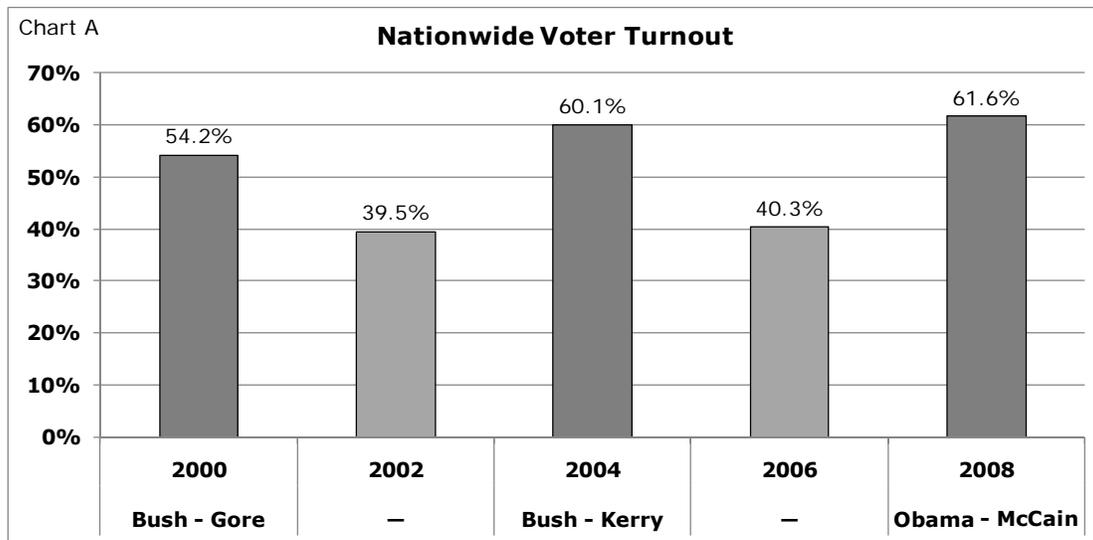# Legislative District Population Size and Voter Turnout

31-October-2009

1. INTRODUCTION

For any given election, a portion of those eligible to vote decide to cast a ballot while others fail to participate. Presumably, those who vote are fulfilling a civic or personal duty while many who choose *not* to vote either believe that their vote is inconsequential or they are indifferent as to the outcome of the elections.

Despite an individual's disposition with respect to voting, his or her decision whether to vote is often affected by a variety of factors. Perhaps the most conspicuous factor is the level of the highest office being decided in a given election cycle. Relative to nationwide voter turnout, note the comparison in the chart below between the presidential and "off-year" biennial elections.

Chart A — **Nationwide Voter Turnout**

2000	2002	2004	2006	2008
54.2%	39.5%	60.1%	40.3%	61.6%
Bush - Gore	—	**Bush - Kerry**	—	**Obama - McCain**

In addition, for any given election in any given district, other factors which could affect voter turnout include:

- Whether any additional higher offices (other than President) are being decided; e.g., federal Senator (six-year term), state governor or state Senator (who usually serve four-year terms).

- Whether any key races are either hotly contested or perceived as predetermined; e.g., is the incumbent certain to win?

- Whether the candidates competing for any given office appear to be fundamentally similar or dissimilar relative to their positions and views.

- Whether there are any significant referendums or propositions on the ballot.

- The number of offices being decided by the election (which can vary from one location to another in any given state).

Beyond the conspicuous factors that affect voter turnout, there are a number of subtler factors which have been evaluated and discussed in various scholarly papers.[1] Many of these factors are relatively abstract and often relate to sociological or economic factors. This report does not attempt to summarize those other factors.

Though a myriad of factors which affect voter turnout have been identified, there is one factor which appears to have been overlooked in the literature: *the population size of the electoral districts*. That relationship is the subject of this report. This analysis compares voter turnout in smaller electoral districts to that of larger districts. The scope of this analysis is the following five election years: 2000, 2002, 2004, 2006, and 2008.

2. SOURCES OF DATA USED IN THIS ANALYSIS

2.1. Voter Turnout

The voter turnout data is provided by the "United States Election Project" (USEP) of George Mason University.[2] The USEP provides estimates of "voting-eligible population" (VEP) which is the number of citizens who are eligible to vote.[3] USEP also provides an estimate of the number of people who voted in each biennial election. This data is provided by state and in the aggregate for the total U.S.

2.2. District Population Size

2.2.1 Population Data

The U.S. Census Bureau provides the "Annual Population Estimates 2000 to 2008" in a spreadsheet.[4] For the analysis described in this report, the population data from the even numbered election years was used.[5]

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[1] Examples of such papers include the following:
  "Rational Choice andTurnout", John H.Aldrich, Feb. 1993
  "The Institutional and Political Factors that Influence Voter Turnout" John Merrifield, Nov. 1991
  "Voting and Nonvoting: A Multi-Election Perspective", Lee Sigelman; Philip W. Roeder; Malcolm E. Jewell; Michael A. Baer, Nov 1985

[2] Information about the United States Election Project, as well as the data they provide, can be accessed at this link:
  http://elections.gmu.edu/

[3] The Voting-Eligible Population (VEP) is based on the total population of those who are of legal voting age, minus those who are ineligible to vote (i.e., non-citizens and ineligible felons as defined by state law). A complete description of the methodology used to estimate VEP is provided by the "United States Elections Project" web site referenced in footnote 2.

[4] This information can be downloaded from: http://www.census.gov/popest/states/NST-ann-est.html

2.2.2   District Population Size

For each of the years evaluated, each state's district population size is determined by dividing the state's total population by the number of electoral districts.[6] This calculation is made for each of the following areas:

- Lower House districts of the State Legislature

- Upper House districts of the State Legislature (i.e., state senate)

- Total State Legislature (both houses combined) [7]

- Congressional Districts of the federal House of Representatives

3.   ANALYTICAL METHODOLOGIES AND RESULTS

3.1.   Data Vectors

Each of the four district sizes identified above is evaluated for each of the five biennial election years. This results in 20 pairs of data vectors, each one consisting of *district population sizes* and the statewide *voter turnout percentages* for all the states. This data is then analyzed using a *ratio analysis* and a *correlation analysis*. The ratio analysis compares the voter turnout of the group of states with the smallest districts to that of the group of states with the largest districts. The correlation analysis calculates the coefficient of correlation, for each data vector, between the *district population sizes* and the *voter turnout percentages*.

3.2.   Ratio Analysis

3.2.1   Grouping the Data

Each of the twenty data vectors are sorted from smallest to largest districts (i.e., the state with the smallest average district size is at the top of the list, and the state with the largest district size is last on the list). Each of the 20 vectors is then divided into tertiles (thirds) as follows:

- S is the group of states with the *smallest* district sizes.

- L is the group of states with the *largest* district sizes.

- M is the group containing the remaining states in the middle.

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[5] The USCB data is the "resident population" data and therefore does not include estimates for U.S. citizens living overseas. Consequently, these population totals are slightly less (in some states) than the population totals actually used to calculate the apportionment. However, this discrepancy is immaterial relative to the analysis that was undertaken for this report.

[6] The actual district population sizes may vary slightly from the average value calculated for this report. However, because the principle of *one person one vote* is rigorously imposed intrastate, any discrepancies will be insignificant.

[7] This is the total number of all representatives in both houses of the state legislature. This is not a "district size" *per se;* instead, it provides a representational ratio relative to the state legislatures in order to provide another point of comparison.

The *S* and *L* groups consist of 17 states each while the *M* group contains the remaining 16 states (to total 50).[8] This data is then analyzed using two different methods. The first method is to compare the *average* voter turnout percentage of *S* and *L*. The second method is to compute the *aggregate* voter turnout for each of the three groups. The aggregate voter turnout percentage of *S* is then compared with that of *L*.

3.2.2   Average Voter Turnout

For *each* of the three groups, the *average* voter turnout of all the states in that group is calculated. The average voter turnout for the largest group (*L*) is then subtracted from that of the smallest group (*S*). For example, for the 2006 election, average *S* and *L* turnout percentages for the lower house districts were *46.07%* and *41.64%*, respectively. Therefore, voter turnout in the *S* group of states was *4.43* percentage points *greater* than that of the *L* group; this result is indicated in the table below under "Lower House Districts" for the year 2006.

Table 1

	Average Voter Turnout: Absolute Difference between *S* and *L*			
Year	**Lower House Districts**	**Upper House Districts**	**Both Houses Combined**	**Congressional Districts**
2000	2.72%	2.41%	2.55%	1.13%
2002	5.86%	5.85%	6.17%	3.71%
2004	1.60%	1.66%	1.44%	2.88%
2006	4.43%	4.93%	4.39%	4.03%
2008	0.39%	0.20%	-0.22%	4.01%

Relative to the analysis above, note that the voter turnout in the group with the smallest districts sizes (*S*) is larger than that of the *L* group *in every instance except one*. (The exception is "Both Houses Combined" for the 2008 election year.)

3.2.3   Aggregate Voter Turnout

For *each* of the three groups (*S*, *L* & *M*), the *aggregate* voter turnout percentage is calculated. That is, for each group of states, the total number of people who *actually voted* and the total number who are *eligible to vote* is totaled. Dividing the first number (total voted) by the second number (total eligible) returns the aggregate voter-turnout percentage for each group of states.

The voter turnout percentage of the largest group (*L*) is then subtracted from that of the smallest group (*S*). For example, for the 2006 election, the average *S* and *L* turnout percentages for the lower house districts were *43.66%* and *40.25%*, respectively. Therefore, voter turnout in the *S* group of states was *3.41* percent-

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[8] Because one state (Nebraska) does not have an upper house, the data for the "Upper House Districts" includes only 49 states. In that case, the *S* and *L* groups consist of 16 states each while the *M* group contains the remaining 17 states (to total 49).

age points greater than that of the *L* group; this result is indicated in the table below under "Lower House Districts" for the year 2006.

Table 2

Aggregate Voter Turnout: Absolute Difference between *S* and *L*				
Year	Lower House Districts	Upper House Districts	Both Houses Combined	Congressional Districts
2000	1.52%	1.24%	1.32%	-0.61%
2002	3.98%	4.16%	4.01%	4.65%
2004	1.31%	1.68%	1.11%	5.42%
2006	3.41%	3.66%	3.26%	7.46%
2008	0.43%	0.56%	0.08%	5.58%

Note that the voter turnout in the group of states with the smallest districts sizes (*S*) is larger than that of the *L* group *in every instance except one*. (The exception is "Congressional Districts" for the 2000 election year.)

Not surprisingly, the results of the aggregate voter turnout analysis are, relatively speaking, similar to the results of the average voter turnout analysis. The reason for conducting a ratio analysis of the data two different ways was only to confirm the analytical results.

3.3. Correlation Analysis

For each of the 20 data vectors, the coefficient of correlation is calculated between the states' *district sizes* and *voter turnout percentages*. The results of this analysis are provided by the table below.

Table 3

Correlation Analysis Results				
Year	Lower House Districts	Upper House Districts	Both Houses Combined	Congressional Districts
2000	-0.11	-0.13	-0.12	-0.22
2002	-0.31	-0.34	-0.32	-0.06
2004	-0.15	-0.17	-0.15	-0.07
2006	-0.22	-0.26	-0.23	-0.10
2008	-0.08	-0.11	-0.09	-0.17

Note that in all cases there is a *negative correlation*. That is, voter turnout tends to *decrease* as the district population size *increases*. However, only in a few cases can the values be said to be potentially significant (e.g., greater than *.25*). That notwithstanding, given the many factors which affect voter turnout, the fact that 100% of these instances manifest a *negative correlation* is certainly consistent with the thesis that district population size is one of those factors.

4. CONCLUSIONS

As shown in this report, the correlation analysis (between district size and voter turnout) indicates that voter turnout tends to *decrease* as the district population size *increases*. This correlation is further confirmed by the two ratio analyses (which compare the states with the smallest electoral districts to those with the largest). Though the magnitudes of these values may appear relatively small, in light of the myriad of other variables which also affect voter turnout, *these results suggest that there is a significant correlative relationship between district population size and voter turnout.*

Of course, this conclusion does not mean that the voter turnout in a smaller district will always be greater than that of a larger district. As explained in the introduction of this report, there are numerous other factors which affect voter turnout and, moreover, many of these factors vary from district to district for any given election cycle. A more comprehensive multivariate analysis is needed to confirm the significance of district population size *vis-à-vis* these other causal factors.

In addition to those other factors, the effect of overlapping districts of various sizes needs to be taken into account. For any given state, the same voter may be voting in a relatively large congressional district *and* in a very small state legislature district (or *vice versa*). Moreover, situated within such districts may be municipal districts that are either exceptionally populous or quite small. Because this analysis only used aggregate statewide voter data, the interplay among those various district sizes (relative to voter turnout) is not evaluated; therefore, a more comprehensive analysis is needed that takes into account (or adjusts for) the affect of overlapping electoral districts of various sizes.

It is not difficult to imagine why district population size would affect voter turnout, especially if we personalize the question. Even dutiful citizens who are reliable voters cannot help but wonder if their vote will make a difference, while those who are more cynical have all but abandoned participatory democracy. Given that perspective, it is logical that a citizen residing in a smaller district (such as those of New Hampshire) is more likely to believe that his or her vote "will make a difference", when compared to someone voting in a massively-sized district (such as those of California).