.78	260	1913	63rd	0.17	61
Texas	1845	29th	0.71	238	1913	63rd	0.32	128
Utah	1895	54th	0.15	37	1913	63rd	0.08	33
Vermont	1791	2nd	0.41	95	1913	63rd	0.24	15
Virginia	1789	1st	0.58	404	1913	63rd	-0.04	44
Washington	1889	51st	0.50	75	1913	63rd	0.37	65
West Virginia	1863	38th	0.83	98	1913	63rd	0.80	58
Wisconsin	1847	30th	0.88	176	1913	63rd	0.80	89
Wyoming	1889	51st	-0.16	17	1913	63rd	-0.30	14

In the preceding table, note that there are two sets of correlation calculations. The first set (on the left) is for the entire duration beginning with each state's admission to the Union until the 108<sup>th</sup> Congress. In order to provide an alternative time frame for consideration, the second set of results (on the right) is for the entire duration during which the total size of the House has been fixed at 435; that is, from the 63<sup>rd</sup> Congress in 1913 to the 108<sup>th</sup> Congress.<sup>12</sup>

Relative to these two data sets — *since admission* and *since 1913* — the correlation is .92 and .81, respectively. The high overall correlation was also illustrated in the chart above in section 2.3. However, this relationship is further corroborated by the high size-tenure correlations occurring in many of the states.

To better illustrate this, in the table above all *statistically significant* positive correlations are highlighted in green.<sup>13</sup> Among the fifty states, 33 of them had significant positive correlations (from their admission until the 108<sup>th</sup> Congress), while fourteen more states had positive correlations *less than* .5. Only three states had negative correlations (none of which were significant).<sup>14</sup> The abundance of high correlations (especially relative to the small number of negative correlations) confirms the overarching correlation between district population growth *and* increasing tenure in office.

In order to provide some indication of statistical validation, the “n” value is also shown in the table. This is the number of elected Representatives that comprises each correlation calculation. Of course, the smaller the number of observations (“n”) the less statistically reliable is the resulting correlation value. Bear in mind that these calculations are comprised of the *entire population* of Representatives (not a sampling thereof). In this context, it is worth noting that the smallest correlations (and the negative ones) also usually have the smallest *n* values.

See Appendix 2 for additional state-by-state correlation data.

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<sup>12</sup> Except for Alaska and Hawaii which were both admitted after 1913.

<sup>13</sup> For the purposes of this analysis, statistically significant correlations are deemed to be those greater than .50.

<sup>14</sup> Those three states also had relatively small number of Representatives (“n”) which reduces their statistical reliability.

## 4. CONCLUSION

During the early 1800s, the House districts' average size remained below 50,000 and the Representatives' average tenure hovered around three to four years. Since then, the average district size has grown steadily to nearly 700,000 inhabitants and the incumbents' *average* tenure in office has generally been ranging from eight to ten years.

For the period between the first Congress (1789) and the 108<sup>th</sup> (2003) the correlation is .92 (for the aggregate U.S.). With respect to the aggregate data, the table below provides additional correlations for a few other time spans.

Evaluation Period	Years	Correlation
<b>First to the 108th Congress</b>	1789 - 2003	0.92
<b>First to the 36th Congress</b> (before the War of Secession)	1789 - 1861	-0.32
<b>40th to the 108th Congress</b> (after the War of Secession)	1867 - 2003	0.89
<b>63rd to the 108th Congress</b> (the time during which the size of the House has been fixed at 435 Representatives)	1913 - 2003	0.81
<b>40th to the 92nd Congress</b> (after the War of Secession to the onset of widespread public opposition to the American war in Vietnam)	1867 - 1873	0.97

These high correlations confirm the hypothesis that incumbency tenure (and therefore reelection rates) increase along with the districts' population. And, as explained in Section 3, the high aggregate correlations are further corroborated by the historical state-level correlations.

It is important to note that these high correlations occur *despite* a number of external factors unrelated to the incumbent's aspiration to be reelected. Chief among these external factors is the decennial turnover imposed by the reapportionment process. Every ten years a number of incumbents — who would have otherwise sought reelection — are involuntarily retired due to the termination of existing seats. Conversely, the reapportionment also grants additional seats to other states which, of course, are initially filled by new Representatives. Both of these factors combine to force a decline in the average tenure whenever a new apportionment is effected.

The other significant external factor is the natural limitation imposed by human mortality. Impending health problems, and even death itself, often brings about the end of an incumbent's public service career. And finally, there are the political up-

heavals which can reduce reelection rates whether or not the underlying causes can be fairly attributed to the sitting incumbents.

Having established this correlation, can we also conclude that there is a causal relationship between district size and tenure? Though the high correlation is a *prerequisite* to establishing such a relationship, it does not prove the existence of causality. However, simple reflection on this question reveals why a causal relationship is probable.

The supposition of this report is that as House districts become larger it becomes increasingly difficult for a challenger to unseat an incumbent. Why would that be so? The most conspicuous factor is that, as districts become larger, the amount of money that must be raised by challengers increases as well. This high cost of campaigning is largely a function of the marketing costs associated with reaching several hundred thousand voters within a congressional district. The marketing challenge is especially great where a relatively unknown challenger is attempting to unseat an incumbent who is already well known to the voters in that district.

As a result, unless a challenger possesses substantial personal wealth, he or she must raise a large amount of money from donors in order to have any likelihood of success. It can be extremely difficult to raise an adequate amount of funds (especially where prospective donors fear alienating the sitting incumbent). So, as the districts increase in size, it becomes less likely that a realistic candidate will chose to challenge an incumbent and, if they do, their likelihood of success is not high.

It is helpful to consider the converse scenario: what if the congressional districts were relatively small (e.g., 50,000 inhabitants)? It is not difficult to imagine that a modestly funded campaign could allow a challenger to defeat an incumbent, especially if the incumbent is not highly regarded by the public. In fact, in such a small district, a challenger may need only campaign door-to-door and participate in a few neighborhood meetings. The largest expense may be direct mail (if needed) as there would be little advantage to utilizing broadcast media to reach such a small segment of the population. In fact, in the context of such small congressional districts, conspicuous use of expensive marketing methods could even inspire voter skepticism.

The case for a causal relationship — between *congressional district population size* and the Representatives' *average tenure in office* — rests primarily on their significant longitudinal correlation as well as plausible arguments as to why such a relationship would exist. Given that, it would be reasonable to expect an *interstate* comparison to reveal a corresponding size-tenure relationship. That is, one would expect the states with larger districts to have a higher size-tenure correlation than those with smaller districts. As explained in Appendix 1 of this report, there is evi-

dence of such a relationship. For a 20-year time frame from 1913 and 1932 the apportionment of representation in the House remained constant for *all* states. Of these, the 25 largest states (relative to their stabilized number of Representatives) had a correlation of +.48 between their *district sizes* and *correlations*.<sup>15</sup> This result supports the hypothesis that incumbency tenure (and therefore reelection rates) increase along with the districts' population.

Finally, it should be noted that the size-tenure relationship probably does *not* replace or refute any of the factors that have been previously posited elsewhere for explaining *incumbency advantage*. Instead, it seems likely that increasing the population of congressional districts would tend to *magnify* the effect of those factors (whatever they may be). Therefore, though reducing the districts' population size to a smaller number would diminish the effect of these various factors, it would not eliminate them entirely.

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<sup>15</sup> See Appendix 2 of this report for a complete description.

## Appendices

## Appendix 1 — Interstate Comparison of Size-Tenure Correlations

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This report proposes that a significant causal relationship exists between *congressional district population size* and the Representatives' *average tenure in office*. This thesis rests primarily on their significant longitudinal correlation as well as plausible arguments as to why such a relationship would exist.

Given that, it would be reasonable to expect there to be a corresponding size-tenure relationship among the states. That is, one would expect the states with larger districts to have a higher size-tenure correlation than the states with smaller districts. This appendix provides such an analysis.

An interstate comparison should be made contemporaneously (i.e., across a common time frame). Comparing states across disparate time frames would implicitly introduce additional variables that would be difficult to quantify, especially with respect to prevailing political externalities. In any case, it is possible to conduct a contemporaneous interstate analysis due to the fact that the district population sizes vary from state to state at any given time. That notwithstanding, this comparison is still complicated by several factors, including:

- It does not take into account the states' disparate internal political environments and, perhaps, disparate election laws and regulations (e.g., at-large districts).
- The small number of Representatives from any particular state tends to reduce the statistical significance of the results.
- Because of the small number of Representatives (relative to any particular state), the tenure data can be significantly impacted by external events such as deaths and reapportionments.

In particular, a significant change in *both* tenure *and* district size usually results whenever a state's apportionment is revised by the decennial reapportionment.<sup>16</sup> Of course, these same issues can impact the *aggregate* analysis as well; however, the relatively large number of data points provided by the aggregate data appears to be adequate for conducting statistical analyses.<sup>17</sup>

Because of the significant impact that the decennial reapportionment may have on any particular state's data, interstate comparisons are generally limited to ten-year intervals which is, in fact, only *five* House elections. This may be too short of a time frame for making interstate comparisons. However, there are many instances where a state's apportionment is held constant for two or more decades (as shown in Ap-

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<sup>16</sup> Decreasing the state's number of seats reduces the number of incumbents who can be reelected. Increasing the number of seats brings in new Representatives (which therefore reduces the maximum possible reelection rate as well as reduces the average tenure).

<sup>17</sup> The tenure data is based on the entire population of Representatives across all elections; it is not a sample or subset of the data.

**Correlation between District Population Size and Incumbency Tenure Duration in the U. S. House**

Appendix 1 — Interstate Comparison of Size-Tenure Correlations

pendix 2). For example, Delaware’s apportionment has remained constant for nearly 190 years. Despite that there are very few states that have, at any given time, comparable multi-decade intervals between reapportionments. There is one notable exception: because Congress failed to reapportion the House in 1920, the apportionment that was implemented in 1913 remained in effect until 1932 (i.e., from the 63<sup>rd</sup> to the 72<sup>nd</sup> Congress). This resulted in a twenty-year period of relative data stability for all states. The table below contains the size-tenure correlation data for this time frame.

State	District Population (1923)	Correlation Coefficient (1913 – 1932)	Apportionment (1913)	Deaths (1913 – 1932)	Stable Seats
Nevada	79,962	0.48	1	0	1
Vermont	176,926	-0.12	2	0	2
Maine	193,451	0.77	4	1	3
Wyoming	200,269	-0.71	1	0	1
Rhode Island	206,723	0.73	3	0	3
Missouri	215,498	-0.59	16	7	9
South Dakota	215,809	0.92	3	0	3
Idaho	217,233	0.87	2	0	2
North Dakota	217,842	0.83	3	1	2
Nebraska	218,715	0.07	6	1	5
Iowa	219,750	0.97	11	1	10
Kentucky	223,180	-0.55	11	4	7
New Hampshire	223,719	0.70	2	3	-1
Kansas	223,882	0.67	8	1	7
Delaware	224,459	0.72	1	0	1
Mississippi	229,057	0.33	8	3	5
Indiana	229,967	0.51	13	2	11
Utah	230,260	0.26	2	1	1
Louisiana	231,926	0.63	8	5	3
Virginia	233,129	-0.63	10	5	5
Tennessee	239,113	-0.38	10	2	8
Colorado	239,529	0.98	4	1	3
Alabama	240,497	0.66	10	4	6
Georgia	241,530	0.61	12	5	7
South Carolina	242,084	0.07	7	2	5
Minnesota	242,148	-0.57	10	3	7
Wisconsin	244,616	-0.11	11	3	8
Massachusetts	245,544	0.33	16	9	7
Pennsylvania	247,086	0.98	36	11	25
Illinois	248,137	0.51	27	10	17
New York	250,989	0.94	43	13	30
West Virginia	252,220	0.30	6	3	3
Arkansas	253,171	0.60	7	4	3
Maryland	254,192	0.89	6	4	2
Oklahoma	262,126	0.62	8	2	6
Florida	263,127	-0.10	4	0	4
North Carolina	267,111	0.24	10	4	6
Ohio	269,401	0.77	22	4	18
Texas	270,851	0.74	18	4	14
Oregon	271,613	0.77	3	2	1
Montana	273,306	0.55	2	0	2
New Jersey	276,326	0.87	12	6	6
Washington	279,132	0.94	5	0	5
Connecticut	284,636	0.87	5	2	3
Michigan	298,297	0.74	13	6	7
California	344,629	0.82	11	7	4
Arizona	352,352	0.11	1	0	1
New Mexico	372,145	0.10	1	1	0
Alaska					
Hawaii					

It is easier to visualize this 20-year period of stable data by examining the table in Appendix 2 (for Congresses 63 – 72).

In the table above, all of the states are listed according to their *average district population sizes*<sup>18</sup> from smallest to largest (first column). The second column indicates each state's *size-tenure correlation* for the 1913-1932 interval.

The purpose of this analysis is to evaluate whether or not the states' size-tenure correlations increase as the associated district populations become larger. In other words, the *correlation* between the first and second columns is calculated (i.e., between *district population* and the *1913-1932 correlations*).

For the entire data set shown in the table, the resulting correlation is +.11 which would suggest that there is *no* correlation. However, the states with the smallest number of Representatives should *not* be included in this calculation due to the statistical unreliability inherent in small population values.<sup>19</sup>

The table's third column is the number of seats apportioned to each of the states during this interval. The fourth column is the estimated number of Representatives who died while in office during the subject interval.<sup>20</sup> This is taken into account since death has an involuntary impact on tenure. The last column, "Stable Seats", is the state's number of seats minus the number of deaths.

For this analysis, all states with *less than* five (5) "Stable Seats" are excluded; thereby eliminating 23 states (as indicated by the shaded rows). This reduces the number of states being evaluated from 48 to 25. The correlation for these remaining 25 states — between their *district sizes* and *correlations* — is +.48. This result supports the hypothesis that states with larger districts will tend to experience longer tenures than states with smaller districts.

Of course, the evaluation of this single time frame does not, in and of itself, conclusively prove that a causal size-tenure relationship always exists, but it does support the thesis. A more comprehensive interstate analysis of the data is outside of the scope of this report. Such an analysis is probably warranted as it could evaluate other time frames and make additional adjustments, to the extent possible, to resolve the analytical challenges noted above. Moreover, a more sophisticated multivariate analysis could take additional quantifiable factors into account so as to possibly determine the *relative* significance of a variety of likely causal factors.

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<sup>18</sup> The population data from 1923 is used as it represents the approximate midpoint for this time frame. There is no data for Alaska and Hawaii as they were not yet states.

<sup>19</sup> In this context, "population" refers to the total number of Representatives (not the district's population).

<sup>20</sup> This data is from the Thirty-Thousand.org (TTO) data set which is described in the "Biographical Compilation of U.S. House Representatives" (at <http://www.thirty-thousand.org/pages/QHA-06.htm>).

## Appendix 2 — Size-Tenure Correlation by State

The tables on the following pages provide the average tenure values in years for each state, and for the total United States, *by Congress*. The following notes are provided to explain how to use the tables.

- A. Total U.S. (aggregate) size-tenure correlations** — the value indicated for each Congress is for the time span beginning with that Congress through the 108<sup>th</sup> Congress. For example, the correlation indicated for the 63<sup>rd</sup> Congress, *+.81*, is for the time frame from the 63<sup>rd</sup> to the 108<sup>th</sup> (inclusive).
- B. The states’ apportionment regimes** — the correlations are provided for each state’s static apportionment regime which, in many cases, is two or more decades in duration. For example, Connecticut’s *second* apportionment regime, identified as *CT-02*, ran from the second Congress to the 17<sup>th</sup>. The data provided for this time frame is as follows:  
 “CT-02 [3-17] R: 7, CC: 0.37, D: 2”, which is explained in the table below.

Reference	Meaning
CT-02	Connecticut’s second apportionment regime.
[3-17]	This apportionment regime is bounded by the 3 <sup>rd</sup> and 17 <sup>th</sup> Congresses, inclusive.
R: 7	Seven Representatives were apportioned to this state for this entire time frame.
CC: 0.37	For this time span, the size-tenure coefficient of correlation was <i>+.37</i> .
D: 2	This is the number of Representatives who died while in office (if any). In this case, two died while serving during this time frame. It is not unusual for a lower correlation to result when there are a high number of deaths relative to the number of House memberships.

- C.** In order to facilitate a high level review of the states’ correlations, each apportionment regime has been color coded to indicate the significance of the correlation. The color coding scheme is as follows.

Magnitude	Correlation	
None/Small	-0.29 to +0.29	
Medium	-0.30 to -0.49	+0.30 to +0.49
Large	-0.50 to -1.00	+0.50 to +1.00
Not calculated		

## Correlation between District Population Size and Incumbency Tenure Duration in the U. S. House

Appendix 2 - Size Tenure Correlation by State

Year	1789	1791	1793	1795	1797	1799	1801	1803	1805	1807	1809	1811	1813	1815	1817	1819	1821	1823	1825	1827	1829	1831					
<b>Census</b>	1					2					3					4						5					
<b>Congress</b>	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22					
<b>Apportionment</b>	CONST.		1					2					3					4									
Total US.....	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92					
<b>State</b>																											
Alabama																AL-01 [16-17] R: 1, CC: 1	AL-02 [18-22] R: 3, CC: -0.17										
Alaska																											
Arizona																											
Arkansas																											
California																											
Colorado																											
Connecticut	CT-01 [1-2] R: 5		CT-02 [3-17] R: 7, CC: 0.37, D: 2										CT-03 [18-27] R: 6, CC: -0.25, D: 1														
Delaware	DE-01 [1-12] R: 1, CC: -0.06												DE-02 [13-17] R: 2, CC: 0.79					DE-03 [18-112] R: 1, CC: 0.42, D: 2									
Florida																											
Georgia	GA-01 [1-2] R: 5		GA-02 [3-7] R: 2, CC: -0.29, D: 1					GA-03 [8-12] R: 4, CC: 0.84					GA-04 [13-17] R: 6, CC: -0.14					GA-05 [18-22] R: 7, CC: -0.15									
Hawaii																											
Idaho																											
Illinois																IL-01 [15-22] R: 1, CC: 0.24											
Indiana													IN-01 [14-17] R: 1, CC: 0.98					IN-02 [18-22] R: 3, CC: 0.36, D: 1									
Iowa																											
Kansas																											
Kentucky	KY-01 [2-7] R: 2, CC: 0.71						KY-02 [8-12] R: 6, CC: 0.45					KY-03 [13-17] R: 10, CC: -0.62, D: 2					KY-04 [18-22] R: 12, CC: 0.78, D: 3										
Louisiana													LA-01 [12-17] R: 1, CC: -0.48					LA-02 [18-27] R: 3, CC: -0.22									
Maine																ME-01 [17-22] R: 7, CC: 0.43, D: 1											
Maryland	MD-01 [1-2] R: 6		MD-02 [3-7] R: 8, CC: 0.91					MD-03 [8-22] R: 9, CC: -0.26, D: 2																			
Massachusetts	MA-01 [1-2] R: 8		MA-02 [3-7] R: 14, CC: 0.32					MA-03 [8-12] R: 17, CC: 0.93, D: 1					MA-04 [13-16] R: 20, CC: -0.4, D: 1					MA-05 [17-22] R: 13, CC: 0.86									
Michigan																											
Minnesota																											
Mississippi																MS-01 [15-22] R: 1, CC: -0.1, D: 1											
Missouri																MO-01 [17-22] R: 1, CC: -0.3, D: 1											
Montana																											
Nebraska																											
Nevada																											
New Hampshire	NH-01 [1-2] R: 3		NH-02 [3-7] R: 4, CC: -0.24					NH-03 [8-12] R: 5, CC: -0.59					NH-04 [13-22] R: 6, CC: 0.39														
New Jersey	NJ-01 [1-2] R: 4		NJ-02 [3-7] R: 5, CC: -0.59, D: 1					NJ-03 [8-27] R: 6, CC: -0.36, D: 6																			
New Mexico																											
New York	NY-01 [1-2] R: 6		NY-02 [3-7] R: 10, CC: 0.68, D: 1					NY-03 [8-12] R: 17, CC: -0.17, D: 1					NY-04 [13-17] R: 27, CC: 0.36, D: 2					NY-05 [18-22] R: 34, CC: 0.72, D: 1									
North Carolina	NC-01 [1-2] R: 5		NC-02 [3-7] R: 10, CC: 0.9, D: 1					NC-03 [8-12] R: 12, CC: 0.99, D: 2					NC-04 [13-27] R: 13, CC: 0.63, D: 6														
North Dakota																											
Ohio													OH-01 [8-12] R: 1, CC: 0.99					OH-02 [13-17] R: 6, CC: 0.57					OH-03 [18-22] R: 14, CC: 0.87, D: 1				
Oklahoma																											
Oregon																											
Pennsylvania	PA-01 [1-2] R: 8		PA-02 [3-7] R: 13, CC: 0.26, D: 2					PA-03 [8-12] R: 18, CC: 0.32, D: 3					PA-04 [13-17] R: 23, CC: -0.87, D: 4					PA-05 [18-22] R: 26, CC: -0.04, D: 3									
Rhode Island	RI-01 [1-2] R: 1		RI-02 [3-62] R: 2, CC: 0.26, D: 4																								
South Carolina	SC-01 [1-2] R: 5		SC-02 [3-7] R: 6, CC: 0.44, D: 1					SC-03 [8-12] R: 8, CC: 0.96, D: 1					SC-04 [13-27] R: 9, CC: 0.33, D: 5														
South Dakota																											
Tennessee							TN-01 [4-7] R: 1, CC: 0.2					TN-02 [8-12] R: 3, CC: 0.62					TN-03 [13-17] R: 6, CC: 0.35, D: 1					TN-04 [18-22] R: 9, CC: 0.88					
Texas																											
Utah																											
Vermont	VT-01 [2-7] R: 2, CC: 0.76						VT-02 [8-12] R: 4, CC: 0.92					VT-03 [13-17] R: 6, CC: 0.73					VT-04 [18-27] R: 5, CC: 0.48										
Virginia	VA-01 [1-2] R: 10, D: 1		VA-02 [3-7] R: 19, CC: 0.69					VA-03 [8-12] R: 22, CC: 0.96, D: 2					VA-04 [13-17] R: 23, CC: -0.63, D: 7					VA-05 [18-22] R: 22, CC: 0.68, D: 4									
Washington																											
West Virginia																											
Wisconsin																											
Wyoming																											

## Correlation between District Population Size and Incumbency Tenure Duration in the U. S. House

Appendix 2 - Size and Tenure Correlation by State

Year	1833	1835	1837	1839	1841	1843	1845	1847	1849	1851	1853	1855	1857	1859	1861	1863	1865	1867	1869	1871
<b>Census</b>				6					7					8					9	
<b>Congress</b>	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42
<b>Apportionment</b>	5				6				7				8							
Total US.....	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.91	0.91	0.91	0.91	0.91	0.90	0.90	0.90	0.90	0.89	0.89	0.89	0.89
<b>State</b>																				
Alabama	AL-03 [23-27] R: 5, CC: 0.82, D: 1								AL-04 [28-37] R: 7, CC: 0.46, D: 1								AL-05 [38-42] R: 6, CC: 0.93, D: 1			
Alaska																				
Arizona																				
Arkansas					AR-01 [24-32] R: 1, CC: 0.48								AR-02 [33-37] R: 2, CC: 0.47				AR-03 [38-42] R: 3, CC: 0.61, D: 1			
California									CA-01 [31-37] R: 2, CC: 0.29								CA-02 [38-42] R: 3, CC: 0.51			
Colorado																				
Connecticut					CT-04 [28-57] R: 4, CC: 0.7, D: 3															
Delaware																				
Florida									FL-01 [29-42] R: 1, CC: -0.28											
Georgia	GA-06 [23-27] R: 9, CC: 0.13, D: 2								GA-07 [28-37] R: 8, CC: 0.42, D: 1								GA-08 [38-42] R: 7, CC: 0.63, D: 1			
Hawaii																				
Idaho																				
Illinois	IL-02 [23-27] R: 3, CC: 0.93, D: 1				IL-03 [28-32] R: 7, CC: 0.55				IL-04 [33-37] R: 9, CC: 0.54, D: 1				IL-05 [38-42] R: 14, CC: -0.03, D: 1							
Indiana	IN-03 [23-27] R: 7, CC: -0.55				IN-04 [28-32] R: 10, CC: -0.13				IN-05 [33-37] R: 11, CC: 0.9, D: 2											
Iowa					IA-01 [29-37] R: 2, CC: -0.13								IA-02 [38-42] R: 6, CC: -0.04, D: 1							
Kansas													KS-01 [37-42] R: 1, CC: 0.38							
Kentucky	KY-05 [23-27] R: 13, CC: 0.16, D: 1				KY-06 [28-37] R: 10, CC: -0.24, D: 1								KY-07 [38-42] R: 9, CC: 0.3, D: 2							
Louisiana					CT-03 [28-37] R: 4, CC: -0.11, D: 3								CT-04 [38-42] R: 5, CC: 1, D: 2							
Maine	ME-02 [23-27] R: 8, CC: -0.75, D: 2				ME-03 [28-32] R: 7, CC: 0.42, D: 1				ME-04 [33-37] R: 6, CC: -0.36				ME-05 [38-42] R: 5, CC: 0.06, D: 1							
Maryland	MD-04 [23-27] R: 8, CC: -0.02, D: 3				MD-05 [28-37] R: 6, CC: 0.77								MD-06 [38-42] R: 5, CC: -0.54							
Massachusetts	MA-06 [23-27] R: 12, CC: 0.53, D: 2				MA-07 [28-32] R: 10, CC: -0.56, D: 6				MA-08 [33-37] R: 11, CC: 0.91, D: 1				MA-09 [38-42] R: 10, CC: 0.92							
Michigan	MI-01 [25-27] R: 1, CC: -0.02				MI-02 [28-32] R: 3, CC: -0.02, D: 1				MI-03 [33-37] R: 4, CC: 0.36				MI-04 [38-42] R: 6, CC: 0.66							
Minnesota													MN-01 [35-42] R: 2, CC: -0.06							
Mississippi	MS-02 [23-27] R: 2, CC: 0.09, D: 1				MS-03 [28-32] R: 4, CC: 0.2				MS-04 [33-37] R: 5, CC: 0.12, D: 1											
Missouri	MO-02 [23-27] R: 2, CC: 0.62				MO-03 [28-32] R: 5, CC: 0.85				MO-04 [33-37] R: 7, CC: 0.71, D: 1				MO-05 [38-42] R: 9, CC: 0.66, D: 2							
Montana																				
Nebraska																	NE-01 [40-47] R: 1, CC: -0.14,			
Nevada													NV-01 [38-97] R: 1, CC: 0.38							
New Hampshire	NH-05 [23-27] R: 5, CC: 0.47				NH-06 [28-32] R: 4, CC: 0.48				NH-07 [33-47] R: 3, CC: 0.08, D: 1											
New Jersey					NJ-04 [28-42] R: 5, CC: 0.63, D: 1															
New Mexico																				
New York	NY-06 [23-27] R: 40, CC: -0.36, D: 3				NY-07 [28-32] R: 34, CC: 0.88, D: 3				NY-08 [33-37] R: 33, CC: 0.64, D: 1				NY-09 [38-42] R: 31, CC: 0.12, D: 2							
North Carolina	NC-05 [28-32] R: 9, CC: -0.19				NC-06 [33-37] R: 8, CC: 0.98				NC-07 [38-42] R: 7, CC: 0.94, D: 1											
North Dakota																				
Ohio	OH-04 [23-27] R: 19, CC: -0.6				OH-05 [28-37] R: 21, CC: 0.09, D: 6								OH-06 [38-42] R: 19, CC: 0.74, D: 2							
Oklahoma																				
Oregon													OR-01 [36-52] R: 1, CC: 0.81, D: 2							
Pennsylvania	PA-06 [23-27] R: 28, CC: -0.32, D: 7				PA-07 [28-32] R: 24, CC: 0.05, D: 5				PA-08 [33-37] R: 25, CC: 0.88, D: 5				PA-09 [38-42] R: 24, CC: 0.67, D: 5							
Rhode Island																				
South Carolina					SC-05 [28-32] R: 7, CC: 0.45, D: 2				SC-06 [33-37] R: 6, CC: 0.81, D: 1				SC-07 [38-42] R: 4, CC: 0.65							
South Dakota																				
Tennessee	TN-05 [23-27] R: 13, CC: -0.57, D: 1				TN-06 [28-32] R: 11, CC: 0.94, D: 1				TN-07 [33-37] R: 10, CC: -0.6, D: 1				TN-08 [38-42] R: 8, CC: 0.23							
Texas					TX-01 [29-37] R: 2, CC: 0.12, D: 1								TX-02 [38-42] R: 4, CC: 1							
Utah																				
Vermont					VT-05 [28-32] R: 4, CC: 0.18				VT-06 [33-47] R: 3, CC: 0.03, D: 1											
Virginia	VA-06 [23-27] R: 21, CC: 0.45				VA-07 [28-32] R: 15, CC: -0.69, D: 3				VA-08 [33-37] R: 13, CC: -0.4, D: 3				VA-09 [38-42] R: 8, CC: 1, D: 1							
Washington																				
West Virginia													WV-01 [38-42] R: 3, CC: 0.67							
Wisconsin					WI-01 [31-37] R: 3, CC: 0.56, D: 1								WI-03 [38-42] R: 6, CC: 0.76, D: 1							
Wyoming																				

**Correlation between District Population Size and Incumbency Tenure Duration in the U. S. House**

Appendix 2 - Size Tenure Correlation by State

Year	1873	1875	1877	1879	1881	1883	1885	1887	1889	1891	1893	1895	1897	1899	1901	1903	1905	1907	1909	1911					
<b>Census</b>				10					11					12					13						
<b>Congress</b>	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62					
<b>Apportionment</b>	9				10				11				12												
Total US.....	0.89	0.88	0.88	0.88	0.88	0.87	0.87	0.87	0.86	0.86	0.85	0.85	0.85	0.85	0.85	0.84	0.84	0.83	0.82	0.82					
<b>State</b>																									
Alabama	AL-06 [43-52] R: 8, CC: 0.94, D: 2										AL-07 [53-62] R: 9, CC: 0.87, D: 2														
Alaska																									
Arizona																									
Arkansas	AR-04 [43-47] R: 4, CC: 0.98					AR-05 [48-52] R: 5, CC: 0.91					AR-06 [53-57] R: 6, CC: 0.97					AR-07 [58-62] R: 7, CC: 0.21, D: 5									
California	CA-03 [43-47] R: 4, CC: 0.97					CA-04 [48-52] R: 6, CC: 0.45					CA-05 [53-57] R: 7, CC: 0.96					CA-06 [58-62] R: 8, CC: 0.94, D: 1									
Colorado	CO-01 [44-52] R: 1, CC: 0.12										CO-02 [53-57] R: 2, CC: 1					CO-03 [58-62] R: 3, CC: 0.01									
Connecticut																									
Delaware																									
Florida	FL-02 [43-57] R: 2, CC: 0.28										FL-03 [58-62] R: 3, CC: 0.9														
Georgia	GA-09 [43-47] R: 9, CC: 0.8, D: 1					GA-10 [48-52] R: 10, CC: 0.63					GA-11 [53-62] R: 11, CC: 0.82, D: 3														
Hawaii																									
Idaho											ID-01 [51-62] R: 1, CC: 0.54														
Illinois	IL-06 [43-47] R: 19, CC: 0.93, D: 2					IL-07 [48-52] R: 20, CC: 0.17, D: 2					IL-08 [53-57] R: 22, CC: 0.2, D: 3					IL-09 [58-62] R: 25, CC: 0.75, D: 4									
Indiana	IN-06 [43-72] R: 13, CC: 0.62, D: 6																								
Iowa	IA-03 [43-47] R: 9, CC: -0.46, D: 1					IA-04 [48-72] R: 11, CC: 0.87, D: 4																			
Kansas	KS-02 [43-47] R: 3, CC: 0.87					KS-03 [48-52] R: 7, CC: 0.12, D: 1					KS-04 [53-72] R: 8, CC: 0.76, D: 3														
Kentucky	KY-08 [43-47] R: 10, CC: 0.65, D: 1					KY-09 [48-72] R: 11, CC: 0.5, D: 8																			
Louisiana	CT-05 [43-57] R: 6, CC: 0.69, D: 5										CT-06 [58-62] R: 7, CC: -0.55, D: 4														
Maine											ME-06 [48-72] R: 4, CC: -0.35, D: 5														
Maryland	MD-07 [43-82] R: 6, CC: 0.5, D: 8																								
Massachusetts	MA-10 [43-47] R: 11, CC: -0.27, D: 4					MA-11 [48-52] R: 12, CC: -0.5					MA-12 [53-57] R: 13, CC: 0.89, D: 3					MA-13 [58-62] R: 14, CC: 0.96, D: 3									
Michigan	MI-05 [43-47] R: 9, CC: 0.63, D: 2					MI-06 [48-52] R: 11, CC: 0.97, D: 2					MI-07 [53-62] R: 12, CC: 0.94, D: 3														
Minnesota	MN-02 [43-47] R: 3, CC: 0.89					MN-03 [48-52] R: 5, CC: 0.01					MN-04 [53-57] R: 7, CC: 0.98					MN-05 [58-62] R: 9, CC: 0.69									
Mississippi	MS-05 [43-47] R: 6, CC: 0.77					MS-06 [48-57] R: 7, CC: 0.57, D: 1					MS-07 [58-72] R: 8, CC: 0.58, D: 3														
Missouri	MO-06 [43-47] R: 13, CC: 0.96, D: 2					MO-07 [48-52] R: 14, CC: 0.85, D: 2					MO-08 [53-57] R: 15, CC: -0.06, D: 1					MO-09 [58-72] R: 16, CC: -0.27, D: 8									
Montana											MT-01 [51-62] R: 1, CC: 0.43														
Nebraska	D: 1					NE-02 [48-52] R: 3, CC: -0.43, D: 1					NE-03 [53-72] R: 6, CC: 0.69, D: 3														
Nevada																									
New Hampshire											NH-08 [48-112] R: 2, CC: -0.05, D: 4														
New Jersey	NJ-05 [43-52] R: 7, CC: 0.57, D: 1										NJ-06 [53-57] R: 8, CC: 0.96, D: 2										NJ-07 [58-62] R: 10, CC: 0.05, D: 1				
New Mexico																									
New York	NY-10 [43-47] R: 33, CC: 0.93, D: 4					NY-11 [48-57] R: 34, CC: 0.55, D: 12					NY-12 [58-62] R: 37, CC: 0.86, D: 7					NM-01 [62-66] R: 1, CC: 0.01									
North Carolina	NC-08 [43-47] R: 8, CC: 0.67, D: 1					NC-09 [48-57] R: 9, CC: -0.35, D: 2					NC-10 [58-72] R: 10, CC: 0.74, D: 4														
North Dakota											ND-01 [51-57] R: 1, CC: 0.12					ND-02 [58-62] R: 2, CC: -0.31									
Ohio	OH-07 [43-47] R: 20, CC: 0.25, D: 1					OH-08 [48-62] R: 21, CC: 0.42, D: 7										OK-01 [60-62] R: 5, CC: 0.97									
Oklahoma																									
Oregon											OR-02 [53-62] R: 2, CC: -0.37, D: 1														
Pennsylvania	PA-10 [43-47] R: 27, CC: 0.61					PA-11 [48-52] R: 28, CC: -0.51, D: 5					PA-12 [53-57] R: 30, CC: 0.82, D: 8					PA-13 [58-62] R: 32, CC: 0.53, D: 10									
Rhode Island																									
South Carolina	SC-08 [43-47] R: 5, CC: 0.2					SC-09 [48-72] R: 7, CC: 0.63, D: 8																			
South Dakota											SD-01 [51-62] R: 2, CC: 0.54, D: 2														
Tennessee	TN-09 [43-72] R: 10, CC: 0.79, D: 7																								
Texas	TX-03 [43-47] R: 6, CC: 0.93, D: 1					TX-04 [48-52] R: 11, CC: 0.85					TX-05 [53-57] R: 13, CC: -0.62, D: 5					TX-06 [58-62] R: 16, CC: 0.99, D: 1									
Utah											UT-01 [54-62] R: 1, CC: 0.93														
Vermont											VT-07 [48-72] R: 2, CC: -0.2, D: 1														
Virginia	VA-10 [43-47] R: 9, CC: 0.71, D: 1					VA-11 [48-72] R: 10, CC: 0.66, D: 12																			
Washington											WA-01 [51-52] R: 1, CC: 1					WA-02 [53-57] R: 2, CC: 0.11					WA-03 [58-62] R: 3, CC: -0.22, D: 1				
West Virginia											WV-02 [48-57] R: 4, CC: 0.22					WV-03 [58-62] R: 5, CC: -0.38									
Wisconsin	WI-04 [43-47] R: 8, CC: 0.39					WI-05 [48-52] R: 9, CC: -0.02, D: 2					WI-06 [53-57] R: 10, CC: 0.88, D: 1					WI-07 [58-72] R: 11, CC: 0.04, D: 4									
Wyoming											WY-01 [51-112] R: 1, CC: -0.16, D: 1														

## Correlation between District Population Size and Incumbency Tenure Duration in the U. S. House

Appendix 2 - Size Tenure Correlation by State

Year	1913	1915	1917	1919	1921	1923	1925	1927	1929	1931	1933	1935	1937	1939	1941	1943	1945	1947	1949	1951	1953	1955	1957	1959	1961																						
<b>Census</b>				14					15					16					17					18																							
<b>Congress</b>	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87																						
<b>Apportionment</b>	13				14				15				16				17																														
Total US.....	0.81	0.80	0.79	0.78	0.76	0.75	0.73	0.72	0.71	0.70	0.70	0.68	0.65	0.62	0.57	0.53	0.47	0.42	0.34	0.24	0.15	0.02	-0.04	-0.02	-0.04																						
<b>State</b>																																															
Alabama	AL-08 [63-72] R: 10, CC: 0.66, D: 4									AL-09 [73-87] R: 9, CC: 0.28, D: 3																																					
Alaska																																															
Arizona	1 [62-77] R: 1, CC: -0.28															AZ-02 [78-87] R: 2, CC: -0.24																															
Arkansas																																															
California	CA-07 [63-72] R: 11, CC: 0.82, D: 7									CA-08 [73-77] R: 20, CC: 1, D: 5									CA-09 [78-82] R: 23, CC: -0.61, D: 2									AR-08 [83-87] R: 6, CC: -0.72, D: 1																			
Colorado	CO-04 [63-92] R: 4, CC: 0.3, D: 4																																														
Connecticut																																															
Delaware																																															
Florida	FL-04 [63-72] R: 4, CC: -0.1									FL-05 [73-77] R: 5, CC: 0.86									FL-06 [78-82] R: 6, CC: -0.9									FL-07 [83-87] R: 8, CC: 0.98, D: 1																			
Georgia	GA-12 [63-72] R: 12, CC: 0.61, D: 5																																														
Hawaii																																															
Idaho	ID-02 [63-112] R: 2, CC: -0.32, D: 1																																														
Illinois	IL-10 [63-77] R: 27, CC: -0.08, D: 12															IL-11 [78-82] R: 26, CC: 0.96, D: 7												IL-12 [83-87] R: 25, CC: 0.51, D: 6																			
Indiana																																															
Iowa																																															
Kansas																																															
Kentucky	KS-05 [73-77] R: 7, CC: -0.83															KS-06 [78-87] R: 6, CC: -0.34, D: 2																															
Louisiana	CT-07 [63-102] R: 8, CC: 0.38, D: 11																																														
Maine																																															
Maryland																																															
Massachusetts	MA-14 [63-72] R: 16, CC: 0.33, D: 9									MA-15 [73-77] R: 15, CC: 0.95, D: 3									MA-16 [78-87] R: 14, CC: 0.77, D: 3									MD-08 [83-87] R: 7, CC: 0.77																			
Michigan	MI-08 [63-72] R: 13, CC: 0.74, D: 6																																														
Minnesota	MN-06 [63-72] R: 10, CC: -0.57, D: 3																																														
Mississippi																																															
Missouri	MS-08 [73-82] R: 7, CC: 0.76															MS-09 [83-87] R: 6, CC: 0.64																															
Montana	MO-10 [73-82] R: 13, CC: 0.02, D: 3																																														
Nebraska	MT-02 [63-102] R: 2, CC: 0.44, D: 1																																														
Nevada	NE-04 [73-77] R: 5, CC: -0.09, D: 1															NE-05 [78-87] R: 4, CC: -0.63, D: 1																															
New Hampshire																																															
New Jersey	NJ-08 [63-72] R: 12, CC: 0.87, D: 6									NJ-09 [73-87] R: 14, CC: 0.01, D: 4																																					
New Mexico	2-77] R: 1, CC: 0.29, D: 1																																														
New York	NY-13 [63-72] R: 43, CC: 0.94, D: 13															NY-14 [73-82] R: 45, CC: -0.06, D: 24												NY-15 [83-87] R: 43, CC: 0.54, D: 1																			
North Carolina																																															
North Dakota	ND-03 [63-72] R: 3, CC: 0.83, D: 1									ND-04 [73-77] R: 2, CC: 0.27									ND-05 [78-92] R: 2, CC: 0.07, D: 2																												
Ohio	OH-09 [63-72] R: 22, CC: 0.77, D: 4									OH-10 [73-77] R: 24, CC: 0.21, D: 4									OH-11 [78-87] R: 23, CC: 0.66, D: 2																												
Oklahoma	OK-02 [63-72] R: 8, CC: 0.62, D: 2									OK-03 [73-77] R: 9, CC: -0.43, D: 2									OK-04 [78-82] R: 8, CC: 0.87, D: 2									OK-05 [83-107] R: 6, CC: -0.41																			
Oregon	OR-03 [63-77] R: 3, CC: -0.21, D: 2																																														
Pennsylvania	PA-14 [63-72] R: 36, CC: 0.98, D: 11									PA-15 [73-77] R: 34, CC: -0.23, D: 6									PA-16 [78-82] R: 33, CC: 0.52, D: 7									PA-17 [83-87] R: 30, CC: 0.78, D: 8																			
Rhode Island	RI-03 [63-72] R: 3, CC: 0.73																																														
South Carolina	SC-10 [73-112] R: 6, CC: -0.12, D: 8																																														
South Dakota	SD-02 [63-72] R: 3, CC: 0.92																																														
Tennessee	SD-03 [73-97] R: 2, CC: -0.14															TN-10 [73-77] R: 9, CC: -0.96, D: 4												TN-11 [78-82] R: 10, CC: 0.94										TN-12 [83-92] R: 9, CC: -0.74, D: 5									
Texas	TX-07 [63-72] R: 18, CC: 0.74, D: 4									TX-08 [73-82] R: 21, CC: 0.08, D: 4									TX-09 [83-87] R: 22, CC: 0.92, D: 1																												
Utah	UT-02 [63-97] R: 2, CC: -0.25, D: 1																																														
Vermont																																															
Virginia	VT-08 [73-112] R: 1, CC: 0.12															VA-12 [73-82] R: 9, CC: -0.34, D: 3												VA-13 [83-102] R: 10, CC: -0.55, D: 1																			
Washington	WA-04 [63-72] R: 5, CC: 0.94																																														
West Virginia	WV-04 [63-87] R: 6, CC: 0.56, D: 5																																														
Wisconsin																																															
Wyoming	WI-08 [73-92] R: 10, CC: 0.97, D: 6																																														

## Correlation between District Population Size and Incumbency Tenure Duration in the U. S. House

Appendix 2 - Size Tenure Correlation by State

Year	1963	1965	1967	1969	1971	1973	1975	1977	1979	1981	1983	1985	1987	1989	1991	1993	1995	1997	1999	2001	2003	2005	2007	2009	2011			
<b>Census</b>				19					20					21					22					23				
<b>Congress</b>	88	89	90	91	92	93	94	95	96	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111	112			
<b>Apportionment</b>	18				19				20				21				22											
Total US.....	-0.01	0.02	-0.01	0.00	0.09	0.23	0.34	0.37	0.34	0.26	0.11	-0.14	-0.26	-0.24	-0.05	0.79	0.96	1.00	1.00	1.00	—							
<b>State</b>																												
Alabama	AL-10 [88-92] R: 8, CC: -0.52, D: 1								AL-11 [93-112] R: 7, CC: -0.71, D: 1																			
Alaska	CC: 0.95, D: 1																											
Arizona	AZ-03 [88-92] R: 3, CC: 0.99								AZ-04 [93-97] R: 4, CC: 0.85								AZ-05 [98-102] R: 5, CC: 0.13				AZ-06 [103-107] R: 6, CC: 0.97				AZ-07 [108-112] R: 8			
Arkansas	AR-09 [88-112] R: 4, CC: -0.73																											
California	CA-11 [88-92] R: 38, CC: 1, D: 5								CA-12 [93-97] R: 43, CC: -0.86, D: 4								CA-13 [98-102] R: 45, CC: 0.98, D: 2				CA-14 [103-107] R: 52, CC: 0.99, D: 4				CA-15 [108-112] R: 53, D: 1			
Colorado									CO-05 [93-97] R: 5, CC: 0.27								CO-06 [98-107] R: 6, CC: 0.1								CO-07 [108-112] R: 7			
Connecticut																												
Delaware																												
Florida	FL-08 [88-92] R: 12, CC: 0.87								FL-09 [93-97] R: 15, CC: -0.33								FL-10 [98-102] R: 19, CC: 0.59, D: 1				FL-11 [103-107] R: 23, CC: 0.93				FL-12 [108-112] R: 25			
Georgia																	GA-14 [103-107] R: 11, CC: 0.94				GA-15 [108-112] R: 13							
Hawaii	HI-02 [88-112] R: 2, CC: 0.28, D: 1																											
Idaho																												
Illinois	IL-13 [88-97] R: 24, CC: 0.75, D: 6								IL-14 [98-102] R: 22, CC: 0.84, D: 3								IL-15 [103-107] R: 20, CC: -0.83				IL-16 [108-112] R: 19							
Indiana									IN-09 [98-107] R: 10, CC: -0.4												IN-10 [108-112] R: 9							
Iowa	IA-07 [88-92] R: 7, CC: -0.13								IA-08 [93-102] R: 6, CC: -0.68												IA-09 [103-112] R: 5, CC: -0.1							
Kansas	KS-07 [88-102] R: 5, CC: 0.61																				KS-08 [103-112] R: 4, CC: -0.5							
Kentucky	KY-12 [88-102] R: 7, CC: 0.87, D: 2																				KY-13 [103-112] R: 6, CC: -0.12, D: 1							
Louisiana																					CT-08 [103-112] R: 7, CC: 0.81							
Maine	ME-08 [88-112] R: 2, CC: 0.13																											
Maryland	MD-09 [88-112] R: 8, CC: 0.18, D: 2																											
Massachusetts	MA-17 [88-97] R: 12, CC: -0.77, D: 2								MA-18 [98-102] R: 11, CC: -0.75, D: 1								MA-19 [103-112] R: 10, CC: 0.69, D: 1											
Michigan	MI-11 [88-97] R: 19, CC: 0.58, D: 1								MI-12 [98-102] R: 18, CC: 0.82								MI-13 [103-107] R: 16, CC: 0.91, D: 1				MI-14 [108-112] R: 15							
Minnesota	MN-08 [88-112] R: 8, CC: 0.51, D: 1																											
Mississippi	MS-10 [88-107] R: 5, CC: -0.68, D: 1																				MS-11 [108-112] R: 4							
Missouri	MO-12 [88-97] R: 10, CC: -0.65, D: 2								MO-13 [98-112] R: 9, CC: 0.18, D: 1																			
Montana																					MT-03 [103-112] R: 1, CC: -0.81							
Nebraska	NE-06 [88-112] R: 3, CC: 0.63																											
Nevada									NV-02 [98-107] R: 2, CC: 0.04												NV-03 [108-112] R: 3							
New Hampshire																												
New Jersey	NJ-10 [88-97] R: 15, CC: 0.64								NJ-11 [98-102] R: 14, CC: -0.47, D: 2								NJ-12 [103-112] R: 13, CC: 0.93, D: 1											
New Mexico									NM-03 [98-112] R: 3, CC: -0.12, D: 1																			
New York	NY-16 [88-92] R: 41, CC: -0.36, D: 1								NY-17 [93-97] R: 39, CC: -0.12								NY-18 [98-102] R: 34, CC: 0.91, D: 3				NY-19 [103-107] R: 31, CC: 0.96				NY-20 [108-112] R: 29			
North Carolina	NC-13 [88-102] R: 11, CC: 0.1, D: 2																				NC-14 [103-107] R: 12, CC: -0.3				NC-15 [108-112] R: 13			
North Dakota									ND-06 [93-112] R: 1, CC: -0.32																			
Ohio	OH-12 [88-92] R: 24, CC: 0.44, D: 3								OH-13 [93-97] R: 23, CC: -0.38, D: 2								OH-14 [98-102] R: 21, CC: 0.82				OH-15 [103-107] R: 19, CC: 0.98				OH-16 [108-112] R: 18			
Oklahoma																					OK-06 [108-112] R: 5							
Oregon									OR-05 [98-112] R: 5, CC: -0.1																			
Pennsylvania	PA-18 [88-92] R: 27, CC: 0.99, D: 7								PA-19 [93-97] R: 25, CC: -0.96, D: 2								PA-20 [98-102] R: 23, CC: 0.78				PA-21 [103-107] R: 21, CC: -0.86				PA-22 [108-112] R: 19			
Rhode Island																												
South Carolina																												
South Dakota									SD-04 [98-112] R: 1, CC: -0.29																			
Tennessee									TN-13 [93-97] R: 8, CC: 0.05, D: 1								TN-14 [98-112] R: 9, CC: -0.4											
Texas	TX-10 [88-92] R: 23, CC: 0.82, D: 2								TX-11 [93-97] R: 24, CC: -0.89, D: 1								TX-12 [98-102] R: 27, CC: 0.96, D: 1				TX-13 [103-107] R: 30, CC: -0.61, D: 1				TX-14 [108-112] R: 32			
Utah									UT-03 [98-112] R: 3, CC: 0.53																			
Vermont																												
Virginia																					VA-14 [103-112] R: 11, CC: 0.36, D: 2							
Washington									WA-07 [98-102] R: 8, CC: 0.89												WA-08 [103-112] R: 9, CC: 0.54							
West Virginia	WV-05 [88-92] R: 5, CC: -0.81								WV-06 [93-102] R: 4, CC: -0.24, D: 1												WV-07 [103-112] R: 3, CC: 0.78							
Wisconsin									WI-09 [93-107] R: 9, CC: 0.31, D: 2												WI-10 [108-112] R: 8							
Wyoming																												