Center for Communication & Civic Engagement

In the Margins: Political Victory in the Context of Error, Residual Votes, and Incident Reports in 2004

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Abstract

In very close elections, the margin of error for the system of collecting and counting votes may be greater than the margin of victory for a candidate. We evaluate three ways of thinking about error in an election: technology error, residual votes, and incident reports. In 2004, we find seven states where electoral outcomes were certified even though the margin of error in that state's voting process was greater than the margin of victory for the declared winner: Florida, Kentucky and South Dakota certified Republican Party candidates for the US Senate; electoral college votes in Iowa and New Mexico were assigned to Bush; electoral college votes in New Hampshire were assigned to Kerry; Washington state certified a Democratic Party candidate for Governor. In each case, the electoral outcome was legitimated by elections officials, not the electorate, because in very close races the voting process cannot reveal electoral intent. Public policy solutions are offered, such as run-off elections, standardized data reporting about error rates, and open source technology solutions.

I. Introduction

Any collection of public opinion, whether through a poll or an election, is a sample.[1] Every sample of public opinion has a margin of error – the smaller the better. Whereas public policy polls collect small, purposefully or randomly selected people to query, elections are large open processes where all citizens are queried for their opinion.

Pollsters report the margin of error for their polls to help readers understand the validity of the sample. In elections, it is often Secretaries of State and legal institutions that validate the sample of opinion collected on voting day. However, elections still have a margin of error.

Since Secretaries of State do not consistently report the data needed for a good comparable measure of the margin of error in elections, CampaignAudit.org researched three of the conceptual ways of estimating election error. First, we calculated the margins of victory in each state for

[1] This paper is based on data collected through CampaignAudit.org. For useful feedback, I am grateful to Mark Farrelly, Eszter Hargittai, and James Witte. Please direct correspondence to Dr. Philip N. Howard, Assistant Professor, Department of Communication, University of Washington, 227 Communications Building, Box 353740, Seattle, Washington, 98195-3740.

the winners of the presidential race, senate races, and governor races. Second, we did the calculations for three different possible ways of comparing error around the country: error in voting machines and counting processes, residual votes, and incident reports.

In this data memo, we explore some of the different ways of estimating the error rate in the 2004 election. There are no pure measures of error in elections, but here we explore three ways of analyzing data about the outcomes of error — technology error, residual votes, and reports of incidents on Election Day.

Inherently, this research has political implications, but we first begin by saying something about what this report is not describing. We are not arguing for recalls, recounts, or different political outcomes. We are not recommending one balloting procedure over another. We are not working with statistical models about social inequality, electoral administration and political outcomes. Instead, this is intended to be a focused exploration of margins of error and margins of victory in 2004.

All of the data reviewed in this short article is publicly available. However, this is considered a white paper because it is just beginning the process of academic peer review. We welcome all critical feedback to help refine our assumptions and calculations.

II. Margins of Victory and Margins of Error

The real problem of error is that we can never be sure about what the problematic ballots reveal. If one percent of all ballots cast are lost or damaged, were they all for the Republican candidate or all for the Democratic candidate? Statisticians call this the distribution of non-response. We could guess that the small number of lost or damaged ballots are evenly distributed between the candidates (half the lost votes were for the Republican candidate, the other half for the Democratic candidate) or that the distribution of lost or damaged ballots is the same as the distribution of ballots that have been securely counted (the proportions of lost votes reflect the proportions of confirmed votes). But this would only be an assumption. What if the distribution was different? What if the distribution in most geographical areas was the same, but the distribution in a key area was different, tipping the race in a surprising way? In some cases we can never answer these questions.

Our goal is to identify crisis states where the administration of elections seems to fail several of the different ways of calculating error. Table 1 lists all states, with known margins of victory and three ways of thinking about margins of error.

A. Margins of Victory.

Using the best available numbers, we calculated the margin of victory as the difference between the number of votes for the first-place candidate

and the number of votes for the second-place candidate. We considered races for the President, governor, and U.S. Senate in the 2004 season. Many of these numbers have been officially certified by state elections offices, but sometimes we had to use the next best source. In order, these were The New York Times, CNN, and The Washington Post. For calculations about the Presidential candidates' margins of error we tried two methods, one where we drew all state results from the same source, USAToday, and one where we used the best available numbers from the state elections officials and if necessary, a secondary source. You can view our spreadsheet on margins of victory in the 2004 election.

B. Margins of Victory and Technology Error Rates.

Since there are many kinds of machines used in collecting and counting votes, one plausible way to calculate the error rate of an election sample is to use the known error rate of the machines used in the sampling. Voting systems have to be certified by elections commissions, and the voting systems are only approved when the commission feels that the machine has an error rate of zero percent and that any error rate would derive from human mistake. However, every engineer knows that an error rate is above zero, and including human error, voting systems tend to have a tangible error rate, usually in the low single digits.

In 2000, a reputable Caltech/MIT study calculated the average error rate by different machines and counting processes: paper ballots (1.3 percent), lever machines (1.7 percent), punch cards (VotoMatic 3.0 percent, Datavote 1.0 percent), optically scanned ballots (1.2 percent), electronic touch screen (1.6 percent), and hand counting (2.0 percent). In other words, in hand counting ballots, two of every hundred ballots cast get lost, damaged, or destroyed and do not get used in tabulating the final results.

By 2004, some counties had bought new voting systems, while others used the same machines they had used in previous elections. If we assume that the same machines had the same error rates in 2004 as they did in 2000, and we know which machines were used in counties in 2004, we can average out the error rate across the counties in each state. We used a data file of national equipment standards (available online here) we mapped these percentages onto 3,140 counties where the voting technology system was known. These records used slightly different terms for voting technologies, but assuming the error rate did not change from 2000, we might assume the error rates were similar in 2004: touch screen or other e-voting (1.6 percent), lever (1.7 percent), central or precinct-based optical scans (1.2 percent), hand counted paper ballots (2.0 percent) and punch cards (1.0%).

In each state, we calculated the average error rate across all the counties in that state for which data was available. For now, this process

gives an error rate for the state, averaged by county. The table below identifies Louisiana, New York, Connecticut and South Dakota as having the highest error rates, while Ohio, Oregon, Washington and Illinois having the lowest error rates.

There are, however several states where the margin of technology error was higher than the margin of victory for a presidential candidate (Iowa, New Mexico, New Hampshire), the margin of victory for a gubernatorial candidate (Washington), or the margin of victory for a Senate candidate (Florida, Kentucky, South Dakota).

Even though Washington has a low error rate, the margin of victory in the gubernatorial race is smaller. It may be effectively impossible to determine a winner with the sample of votes collected on November 2. Of course, there are procedural ways of determining a winner: our legal system provides a method for choosing the winner, and the winner in Washington State is whoever is declared the winner by the Secretary of State and survives any subsequent court challenges.

The problem is not that election races can be close races. But problems do arise when public opinion is evenly split between two candidates and election systems are not refined enough to measure such a narrow split.

The next step will be to use the technology error rates for county to calculate how many votes in each county might have been affected. Obviously, a machine with a high error rate will have a greater impact on the outcome of an election if it is sitting in the most populous county. You can view our spreadsheet on technology error in the 2004 election.

C. Margins of Victory and Residual Vote Rates.

Using the residual vote rates being calculated by MIT political scientist Charles Stewart for 2004, we can also explore voting error in terms of the incidence of spoiled and unmarked ballots associated with an election. In many states, the residual vote rate dropped between 2000 and 2004. Unfortunately, several states do not report total turnout, but as of this week, the three states with the highest residual vote rates are Nebraska (1.8 percent), Idaho (2.4 percent), and New Mexico (2.5 percent).

It should be noted that the residual vote rates for Iowa (1.0 percent) and New Mexico are higher than the margin of victory for the Presidential race in that state. In other words, the winning Presidential candidate in Iowa and New Mexico won by a smaller percentage than the number of spoiled and unmarked ballots in those states. Similarly, the residual vote rates for Florida, South Dakota and Kentucky are higher than the margins of victory for Senators from those states. The same is true for the residual vote rate in Washington's Gubernatorial race. You can view our spreadsheet on residual votes in the 2004 election.

D. Margins of Victory and Reported Incidents.

There have always been mistakes in administering elections, and ideally we would be able to calculate a precise error rate using records of all the known problems. Unfortunately, detailed records of errors are rarely kept and rarely shared. But during the 2004 campaign, many reports of problems were collated online, and VerifiedVoting.org collected more than 36,000 reports of problems at polling stations and counting rooms across the countries. Officially collected data would be better than self-reported data, but we can still use this dataset to help explore relationship between margin of victory and error.

First, we chose only incidents that were reported on or after Nov. 2 pertaining to incidents on Election Day publicly available at Voteprotect.org. Second, we divided the number of incidents reported in each state by the number of voters in that state, to come up with a ratio of incidents for every million voters. In half the states, there were fewer than 100 incidents for every million voters, and on average, nationwide, each state reported about 180 incidents. However, the five states with the highest incident rates for every million voters include Ohio (473), Pennsylvania (538), Colorado (556), Arizona (887), and New Mexico (1122). Washington, D.C., also had an unusually high incident rate (685).

Many of the reported about incidents are people who intended to vote but were prevented from registering a ballot once they arrived at the polling station. Thus, we also calculated the rate of reported incidents for every million eligible voters, and for every million registered voters. Consistently, Washington, D.C., and five states listed above had the highest incident rates per eligible voter and per registered voter. You can view our spreadsheet on incident reports per voter, eligible voter, and registered voter in the 2004 election.

We should restate that this is self-reported data, and in some states voters have been more inclined to report problems than the voters in other states. In many states it is one or two counties that are 'statistical outliers' in that they have most of the reported incidents for that state and drive up the state's overall average. While this way of thinking about error rates is useful, this particular data is probably the least reliable for national comparison. Moreover, that the national average is *only* 180 incidents for every *million* voters is a tribute to the hard work of the nation's public election officials and the many volunteers who help manage elections. Nonetheless, this data helps us identify the kinds of problems that raise a state's error rates.

III. Conclusion

There is no one way to estimate error in elections, but thinking about error rates is crucial whenever there is a small margin of victory in a political race. Table 1 presents the margins of victory for presidential,

gubernatorial and senate candidates in 2004, along with three ways of thinking about the margins of error for those races. Table 2 pulls out all the races where the margin of error was greater than the margin of victory in 2004.

CampaignAudit.org is continuing its research. The next step will be to weigh the error by total voting population, and to expand the comparisons to other races, such as the US House of Representatives. We will explore other ways of measuring error around the country such as, comparing the proportions of residual votes across states and the proportions of reported incidents at polling stations. Finally, we will identify crisis states, where the margins of error in 2004 were larger than the margins of victory for a winning candidate.

We should begin to debate the public policy solutions to the problem of error margins in elections. State's elections officials should systematize they way they collect and report error statistics, and publicly report this data. This study took a team of 10 people two weeks to collect and analyze data on margins of victory and error. Legislators should develop the means for doing run-off elections in situations where it is known that recounting the same sample of votes will not clarify the intent of the electorate.

Perhaps most important, states should invest in open-source technologies that reduce error rates in elections. Since many companies build voting technologies and withhold access to design specifications to protect their intellectual property, these technologies are difficult to assess for their error rates. Open-source election technologies would allow us to confidently assess and compare rates of error in elections.

Table 1: Margins of Victory and Error, All States, Percentages, 2004

State	Margins of Victory			Margins of Error		
	President	Governor	Senator	Residual Vote Rate	Technology Error Rate	Incidents per Million Voters
Alabama	25.8	-	35.2	a	1.2	146.6
Alaska	27.7	-	4.5	0.5	1.6	54.6
Arizona	10.3	-	56.1	1.3	1.2	887.7
Arkansas	9.7	-	11.8	1.4	1.3	90.2
California	10.4	-	21.2	1.5	1.2	176.6
Colorado	4.7	-	4.8	0.9	1.3	556.0
Connecticut	10.3	-	33.7	1.0	1.7	20.9
Delaware	7.6	5.1	-	-	1.6	56.5
District of Columbia	79.8	-	-	1.1	-	685.1
Florida	5.0	-	1.1	0.4	1.3	409.7
Georgia	16.6	-	17.9	0.4	1.6	204.3
Hawaii	8.8	-	56.5	0.6	1.4	42.3
Idaho	38.1	-	98.4	2.4	1.4	52.6
Illinois	10.1	6.7	42.9	1.8	1.1	192.6
Indiana	20.7	7.7	24.4	1.7	1.5	100.6
Iowa	0.7	-	42.5	1.0	1.3	5.4
Kansas	26.1	-	41.6	A	1.4	40.4
Kentucky	19.8	-	1.3	0.9	1.6	66.2
Louisiana	14.5	-	21.7	a	1.7	309.7
Maine	12.4	-	30.8	-	1.5	41.3
Maryland	12.4	-	30.8	-	1.6	103.9
Massachusetts	25.0	-	-	0.5	1.4	41.9
Michigan	3.4	-	-	0.7	1.3	145.0
Minnesota	3.5	-	-	a	1.4	19.0
Mississippi	20.0	-	-	a	1.2	59.1
Missouri	7.2	3.0	13.3	a	1.2	224.6
Montana	20.2	4.4	-	1.2	1.5	31.9
Nebraska	16.7	-	-	1.8	1.5	74.1
Nevada	2.6	-	25.7	0.3	1.6	173.2
New Hampshire	1.4	2.2	32.6	1.2	1.5	32.8
New Jersey	6.2	-	-	0.8	1.6	288.2
New Mexico	0.8	-	-	2.5	1.5	1122.1
New York	17.5	-	46.1	0.8	1.7	270.9
North Carolina	12.4	12.1	4.6	-	1.4	138.1
North Dakota	27.1	43.0	35.8	1.0	1.3	0.0
Ohio	2.1	-	27.8	1.7	1.1	473.8
Oklahoma	31.1	-	11.5	a	1.2	11.6
Oregon	3.9	2.7	31.7	0.8	1.2	29.8
Pennsylvania	2.3	-	10.8	a	1.4	538.0
Rhode Island	19.6	--	-	-	1.2	46.4
South Carolina	17.1	-	9.6	-	1.5	238.2
South Dakota	21.5	-	1.2	1.7	2.0	10.5
Tennessee	14.3	-	-	1.1	1.4	100.2
Texas	22.9	-	-	a	1.5	218.4
Utah	41.5	13.4	39.6	1.5	1.5	52.4
Vermont	20.1	20.8	46.1	0.6	1.6	36.1
Virginia	8.2	-	-	0.8	1.5	146.0
Washington	7.2	0.0	12.0	0.8	1.3	117.5
West Virginia	13.0	29.2	-	1.7	1.1	36.5
Wisconsin	25.2	-	22.3	a	1.6	248.5
Wyoming	39.8	-	-	1.0	1.3	29.4

Note: (a) State does not report total turnout, so residual vote cannot be calculated. All figures are rounded. The National Election Standard report did not differentiate between punch card machines, even though there big differences in error rates for this equipment. To be conservative, we took the one of the lowest error rate for this equipment, 1.0%. The margin of victory for the candidate was calculated as the absolute value of the difference between the first and second place finisher, divided by the total votes for the top two candidates.

Sources: Margins of victory from certified state elections offices as of December 8, 2004, otherwise secondary news source. Margins of error from multiple sources: national equipment standards from VerifiedVoting.org, residual vote rates from Charles Steward (2004), technology error rates from Caltech/MIT 2000. All calculations and raw data available at www.campaignaudit.org.

Table 2: Within the Margins—Races Where the Margin of Error was Greater than the Margin of Victory, Percentages, 2004

Races	Margin of Victory	Margin of Error	
		Residual Vote Rate	Technology Error Rate
President (Electoral College Vote in Parenthesis)			
Iowa (7)	0.7	1.0	1.3
New Hampshire (4)	1.4	1.2	1.5
New Mexico* (5)	0.8	2.5	1.5
US Senate Races			
Florida	1.1	0.4	1.3
Kentucky	1.3	-	1.6
South Dakota	1.2	1.7	2.0
Governor Races			
Washington	0.0	0.8	1.3

Note: Figures are rounded. * Additionally, this state had one of the highest rates of reported election-day incidents per million voters.

Sources: Margins of victory from certified state elections offices as of December 8, 2004, otherwise secondary news source. Margins of error from multiple sources: national equipment standards from VerifiedVoting.org, residual vote rates from Charles Stewart (2004), technology error rates from Caltech/MIT 2000. All calculations and raw data available at www.campaignaudit.org.

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Raw Data

Summary2.xls
MarginsOfVictory2.xls
EquipmentErrorRates2.xls
IncidentErrorRates2.xls
ResidualVoteRates2.xls