Elections Performance Index

Methodology

February 2013

Table of Contents

Introduction

The Elections Performance Index (EPI) is the first objective measure created to comprehensively assess how election administration functions in each state.

The EPI is based on 17 indicators:

- Absentee Ballots Rejected
- Absentee Ballots Unreturned
- Data Completeness
- Disability- or Illness-Related Voting Problems
- Military and Overseas Ballots Rejected
- Military and Overseas Ballots Unreturned
- Online Registration Available
- Post-Election Audit Required
- Provisional Ballots Cast
- Provisional Ballots Rejected
- Registration or Absentee Ballot Problems
- Registrations Rejected
- Turnout
- Voter Registration Rate
- Voting Information Look-Up Tools
- Voting Technology Accuracy
- Voting Wait Time

By analyzing quantifiable data on these indicators, the EPI makes it possible to compare election administration performance across states, from one election cycle to the next, and to begin to identify best practices and areas for improvement.

The 17 indicators can be used by policy makers, election officials, and other citizens to shed light on issues related to such areas as voter registration, turnout, waiting times, absentee ballots, use of online technology, military and overseas voters, provisional ballots, access for people with disabilities, and the impact of voting machines or ballot design.

The online EPI interactive report presents these indicators in a format that allows a user to dig deeper and find the context behind each measurement. Using this tool, the user can see individual state pages that tell the stories about the states and individual indicator pages that explain what each indicator means and how to interpret differences.

Although we are clear about the assumptions we make, we understand that people may disagree about what ought to be included in such an index. Our tool provides users with the functionality to adjust the indicators to create their own index.

The EPI presented here is based on the 2008 and 2010 elections and will be updated once 2012 data become available.

How the EPI Was Developed

The Pew Center on the States worked with Professor Charles Stewart III of the Massachusetts Institute of Technology (MIT) to convene an advisory group (see Appendix for list of members) of leading state and local election officials from 12 states, as well as academics from the country's top institutions, to help guide the development of an Elections Performance Index.

Meeting five times over a development period between July 2010 and July 2012, the group borrowed the best ideas from indices in other public policies areas, identified and validated existing data sources, and determined the most useful ways to group these data.

To be useful, the right data must be married to an understanding of how elections function. Along with our advisory group, we surveyed a range of data sources to find approximately 40 potential indicators of election administration that could be used to understand performance or policy in this field. The challenge of identifying this data and compiling such measurements resulted in Pew's February 2012 report *Election Administration by the Numbers*, which provides an overview of elections data and how to use them.

We submitted these initial 40 measurements to strong validity and reliability tests and worked with the advisory committee to narrow them down over the course of two years. The 17 indicators presented here are the final measurements as decided in consultation with the advisory committee. We describe in more detail below how these indicators were chosen, the process of where these data came from, how they were prepared, and how they are used in the indicators.

Choice of Indicators

The Elections Performance Index is built using 17 indicators, with an overall score that calculates the average of all indicator rankings for each state.

Deciding which indicators to include in the EPI was an iterative process, in which two broad considerations were kept in mind.

1. Any performance index, regardless of the subject, should reflect a comprehensive understanding of all salient features of the policy process being assessed.
2. Any indicator in the index must conform to a set of quality standards.

In the process of developing the EPI, the staff at Pew—in consultation with Professor Stewart, and its advisory committee—pursued a systematic strategy to ensure that both of these considerations were given due weight.

Comprehensive understanding of election policy and administration

The initial conceptualization of election administration drew upon Heather Gerken's *Democracy Index.*[1] Building off this work, it became clear that a well-run election is one in which all eligible voters can straightforwardly cast ballots (convenience) and in which *only* eligible voters cast ballots, which are counted accurately and fairly (integrity).

Elections can further be broken down into three major administrative phases: registration, voting, and counting.

Combining these two ideas, we can conceptualize a rather simple yet powerful rubric to use in making sure all important features of election administration are accounted for in the construction of an index. This rubric can be summarized as shown below.

[1] Heather K. Gerken, *The Democracy Index: Why Our Election System Is Failing and How to Fix It* (Princeton, N.J.: Princeton University Press, 2009).

Figure 1

	Convenience	Integrity
Registration		
Voting		
Counting		

Each of the six cells in this table reflects a feature of election administration we seek to capture in the EPI. For instance, an EPI should strive to assess how easy it is for eligible voters to register (registration convenience) and how well registration lists are maintained, to ensure that ineligible voters are removed (registration integrity).

This rubric was used throughout the development process to help understand which aspects of elections were well covered by the available indicators and to illuminate areas in which further work was needed to develop indicators.

Throughout the development process, it was apparent that indicators measuring the convenience of voting were much more abundant than indicators measuring security and integrity. This fact represents the current state of election data. Because of the intense policy interest in the security and integrity of elections, working with the elections community to develop a more robust set of integrity-related indicators is a priority of the EPI project moving forward.

It was also apparent that the row depicting "voting" is the phase in which there is the most objective information to help assess the performance of American elections. The mechanics of voting produce copious statistics about how many people engage in different modes of voting (in person on Election Day, in-person early voting, and absentee/vote by mail), along with subsidiary statistics about those modes (for example, how many absentee ballots were requested, how many were returned, how many were rejected and for what reason, etc.). A close second is "registration," which also produces many performance statistics as a byproduct of the administrative workflow.

"Counting" is an area where high-quality measures of election performance remain in relatively short supply. The measures that do exist—such as whether a state required post-election audits—tend to reflect *inputs* into election administration, rather than *outputs* of the process. By inputs, we mean that the measures reflect the presence of "best practices" set into law by the state, rather than outputs that assess the data produced by the performance of a particular election practice. As with the issue of voting security and integrity, the area of vote counting is one in which effort must be expended in the future so that the EPI might cover the process of voting more comprehensively.

Quality standards

The first step of developing the EPI involved taking the conceptualization of election administration and policy reflected in Figure 1 and brainstorming about the different measures that could be associated with each of the six cells in that table.[2] That process, done in collaboration with the advisory committee, initially yielded more than 40 different indicators. Some were well established and easy to construct, such as the turnout rate of states. Others were less so, such as the correlation between canvassed vote counts and audited vote counts.

To move from the list of "candidate indicators" to those that currently appear in the index, we developed criteria to judge whether an indicator was valid and reliable enough for inclusion. Most policy indicator projects think explicitly about this issue; with the advisory group, we surveyed the criteria behind many of today's leading policy indices. These include projects such as the Environmental Performance Index,[3] the County Health Rankings & Roadmaps,[4] the World Justice Project Rule of Law Index,[5] the Doing Business project of the International Finance Corporation and the World Bank,[6] and the Annie E. Casey Foundation's Kids Count index.[7]

Drawing on the work of these other efforts, the EPI adopted the following criteria for helping to decide which candidate indicators to include in the current release of the Elections Performance Index.

1. *Any statistical indicator included in the EPI must be from a reliable source.* Preferably, the source should be governmental; if not, it should demonstrate the highest standards of scientific rigor. Consequently, the EPI relies heavily on sources such as the U.S. Election Assistance Commission, the U.S. Census Bureau, and state and local election departments.
2. *The statistical indicator should be available and consistent over time.* Availability over time serves two purposes. First, from a methodological perspective, it allows us to assess the stability of the measure, which is a standard technique for assessing reliability. Second, it allows the index to evolve to reflect developments with the passing of elections; states should be able to assess whether they are improving and benchmark their most recent performance against past performance, overall goals, or perceived potential. The issue of consistency arises because we want to make sure that an indicator measures the same thing over time, so that changes in a measure reflect changes in policy or performance, not changes in definition.
3. *The statistical indicator should be available and consistent for all states.* Because the EPI seeks to provide comparable measurements, it is important that the measures included in the index be available for all states. However, this is not always possible, given the variation in some state election practices. For instance, some states with Election Day registration do not require the use of provisional ballots; therefore, provisional balloting statistics may not be available for these states. With this allowance in mind, some candidate indicators were excluded because data were available for too few states or because state practices varied so widely that it was impossible to form valid comparisons.
4. *The statistical indicator should reflect a salient outcome or measure of good elections.* In other words, the indicator should reflect a policy area or feature of elections that either affects many people or is prominently discussed in policy circles. An example of a policy area that is salient but affects a relatively small number of voters concerns overseas and military voters, who comprise a small fraction of the electorate but about whom Congress has actively legislated in recent years.
5. *The statistical indicator should be easily understood by the public and have a relatively unambiguous interpretation.* That an indicator should be easily understood is an obvious feature of a policy index. The desire to include indicators with unambiguous interpretations sometimes presented a challenge, for at least two reasons. First, values of some indicators were sometimes the consequence of policy *and* demographic features of the electorate. For instance, academic research demonstrates that

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[2] In doing this brainstorming, it became immediately apparent that some indicators could arguably occupy different cells of the table.
[3] http://epi.yale.edu/
[4] http://www.countyhealthrankings.org/
[5] http://worldjusticeproject.org/rule-of-law-index/
[6] http://www.doingbusiness.org/
[7] http://datacenter.kidscount.org/

registration rates are a result of both the registration laws enacted by states and factors such as education and political interest. In these cases, if it could be shown that changes in policy regularly produced changes in indicators, we included the indicators. Second, some features of election administration—such as the usage rate of provisional ballots or the rejection rates of new voter registrations and absentee ballots—can be interpreted differently. A high provisional ballot usage rate could represent problems with voter registration lists or large numbers of voters who were allowed to vote despite problems with registration lists. Indicators that were deemed highly ambiguous were removed from consideration; indicators with less ambiguity were retained, but more discussion and research are warranted.

6. *The statistical indicator should be produced in the near future.* Because the EPI is envisioned as an ongoing project, it is important that any indicators chosen at this point be continued in the future. In addition, because one function of the EPI is to document changes in policy outputs as states change their laws and administrative procedures, it is important to focus on indicators that can document the effects of policy change. There is no guarantee that any of the indicators that remained in the EPI will be continued into the future. However, the indicators that were chosen were the ones *most likely* to continue, due to being produced by government agencies or as part of ongoing research projects.

Aggregation of Indicators

The EPI is built through the use of 17 indicators of electoral performance. Because election administration is so complex and combines so many different activities, it is illuminating to explore each indicator separately, with an eye toward understanding how particular states perform, both in isolation and in comparison with one another.

However, another way to use the EPI is to combine information from different indicators to develop a summary measure of the performance of elections. It is useful to know how a particular state performs on most measures, relative to other states.

The overall state percentiles and "performance bars" used in the EPI interactive report are based on a method that essentially calculates the average of all indicator rankings for each state. This, by nature of averages, weighs the indicators equally.[8] In addition, the summary measurement, which is calculated using the same basic averaging, whether a user selects all of the indicators in the interactive report or only a few, is what drives the performance bar chart.

However, implementing this method required adjustment for two realities of the data: missing values and the issue of scaling.

Missing values

For many measures, especially those derived from the Election Administration and Voting Survey (EAVS), states had missing data due to the failure of a state—or its counties—to provide the information needed to calculate the indicator.[9] The question arises as to how to rank states in these circumstances. For

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[8] In the process of developing the EPI, the issue of using other aggregation methods was explored with the advisory committee. Among these were methods that gave different weights to different indicators, and methods based on data reduction techniques such as factor analysis. In the end, it was decided that a method that relied on simple averages was the most robust and straightforward. Having all indicators contribute an equal influence to the overall rating is the cleanest approach. It is also the clearest to implement when the data consists of a nontrivial amount of missing data. As the science of election administration develops a more robust empirical basis, and as data collection becomes more complete, there may come a time when the accumulated knowledge could guide alternative approaches to aggregating the data into a bottom-line index number, or even separating out indicators into sub-indices.

[9] As a general matter, we adopted the following rule to decide whether a state would be regarded as missing for the purpose of reporting the value of an indicator: a state was included only if the counties reporting the data necessary to calculate the indicator constituted at least 85% of the registered voters in the state. (For North Dakota, which does not have voter registration, we substituted the voting-age population of counties.) We picked the 85% threshold to ensure that if we were to include data from counties that did not report the necessary data, the overall result for the state would change by only a small

instance, nine states (Alabama, Arkansas, Connecticut, Minnesota, Mississippi, New Mexico, New York, Tennessee, and West Virginia) did not report enough data to calculate the percentage of absentee ballots that were not returned in 2008. In addition, Oregon was excluded from this measure because its use of vote by mail made its EAVS responses incomparable to those of other states. Therefore, we could compute the absentee ballot non-return rate for only 41 states (including the District of Columbia as a state for this and similar comparisons).

To handle situations such as this, we decided to first generate the ranking among the states for which we had data. Then we "normalized" the ranking, setting the top-ranked state for both 2008 and 2010 combined to 1 (or 100 percent) and the bottom-ranked state to 0. In this example, for instance, West Virginia, with a 51.6 percent non-return rate in 2010, would be set to 0, while New Mexico, with a 0 percent non-return rate, would be set to 1. The 39 remaining states would then be set to values that reflected their ranking and were relative to the distance between the high and low values.[10]

Scaling

Another issue that had to be addressed in constructing the EPI was how to scale the indicators before combining them into a summary measure. As discussed, the general strategy was to construct a scale that ran from 0 to 1 for each indicator, with 0 reserved for the state with the lowest performance measure over 2008 and 2010, and 1reserved for the state with the highest measure.

Since many of the indicators are not naturally bound between 0 and 1, it is necessary to estimate what the natural interval is. Based on an indicator's high and low values for 2008 and 2010 combined, states would receive a score between 0 and 1 that proportionately reflected their position between the high and low values. In the instance of the Voting Technology Accuracy indicator, which is based on the residual vote rate, we use data from 2000, 2004, and 2008. As an example of this scaling, we know that the highest residual vote rate since 2000 was 3.85 percent in 2000 in Illinois, while the lowest was 0.28 percent in 2008 in Nevada. Therefore, the lowest residual vote rate found between 2000 and 2008 (0.28 percent) would be set to 1—a lower residual vote rate indicates fewer voting accuracy problems—and the highest residual vote rate (3.85 percent) would be set to zero. All of the remaining states would receive a score between 0 and 1 that reflected proportionately how far within this interval each state's value was.

A shortcoming of this approach is that it may make too much of small differences in performance, especially in a case where most states perform at the high range, with only a few at the low end This is the case with Data Completeness, where many states had rates at or near 100 percent. Thus it seems more valid to use the raw value of the indicator in the construction of a composite index score, rather than the rank.

Data Overview

The Elections Performance Index relies on a variety of data sources, including census data, state-collected data, Pew Center on the States reports, and public surveys. The data sources were selected based on significance at the state level, data collection practices, completeness, and subject matter. Although we present an introduction to these data sources, additional information on their strengths and limitations can

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amount. In other words, we are confident that the statistics reported here are not overly influenced by the inclusion or exclusion of counties due to concerns about missing data. For states with more than 15% missing data (weighted by county registration), we concluded it would be better to exclude them from the presentation than to report an estimated value for these states that was subject to significant revision if the missing data were presented.

[10] The primary alternative to this approach that we considered was to rank all states for which we had data and then place those states missing data immediately below the state with the lowest ranking. We decided against this strategy for two reasons. First, to do so would overly weight the consideration of missing data in the index. The EPI already has one indicator of the completeness of election administration data that was reported, and it seemed excessive to have this measure intrude into the other measures. Second, after simulating different results that varied different rules about handling states with missing data, we discovered that placing states with missing data tended to elevate the ranking of states with a lot of missing data, which would entirely undo the effect of the data-completeness measure.

be found in "Section 1: Datasets for Democracy" in the 2012 Pew report *Election Administration by the Numbers*.

The U.S. Census Bureau

In November of every federal election year, the U.S. Census Bureau conducts a Voting and Registration Supplement (VRS) as part of its Current Population Survey (CPS). The VRS surveys individuals on their election-related activities. The EPI includes two indicators from this data source: Disability- or Illness-Related Voting Problems and Registration or Absentee Ballot Problems.

While the CPS is a monthly survey, the VRS is biennial, conducted every other November following a federal election. In 2010, the VRS interviewed approximately 80,000 eligible voters.[11] While on occasion special questions are included in the VRS, the core set of questions is limited and ascertains whether the respondent (1) voted in the most recent federal election and (2) was registered to vote in that election. Eligible voters who report they did not vote in the most recent federal election are asked *why* they failed to vote.

The Survey of the Performance of American Elections

The Survey of the Performance of American Elections (SPAE) is a public interest survey. SPAE surveyed 10,000 registered voters (200 from each state) via Internet in the week following the 2008 presidential election. Data from this survey were used to create an indicator measuring waiting time to vote.

The Election Administration and Voting Survey

The U.S. Election Assistance Commission administers EAVS, a survey that collects jurisdiction-level data from each state and the District of Columbia on a variety of topics related to election administration for each federal election. EAVS data make up the majority of the EPI's indicators and are used for indicators related to turnout, registration, absentee ballots, military and overseas ballots, and provisional ballots.

The United States Elections Project

The United States Elections Project provides data on the voting-eligible population for presidential and midterm elections. Michael McDonald, an associate professor at George Mason University who holds a Ph.D. in political science, conducts the research for the project.

'Being Online is Not Enough' and 'Being Online is Still Not Enough'

The Pew Center on the States' reports *Being Online is Not Enough* (2008) and *Being Online is Still Not Enough* (2011) reviewed the election Web sites of all 50 states and the District of Columbia. The reports researched whether these sites provide a series of look-up tools to assist voters. The 2008 report identified whether states had a registration status look-up tool and a polling place look-up tool in time for the November 2008 election. The 2011 report identified whether states provided look-up tools for registration status, location of polling places, absentee and provisional ballot information, and precinct-level ballot information in time for the November 2010 election. The look-up tool scores for both years are used to evaluate states on their election Web sites.

[11] **A high percentage of respondents are "informants," that is, respondents within a household who report about the voting behavior of the individual in question.**

Data Cleaning and Modification of the EAVS

The Election Assistance Commission's EAVS data had substantial missing or anomalous information. In order to ensure that the EAVS data included in the EPI were as accurate and complete as possible, we conducted a multistep clean-up process.

Missing data

In some cases, states were missing responses for all of their jurisdictions; in other cases, data were missing for only a few jurisdictions. If a state lacked data for all jurisdictions, we attempted to gather the missing information by contacting the state or counties directly. If a state was missing data for just some jurisdictions, we decided whether to follow up based on the percentage of data missing and the distribution of that data throughout the state. If a state's data total was 85 percent or more complete, we did not follow up on the missing data unless it contained a high-population jurisdiction whose absence meant that a state-level indicator might not representatively reflect elections in that state. If a state's data was less than 85 percent complete, we always followed up on missing data.

We used several different strategies to collect missing data. In nearly all cases, we contacted the state to see if additional information was available. We contacted a state at least four times and reached out to at least two staff people before ceasing attempts at gathering missing data. In specific cases, we contacted local election officials to obtain missing data.

In some cases, we were able to gather missing data ourselves. For example, we were able to find the number of voters from each jurisdiction who participated in the election on various state election Web sites, even if it was not submitted to the Election Assistance Commission.

Finally, we imputed some of the missing data when the EAVS survey asked for the same data in different places throughout its questions. If the missing data could be found in another question, we would replace the missing value with this question's value.

When missing data were found, either from the state or through our own imputations, the data were added to the EAVS data set and used to calculate the indicators.

Anomalous data

Two primary strategies were used to identify anomalous data. First, each of the EAVS-based indicators used a pair of questions to develop the indicator value, such as the number of absentee ballots sent to voters and the number of absentee ballots returned. We looked at each question pair and identified instances where one value contradicted the other—for example, the number of absentee ballots returned exceeded the number of absentee ballots sent out. For these cases, we marked both questions as missing.

For the second strategy, we identified cases where a county's response to a question was statistically improbable ($p<0.0005$), given the responses provided to related questions and the responses provided by other counties in that state. The potentially anomalous values were examined individually and a decision was made as to whether there was a clear flaw in the data reporting. If the response was identified as having an obvious flaw, given the context of other response values, it was set to missing. If examination did not clearly reveal the response to be anomalous as the result of a reporting issue, the response was left as originally reported.

If the anomalous data, now set to missing, resulted in the state missing more than 15 percent of data for any one question, we contacted the state and imputed values using the same procedure used for missing data. If we were able to gather any new data to replace the anomalous data, we included the new information in the dataset and used it to develop the indicators.

Indicators and Data Sources

Indicator	Data Source	Years
Online capabilities		
Voting Information Look-Up Tools	*Being Online is Not Enough* (Pew, 2008) and *Being Online is Still Not Enough* (Pew, 2011)	2008, 2010
Online Registration Available	*Being Online is Not Enough* (Pew, 2008) and *Being Online is Still Not Enough* (Pew, 2011)	2008, 2010
Registration and voting		
Registrations Rejected	EAVS	2008, 2010
Registration or Absentee Ballot Problems	VRS	Off-years (2002, 2006, 2010) vs. on-years (2000, 2004, 2008)
Disability- or Illness-Related Voting Problems	VRS	Off-years (2002, 2006, 2010) vs. on-years (2000, 2004, 2008)
Voter Registration Rate	VRS	2008, 2010
Turnout	United States Elections Project	2008, 2010
Voting Wait Time	SPAE	2008
Voting Technology Accuracy	State election division records	2008
Military and overseas voters		
Military and Overseas Ballots Rejected	EAVS	2008, 2010
Military and Overseas Ballots Unreturned	EAVS	2008, 2010
Post-election audit requirements		
Post-Election Audit Required	EAVS Statutory Overview	2008, 2010
Provisional ballots		
Provisional Ballots Cast	EAVS	2008, 2010

Provisional Ballots Rejected	EAVS	2008, 2010
Absentee ballots		
Absentee Ballots Rejected	EAVS	2008, 2010
Absentee Ballots Unreturned	EAVS	2008, 2010
Data transparency		
Data Completeness	EAVS	2008, 2010

Indicators in Detail

Absentee Ballots Rejected

Data source: Election Administration and Voting Survey

The use of absentee ballots has grown significantly over the past two decades as states have expanded the conditions under which voters may vote absentee. However, not all absentee ballots returned for counting are actually accepted for counting. Absentee ballots may be rejected for a variety of reasons; the two most common, by far, are because the ballot arrived after the deadline (at least 18.4 percent of all rejections in 2008) and/or because there were problems with the signature on the return envelope (at least 18.7 percent of all rejections in 2008).[12]

Coding convention

Expressed as an equation, the domestic absentee ballot rejection rate can be calculated as follows from the EAVS datasets:

$$\textbf{Absentee Ballot Rejection Rate} = \frac{\textit{\textbf{Domestic absentee ballots rejected in the general election}}}{\textit{\textbf{Total participants}}}$$

Data will be missing if a county has failed to provide any of the variables included in the calculation.

Correspondence between variable definition and EAVS variable names

Descriptive name	*2008 EAVS*	*2010 EAVS*
Domestic absentee ballots rejected	c4b	qc4b
Total participants	f1a	qf1a

[12] These figures are taken from the 2008 Election Administration and Voting Survey report issued by the U.S. Election Assistance Commission, Table 34C. The percentages quoted here for rejection rates due to late arrival and signature problems are clearly underestimates, because more than half of rejections are attributed to an "other" or "not categorized" category.

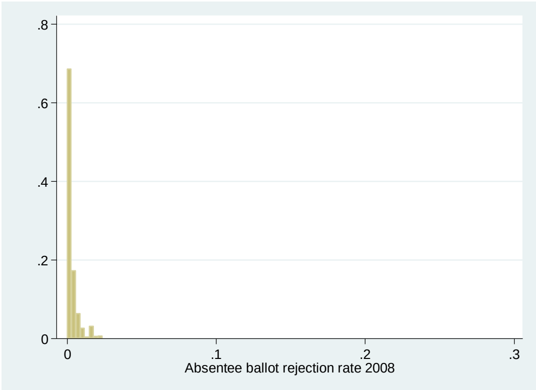
<u>Data availability, county data</u>

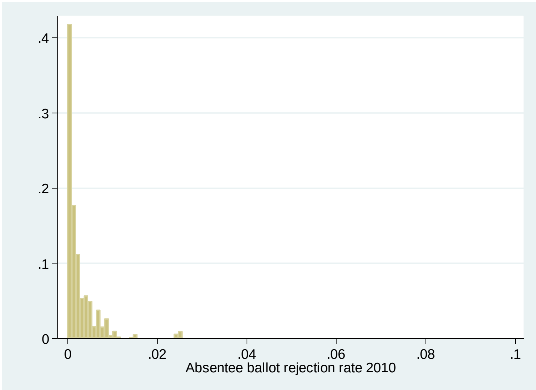
	2008 EAVS				2010 EAVS		
Descriptive name	Var. name	Missing cases, raw	Missing cases, weighted by registered voters		Var. name	Missing cases, raw	Missing cases, weighted by registered voters
Domestic absentee ballots rejected	c4b	440 (9.66%)	378.96 (8.45%)		qc4b	270 (5.84%)	319.57 (6.84%)
Total participants	f1a	144 (3.16%)	61.94 (1.38%)		qf1a	32 (0.69%)	4.91 (0.11%)
Overall		450 (9.87%)	431.05 (9.61%)			275 (5.94%)	320.07 (6.95%)

Because of missing data, it was not possible to compute domestic absentee ballot rejection rates for the following: Alabama, Arkansas, Illinois, Indiana, Mississippi, New York, South Dakota, and West Virginia (2008); and Alabama, Massachusetts, Mississippi, New Mexico, and New York (2010). Data for Oregon (2008 and 2010) and Washington State (2010) were removed because, as vote-by-mail states, their definition of an "absentee ballot" varies significantly from that of other states.[13]

Stability of domestic absentee ballot rejection rates across time

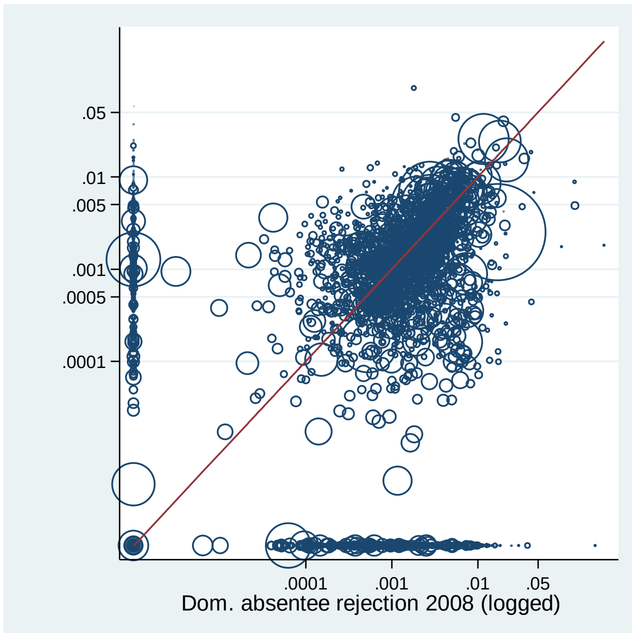
We begin by comparing domestic absentee ballot rejection rates, measured at the county level, for 2010 and 2008. The raw data exhibit what is known as a pronounced "right skew." That is, most counties have very low rejection rates, while a few have relatively high rates. This is illustrated in the following two histograms, which show the distribution of rejection rates for 2008 and 2010 for each U.S. county for which we have the relevant data.[14]





[13] The only county in Washington State to still have precinct place voting in 2010 was Pierce County. However, in 2010 89% of the county voted by mail, according to the county elections office, so we have decided not to include all of Washington State in 2010 as it was almost all vote by mail.
[14] The counties have been weighted by the number of general election participants in 2008.

Because of this pronounced right skew, any scatterplot that compares 2010 values with 2008 values will be misleading—the bulk of observations will be clumped around the origin, with our eye drawn toward the small number of outliers with extremely large values. To deal with this pronounced right skew, it is common to transform the measures by taking logarithms. One problem this creates is that a large fraction of counties had zero domestic absentee ballots rejected in 2008 and/or 2010, and the logarithm of zero is undefined. Therefore, in the scatterplot below, counties with zero rejected ballots have been set to 0.00001, which is slightly below the smallest nonzero usage rate that was actually observed. Finally, so that the influence of larger counties is visually greater than that of smaller counties, we weight the data tokens in proportion to the size of the county.[15]



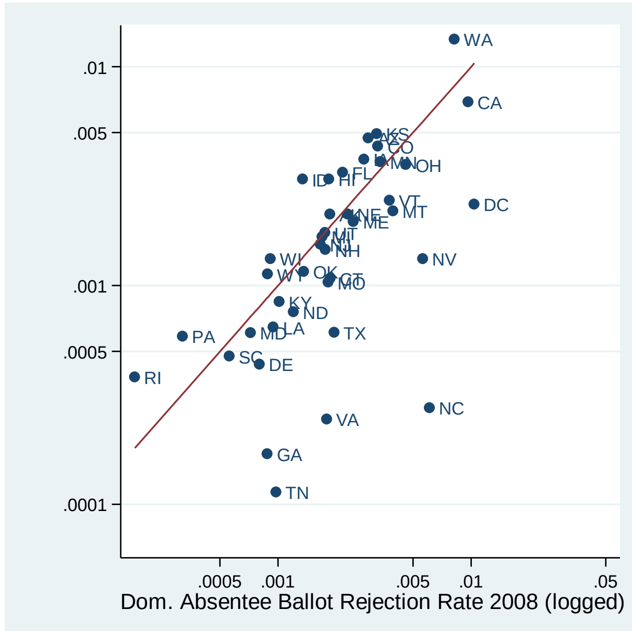
As this graph illustrates, for counties that reported the data necessary to calculate rejection rates in both 2008 and 2010, rates are roughly similar these two years. The Pearson correlation coefficient, which measures the degree of similarity across these two election cycles, is .49, which is below the countywide correlation we observe for the other EAVS-based indicators.[16]

This graph also illustrates how counties that report no rejected domestic absentee ballots one election cycle often report a considerably greater rejection rate the next cycle. Sometimes this is because the county is very small. With domestic absentee ballot rejection rates overall being relatively low—0.3 percent in both 2008 and 2010—a county with only a few hundred voters might very well experience an election cycle in which no domestic absentee ballots were rejected. However, relatively large counties will sometimes report zero absentee ballots in one election cycle and a relatively large number in the other cycle. This sort of behavior calls for further investigation and research. Until such research is conducted, this pattern alerts us to the need to be cautious when using data about the rejection of absentee ballots.

The EPI reports absentee ballot rejection rates at the state level. The statewide rejection rates are similarly right-skewed; therefore it is necessary to translate the rejection rates into logarithms before plotting the rejection rate in 2010 against the rejection rate in 2008.

[15] More precisely, we weight the counties by the number of general election participants in 2008.

[16] The correlation coefficient was calculated on the logged values, weighting each county by the number of general election participants in 2008.



As with the measure calculated at the county level, the indicator calculated at the state level is stable when we compare 2008 with 2010. Indeed, the state aggregates are more highly correlated than the county figures. The Pearson correlation coefficient describing the relationship across the two years is .62, using the values that have been transformed into logarithms.

Absentee Ballots Unreturned

Data source: Election Administration and Voting Survey

Although absentee ballot use has grown as states have loosened the conditions in which voters may vote absentee, not all absentee ballots that are mailed to voters are returned to be counted. In states that maintain permanent absentee lists, which allow voters to receive mail ballots automatically for all future elections, some of this is understandable in terms of voter indifference to particular elections.

It is not hard to imagine that some voters who request an absentee ballot either decide to vote in person[17] or not at all. However, because there is generally no chain of custody maintained for absentee ballots, from the point when they are mailed to voters to when they are received by election officials to be counted, it is also possible for ballots that are mailed back for counting to be lost in transit.

Coding convention

Expressed as an equation, the domestic absentee ballot non-return rate can be calculated as follows from the EAVS datasets:

$$\textbf{Pct. of domestic absentee ballots trans. not returned} = 1 - \frac{\boldsymbol{Returned\ ballots}}{\boldsymbol{Ballots\ transmitted}}$$

Data will be missing if a county has failed to provide any of the variables included in the calculation.

Correspondence between variable definition and EAVS variable names

Descriptive name	*2008 EAVS*	*2010 EAVS*
Total returned absentee ballots	c1b	qc1b
Total absentee ballots sent out	c1a	qc1a

Data availability, county data

	2008 EAVS				2010 EAVS		
Descriptive name	Var. name	Missing cases, raw	Missing cases, weighted by registered voters		Var. name	Missing cases, raw	Missing cases, weighted by registered voters
Total unreturned absentee ballots	c1b	324 (7.11%)	235.14 (5.10%)		qc1b	131 (2.83%)	198.11 (4.42%)
Total absentee ballots sent out	c1a	344 (7.55%)	238.07 (5.17%)		qc1a	126 (2.72%)	251.78 (5.61%)

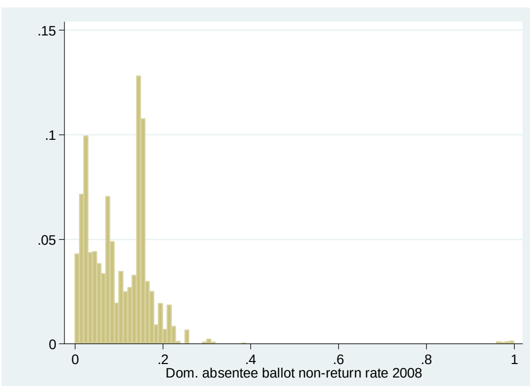
[17] According to the 2008 Election Administration and Voting Survey issued by the Election Assistance Commission, 1% of rejected provisional ballots were because the voter had already voted.

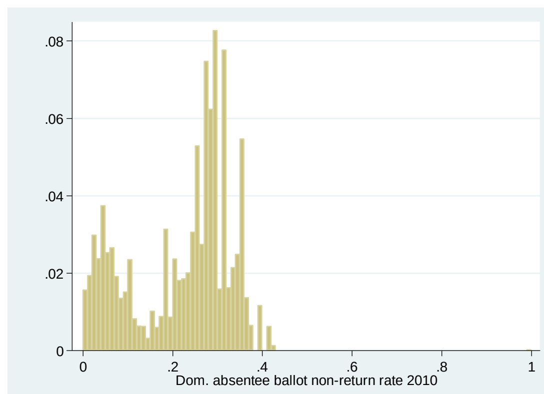
Overall		445 (9.77%)	342.47 (7.63%)			145 (3.13%)	240.65 (5.22%)

Because of missing data, it was not possible to compute domestic absentee ballot non-return rates for the following: Alabama, Arkansas, Connecticut, Minnesota, Mississippi, New Mexico, New York, Tennessee, and West Virginia (2008); and Alabama, Indiana, Mississippi, and New York (2010). Data for Oregon (2008 and 2010) and Washington State (2010) were removed because, as vote-by-mail states, their definition of an "absentee ballot" varies significantly from that of other states.[18]

Comparison of domestic absentee ballot non-return rates across time

We begin by comparing domestic absentee ballot non-return rates, measured at the county level, for 2010 and 2008. The raw data exhibit what is known as a pronounced "right skew." That is, most counties have very low non-return rates, while a few have relatively high rates. This is illustrated in the following two histograms, which show the distribution of non-return rates for 2008 and 2010 for each U.S. county for which we have the relevant data.[19]

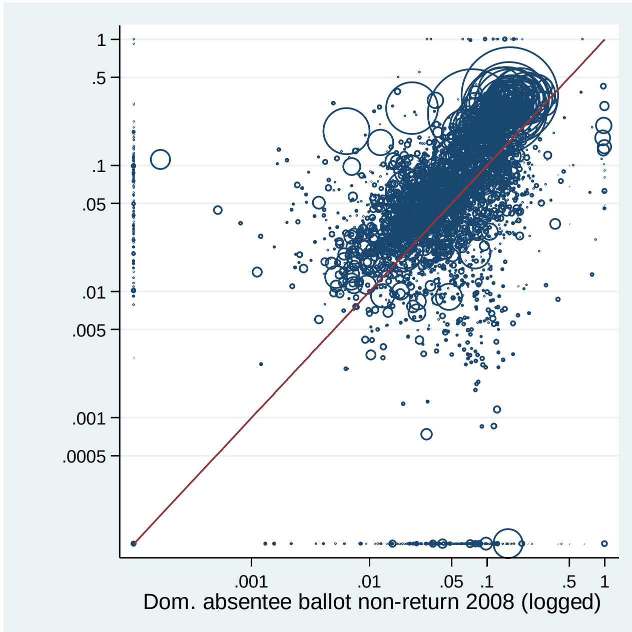




(Although the right skew may not be immediately apparent in these graphs, especially in the graph for 2010, note that there are small numbers of counties represented in the far-right tails of both graphs. The skewness statistic, which is equal to 0 when a distribution is symmetrical and which is positive when it is right-skewed, is quite high in both years, at 6.17 for 2008 and 4.62 for 2010.)

Because of this right skew, any scatterplot that compares 2010 values with 2008 values will be misleading—the bulk of observations will be clumped around the origin, with our eye drawn toward the small number of outliers with extremely large values. To deal with this right skew, it is common to transform the measures by taking logarithms. One problem this creates is that a large fraction of counties had zero non-returned absentee ballots in 2008 and/or 2010, and the logarithm of zero is undefined. Therefore, in the scatterplot below, counties with zero non-returned ballots have been set to 0.0001, which is slightly below the smallest nonzero usage rate that was actually observed. Finally, so that the influence of larger counties is visually greater than that of smaller counties, we weight the data tokens in proportion to the number of absentee ballots mailed out by the county.[20]

[18] The only county in Washington State to still have precinct-place voting in 2010 was Pierce County. See footnote 25 for more information.
[19] The counties have been weighted in proportion to their size or the total absentee ballots mailed in the 2008 general election.
[20] More precisely, we weight the counties by the number of ballots transmitted by the county in 2008.



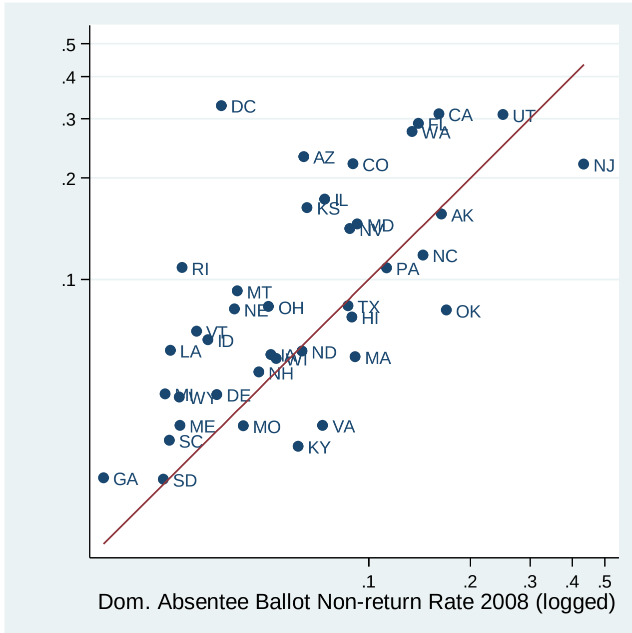
As this graph illustrates, for counties that reported the data necessary to calculate non-return rates in both 2008 and 2010, rates are similar these two years. The Pearson correlation coefficient, which measures the degree of similarity across these two election cycles, is .62.[21]

This graph also illustrates how counties that report no unreturned domestic absentee ballots one election cycle sometimes report a considerably greater non-return rate the next cycle. However, non-return rates are relatively high—10.2 percent in 2008 and 22.2 percent in 2010. Therefore, it is unusual for a county to report zero unreturned absentee ballots. However, most of these counties are very small, with very low numbers of absentee ballots sent out in the first place.[22]

The EPI reports absentee ballot non-return rates at the state level. The statewide non-return rates are similarly right-skewed; therefore it is necessary to translate the non-return rates into logarithms before plotting the non-return rate in 2010 against the non-return rate in 2008.

[21] The correlation coefficient was calculated on the logged values, weighting each county by the number of absentee ballots mailed out in 2008.

[22] The average county with no unreturned absentee ballots in 2008 mailed out 323 absentee ballots; the average county overall mailed out more than 6,700. The average county with no unreturned absentee ballots in 2010 mailed out only 25 absentee ballots; the average county overall mailed out more than 5,000.



As with the measures calculated at the county level, the indicator calculated at the state level is stable when we compare 2008 with 2010. The Pearson correlation coefficient describing the relationship across the two years is .67, using the values that have been transformed into logarithms.

Data Completeness

Data source: Election Administration and Voting Survey

The starting point for managing elections against metrics is gathering and reporting core data in a systematic fashion. The Election Assistance Commission (EAC), through its Election Administration and Voting Survey (EAVS), has established the nation's most comprehensive program of data gathering in the election administration field. The greater the extent to which local jurisdictions gather and report core data contained in the EAVS, the more thoroughly election stakeholders will be able to understand key issues pertaining to the conduct of elections.

The nature of the items included in the EAVS makes it the logical choice of a source for assessing the degree to which election jurisdictions gather and make available basic data about the performance of election administration in states and local election units. The EAVS is a very comprehensive survey, consisting of six sections: voter registration, UOCAVA voting, domestic absentee voting, election administration, provisional ballots, and Election Day activities. The EAVS inquires of states and localities basic quantities associated with each federal election: how many people voted, the modes they used to vote, etc. The survey is responsive to EAC mandates to issue regular reports, given in the National Voter Registration Act (NVRA), the Uniformed and Overseas Citizens Absentee Voting Act (UOCAVA), and the Help America Vote Act (HAVA). The EAVS survey instrument is 29 pages long, and the dataset produced by the 2010 instrument amounted to 413 different variables.

While states are mandated to provide some of the information requested in the EAVS, other items are not mandatory. Therefore, in using the EAVS to build a measure of the degree to which states report basic data related to election administration to the public, it is important to distinguish between what is basic among the data that is included in the EAVS and what may be considered either secondary or (more often) a more detailed look at basic quantities. The data completeness measure is based on the reporting of basic measures.

The central idea of this measure is to assess states according to how many counties report core statistics that describe the workload associated with conducting elections. The completeness measure starts with 15 survey items that were considered so basic that all jurisdictions should be expected to report them, for the purpose of communicating a comprehensive view of election administration in a community:

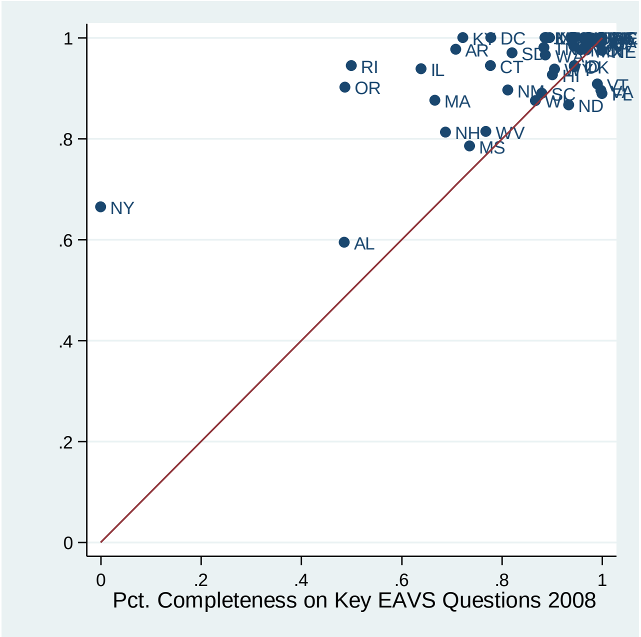
1. New registrations received
2. New valid registrations received
3. Total registered voters
4. Provisional ballots submitted
5. Provisional ballots rejected
6. Total ballots cast in the election
7. Ballots cast in person on Election Day
8. Ballots cast in early voting centers
9. Ballots cast absentee
10. Civilian absentee ballots transmitted to voters
11. Civilian absentee ballots returned for counting
12. Civilian absentee ballots accepted for counting
13. UOCAVA ballots transmitted to voters
14. UOCAVA ballots returned for counting
15. UOCAVA ballots counted

Added to these 15 basic measures are three measures that are used to construct indicators used in the election index:

16. Invalid or rejected registration applications
17. Absentee ballots rejected

18. UOCAVA ballots rejected

The following graph describes the completeness measure for 2010, compared with that for 2008.



As the graph illustrates, overall completion levels of the key EAVS items improved considerably from 2008 to 2010. The completeness measure rose for 36 states and the District of Columbia, stayed the same in six states, and fell for eight. Among these latter, the drops in completeness between 2008 and 2010 were slight (5 percent on average). Seven states had completeness levels of 100 percent in 2008; 14 states and the District of Columbia had 100 percent completeness levels in 2010.

Disability- or Illness-Related Voting Problems

Data source: Voting and Registration Supplement of the Current Population Survey

Access to voting for the physically disabled has been a public policy concern for years. The federal Voting Accessibility for the Elderly and Handicapped Act (VAEHA), passed in 1984, generally requires election jurisdictions to ensure that their polling places are accessible to disabled voters. The Voting Rights Act of 1965, as amended, and the 2002 Help America Vote Act (HAVA) also contain provisions that pertain to ensuring that disabled Americans have access to voting. HAVA, in particular, established minimum standards for the presence of voting systems in each precinct that allow people with disabilities the same access to voting as people without disabilities.

Studies of the effectiveness of these laws and other attempts at accommodation have been limited. On the whole, they confirm that election turnout rates for people with disabilities are below those for people who are not disabled, and that localities have a long way to go before they meet the requirements of laws such as the VAEHA and the HAVA.[23] Investigations into the participation of the disabled and the accessibility of polling places have, at most, been conducted using limited representative samples of voters or localities. As far as can be ascertained, studies comparing jurisdictions have not been conducted.

Coding convention

This indicator is based on responses to the Voting and Registration Supplement (VRS) of the Current Population Survey (CPS), which is conducted by the U.S. Census Bureau. Specifically, it is based on responses to item PES4, which asks of those who reported not voting: "What was the main reason you did not vote?" Response categories include the following:[24]

Response category	Pct. of respondents in 2008[25]
Illness or disability (own or family's)	16.1%
Out of town or away from home	9.5%
Forgot to vote (or send in absentee ballot)	2.8%
Not interested, felt my vote wouldn't make a difference	14.4%
Too busy, conflicting work or school schedule	18.9%
Transportation problems	2.8%
Didn't like candidates or campaign issues	13.9%
Registration problems (i.e., didn't receive absentee ballot, not registered in current location)	6.4%
Bad weather conditions	0.3%

[23] Government Accountability Office, "Voters with Disabilities: Additional Monitoring of Polling Places Could Further Improve Accessibility," GAO-09-941, September 2009 report.

[24] In addition to the following categories, there are provisions in the data for "no response," "refused," "don't know," and "blank or not in universe."

[25] Based on weighting by variable PWSSWGT, which is the "final weight" given to each individual in the survey, which is constructed to be proportional to the inverse probability of being included in the survey. Percentages are based on respondents who gave one of these answers, excluding those who refused or said they did not know, did not respond, or were not in the sample universe.

Inconvenient hours or polling place, or hours or lines too long	2.9%
Other	12.2%

The first response category forms the basis for this indicator. Note that it includes both individuals who say they were disabled and those that say they were ill. Furthermore, it includes disability or illness for either the respondent or a member of the family. A more precisely honed measure of the degree to which disabled voters have access to voting would include information about which respondents were themselves disabled. Unfortunately, only in 2010 did the VRS begin asking respondents if they, themselves, were disabled. Therefore, it is presently not possible to construct a measure that focuses only on disabled respondents. However, it is possible to use information about the disability of respondents in 2010 to test the validity of the measure.

The 2010 CPS asked respondents if they had one of six different disabilities. The following table lists those disabilities, along with the percentage of nonvoters who reported having that disability *and* stated that the primary reason they did not vote was due to illness or disability. In addition, it reports the nonvoting rates due to illness or disability among respondents who reported no disabilities.

Disability	N (weighted)	% not voting due to illness or disability
Difficulty dressing or bathing	461	62.8%
Deaf or serious difficulty hearing	643	35.7%
Blind or difficulty seeing even with glasses	377	44.5%
Difficulty doing errands	936	58.3%
Difficulty walking or climbing stairs	1,531	49.2%
Difficulty remembering or making decisions	775	43.2%
[Any one of the above disabilities]	2,386	39.5%
[No disabilities reported]	13,968	7.2%

Thus, a nonvoter with any one of the disabilities is almost four times more likely to give the "illness or disability" answer to the question of why he or she did not vote, compared with someone without any of these disabilities. Furthermore, the more disabilities a nonvoter lists, the more likely he or she is to give this response, as the following table demonstrates.

	Number of disabilities						
	0	1	2	3	4	5	6
Pct. blaming illness or disability	7.2%	25.2%	43.9%	53.5%	70.6%	73.8%	67.9%
N	13,968	1,157	557	376	191	70	35

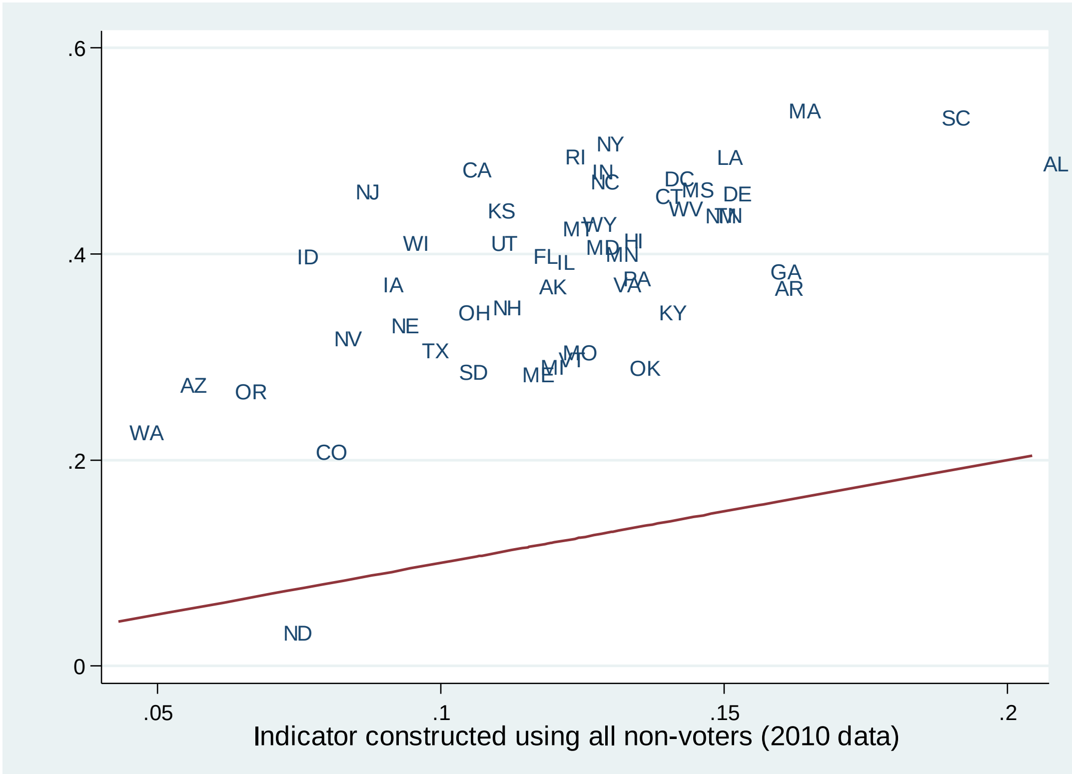
Finally, it should be noted that respondents to the VRS who reported they had one of these disabilities were also less likely to report that they had voted in the first place, as is illustrated in the following table. However, the differences in voting rates between those who report a disability and those who do not are not as great as the differences seen in the reasons for not voting.

Disability	N (weighted)	% voting
Difficulty dressing or bathing	1,621	38.0%
Deaf or serious difficulty hearing	3,108	56.6%
Blind or difficulty seeing even with glasses	1,489	44.8%
Difficulty doing errands	3,407	38.2%
Difficulty walking or climbing stairs	6,290	49.8%
Difficulty remembering or making decisions	2,974	34.6%
[Any one of the above disabilities]	10,533	49.2%
[No disabilities reported]	69,286	54.9%

We are using answers to this question as an indicator of how difficult it is for disabled voters to participate in elections. It would be ideal to measure this variable by considering only the responses of disabled voters. Unfortunately, before 2010 the CPS did not ask respondents if they had a physical disability. Therefore, the indicator mixes the responses of disabled and nondisabled individuals. In 2010, the CPS began asking directly about disability status. This means that as time goes on, it will be possible to construct this indicator by relying solely on the responses of disabled respondents.

In the interim, it is important to know whether the relative ranking of states on this indicator is the same if we confine ourselves to disabled respondents, compared with constructing the indicator using the responses of all respondents. We are able to answer this question using the 2010 data, because we can construct the indicator both ways—using answers from all respondents *and* using answers from only disabled respondents.

The following graph illustrates how this indicator changes as we narrow the respondents from the complete nonvoting population to the *disabled* nonvoting population, using the 2010 data. The *x*-axis represents the indicator as it is currently constructed for the EPI. The *y*-axis represents the indicator as it is constructed if we used only the self-identified disabled population in the dataset.



With one exception (North Dakota), when we confine the calculation of this indicator to self-identified disabled nonvoters, values of this indicator are greater than if we calculate it using responses from all nonvoters. This is what we would expect if disabled respondents are more likely to give this answer than are nondisabled respondents. At the same time, the two methods of constructing this indicator are highly correlated—the Pearson correlation coefficient is .63. Therefore, we have confidence that constructing this indicator using the entire nonvoting population as a base should yield a valid measure. However, a better measure would be one constructed solely from the responses of disabled voters, which is a strategy we anticipate following in future years.

Stability of rates across time

The rate at which nonvoters report they failed to vote because of illness and disability will vary across time, for a variety of reasons. On the one hand, some of these reasons may be related to policy—for instance, a statewide shift to all vote-by-mail balloting (such as in Oregon and Washington) may cause a reduction in the percentage of nonvoters giving this excuse for not voting. On the other hand, some of these reasons may be unrelated to election administration or policy, and therefore can be considered random variation.

One advantage of an indicator based on VRS data is that the survey goes back for many elections. The question about reasons for not voting has been asked in its present form since 2000. Therefore, it is possible to examine the intercorrelation of this measure at the state level across six federal elections—2000, 2002, 2004, 2006, 2008, and 2010—to test its reliability.

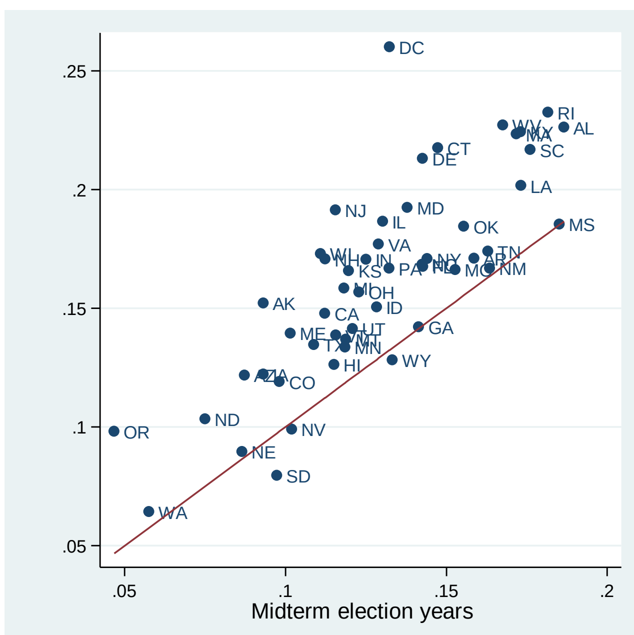
The following table is the correlation matrix reporting the Pearson correlation coefficients for values of this indicator across these six elections.

	Year					
Year	2000	2002	2004	2006	2008	2010
2000	1.000					
2002	0.589	1.000				
2004	0.318	0.499	1.000			
2006	0.451	0.593	0.565	1.000		
2008	0.526	0.553	0.503	0.613	1.000	
2010	0.536	0.645	0.523	0.561	0.598	1.000

The correlation coefficients between pairs of elections are moderately high. The fact that the coefficients do not decay across the decade's worth of data suggests the underlying factor being measured by this indicator is stable within individual states; therefore, there is strong reliability to the measure. As a result, it may be prudent to consider combining data across years so that the reliability of the measure can be improved.

It is tempting to consider creating a single scale from this set of data (considering the observations from all of the elections, 2000 to 2010, together), because of the moderately high overall intercorrelations. However, comparing the *averages* for each year reveals that more nonvoters give the "illness or disability" excuse in presidential election years (16.2 percent national average) than in midterm election years (12.9 percent national average). Consequently, a more prudent strategy is to treat presidential and midterm election years separately.

We created two scales from the dataset, one consisting of the average rates for presidential election years, and the other consisting of the average rates for midterm election years. The following graph shows the correlation across these two measures.



The Pearson correlation coefficient quantifying this relationship is .80, which is significantly higher than any of the coefficients in the correlation matrix shown above. By combining data across several election years for midterm and presidential elections, we are able to create measures in which random noise is reduced.

Military and Overseas Ballots Rejected

Data source: Election Administration and Voting Survey

By far, the principal reason ballots sent to UOCAVA (Uniformed and Overseas Citizens Absentee Voting Act) voters are rejected is that they are received by election officials after the deadline for counting. In 2008, 43.7 percent of rejected UOCAVA ballots were rejected for this reason; in 2010, this percentage was reduced to 32.4.[26] However, it must be noted that the reporting about why UOCAVA ballots are rejected is lacking. In 2008, 31.2 percent of rejected UOCAVA ballots were accounted for by an undefined and undifferentiated "other" category, while 12.2 percent were not categorized at all. In 2010, these percentages were 49.0 and 11.4, respectively.

<u>Coding convention</u>

Expressed as an equation, the UOCAVA absentee ballot rejection rate can be calculated as follows from the EAVS datasets:

$$\textbf{Pct. of Returned UOCAVA Ballots Rejected} = \frac{\boldsymbol{UOCAVA\ ballots\ rejected\ in\ the\ general\ election}}{\boldsymbol{Returned\ by\ voters\ and\ submitted\ for\ counting}}$$

Data will be missing if a county has failed to provide any of the variables included in the calculation.

<u>Correspondence between variable definition and EAVS variable names</u>

Descriptive name	*2008 EAVS*	*2010 EAVS*
UOCAVA ballots rejected	b13	qb13a
Total UOCAVA ballots submitted for counting	b3	qb3a

<u>Data availability, county data</u>

	2008 EAVS				2010 EAVS		
Descriptive name	Var. name	Missing cases, raw	Missing cases, weighted by registered voters		Var. name	Missing cases, raw	Missing cases, weighted by registered voters
Total UOCAVA ballots rejected	b13	486 (10.66%)	555.08 (12.37%)		Qb13a	112 (2.42%)	24.43 (0.53%)
Total UOCAVA ballots returned and submitted for counting	b3	781 (17.14%)	287.02 (6.40%)		qb3a	236 (5.10%)	115.67 (2.51%)
Overall		781	555.08			272	131.59

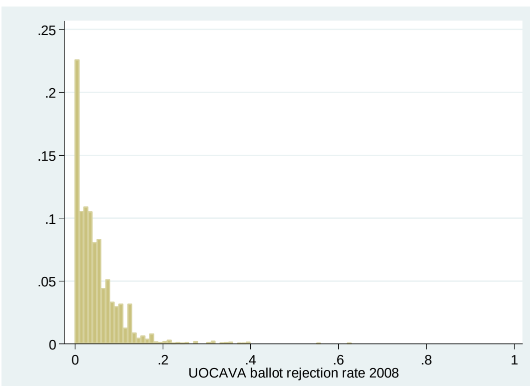
[26] **2008 UOCAVA Survey Report, p. 10; 2010 UOCAVA Survey Report, p. 8.**

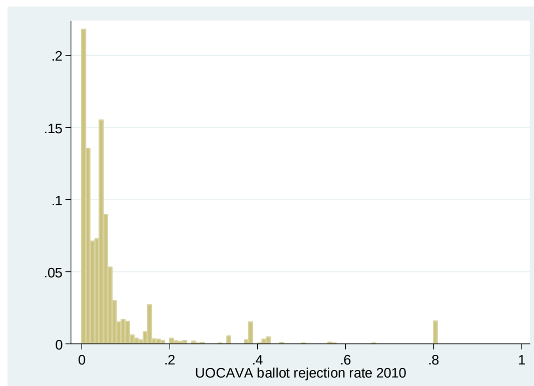
		(17.14%)	(12.37%)			(5.88%)	(2.86%)

Because of missing data, it was not possible to compute UOCAVA ballot rejection rates for the following: Alabama, Arkansas, Connecticut, District of Columbia, Hawaii, Indiana, Kentucky, Mississippi, New York, Oregon, Rhode Island, South Dakota, West Virginia, and Wyoming (2008); and Maine, Mississippi, New Mexico, South Dakota, Virginia, Vermont, and West Virginia (2010).

Comparison of UOCAVA ballot rejection rates across time

We begin by comparing UOCAVA ballot rejection rates, measured at the county level, for 2010 and 2008. The raw data for 2008 exhibit what is known as a pronounced "right skew." That is, most counties have very low rejection rates, while a few have relatively high rates. The raw data for 2010 show a similar right skew in the data, once a clear outlier is removed. The outlier is Queens County, New York, which received back more UOCAVA ballots than any other county in 2010 (2,649) and rejected 80 percent of them. Queens County is represented by the tall peak on the right side of the 2010 graph. Both of these patterns are illustrated in the following two histograms, which show the distribution of rejection rates for 2008 and 2010 for each U.S. county for which we have the relevant data.[27]





Because of the right skew in the distribution of rejection rates, any scatterplot that compares 2010 values with 2008 values will be misleading—the bulk of observations will be clumped around the origin, with our eye drawn toward the outliers with extremely large values. To deal with this right skew, it is common to transform the measures by taking logarithms. One problem this creates is that a large fraction of counties had zero UOCAVA ballots rejected in 2008 and/or 2010, and the logarithm of zero is undefined. Therefore, in the scatterplot below, counties with zero rejected ballots have been set to 0.0001, which is slightly below the smallest nonzero usage rate that was actually observed. Finally, so that the influence of larger counties is visually greater than that of smaller counties, we weight the data tokens in proportion to the size of the county.[28]

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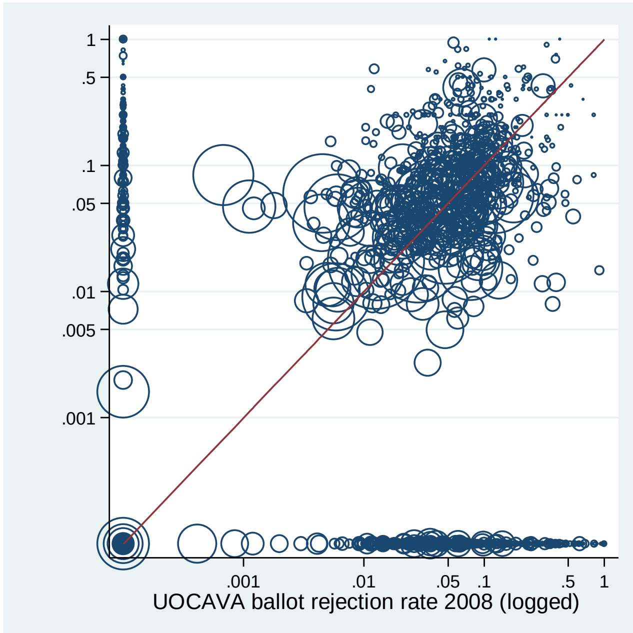
[27] **The counties have been weighted in proportion to the number of UOCAVA ballots returned for counting.**

[28] **More precisely, we weight the counties by the number of returned UOCAVA ballots in 2008.**

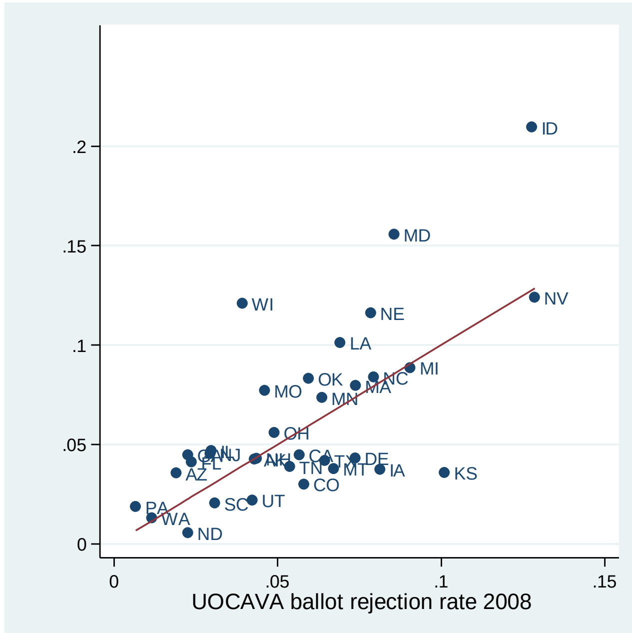


As this graph illustrates, for counties that reported the data necessary to calculate rejection rates in both 2008 and 2010, rates are weakly correlated these two years. The Pearson correlation coefficient, which measures the degree of similarity across these two election cycles, is .37.[29]

The relatively small correlation in this measure between 2008 and 2010 is likely explained in part by the evolving nature of laws related to UOCAVA ballots. The Military and Overseas Voter Empowerment (MOVE) Act of 2009, which requires election officials to transmit requested UOCAVA ballots at least 45 days before a federal election, was implemented in time for the 2010 general election, but several states were given waivers for this election. Further, difficulties in meeting the demands of the act were reported in many states that had not been given waivers. One should expect that, as states and localities develop and establish procedures to meet the requirements of the MOVE Act, inter-year correlations in rejection rates should increase. If they do not, this would be cause for further research.

The EPI reports UOCAVA ballot rejection rates at the state level. Unlike many of the other measures that are derived from the EAVS, statewide UOCAVA ballot rejection rates are not right-skewed. Therefore, the plot of statewide rejection rates, 2010 against 2008, uses the raw percentages rather than logarithms of the rates.

[29] The correlation coefficient was calculated on the logged values, weighting each county by the number of returned UOCAVA ballots in 2008.



The UOCAVA rejection rate measure is much more stable across time when measured at the state level than when measured at the county level. The Pearson correlation coefficient describing the relationship across the two years at the state level is .66.

Military and Overseas Ballots Unreturned

Data source: Election Administration and Voting Survey

UOCAVA ballots are returned by voters at a much lower rate than civilian absentee ballots are. For instance, if we examine the set of counties that reported all the necessary data in 2008 to calculate return rates for both types of ballots—to remove any biases in the analysis that may be introduced because of incomparable samples—the UOCAVA non-return rate was 28.0 percent, compared with 10.2 percent for civilian absentee ballots. In 2010, these figures were 66.4 and 22.3 percent, respectively.

Laws pertaining to UOCAVA voting are in flux, a factor that may be partially responsible for the very high non-return rates in 2010 and, as we will see below, the relatively low correlation at the county level between non-return rates in 2008 and 2010. One element of UOCAVA and MOVE concerns the period for which a ballot request is in force. Under the original UOCAVA provisions, an application to become a UOCAVA voter could be valid for two federal election cycles. The MOVE Act changed this, allowing states to narrow the period to which a ballot request applied to a single calendar year. The original UOCAVA provision may have resulted in a large number of ballots being mailed that were not needed (or wanted), at a cost to election offices. While the MOVE Act change was intended to reduce the number of unneeded ballots that were mailed, it is unclear whether many states availed themselves of the opportunity to change their practices, at least by 2010. It is clear, however, that practices about sending out UOCAVA ballots are evolving; therefore, it is not surprising that non-return rates have exhibited a great deal of variance in recent years.

At present, it is not well understood why a large number UOCAVA ballots go unreturned. Is it for the same reasons that civilian absentee ballots are not returned, or are there reasons unique to UOCAVA voting? Clearly, more research is needed in this area.

Coding convention

Expressed as an equation, the UOCAVA ballot non-return rate can be calculated as follows from the EAVS datasets:

$$\textbf{Pct. of UOCAVA ballots trans. not returned} = \mathbf{1} - \frac{\boldsymbol{Returned\ ballots}}{\boldsymbol{Ballots\ transmitted}}$$

Data will be missing if a county has failed to provide any of the variables included in the calculation.

Correspondence between variable definition and EAVS variable names

Descriptive name	*2008 EAVS*	*2010 EAVS*
Total returned UOCAVA ballots	b2a	qb2a
Total UOCAVA ballots sent out	b1a	qb1a

Data availability, county data

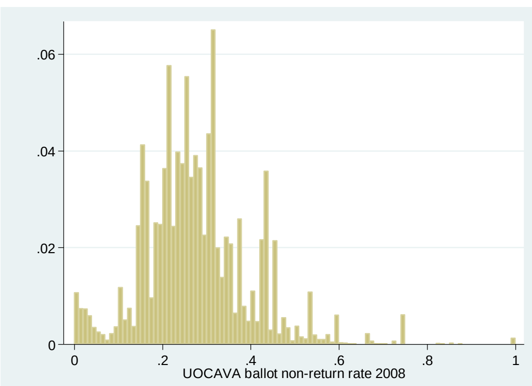
	2008 EAVS				2010 EAVS		
Descriptive name	Var. name	Missing cases, raw	Missing cases, weighted by registered voters		Var. name	Missing cases, raw	Missing cases, weighted by registered voters

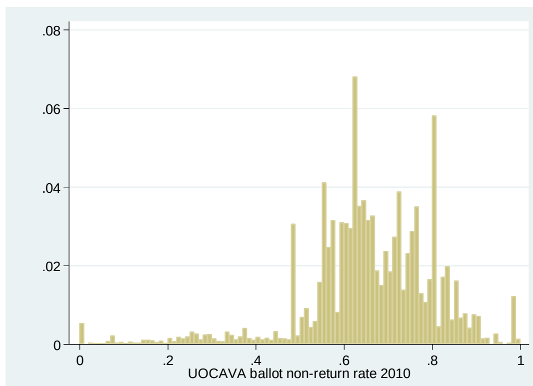
Total unreturned UOCAVA ballots	b2a	486 (10.50%)	287.02 (6.40%)		qb2a	87 (1.88%)	17.46 (0.38%)
Total UOCAVA ballots sent out	b1a	267 (5.86%)	239.70 (5.34%)		qb1a	95 (2.05%)	18.44 (0.40%)
Overall		537 (11.78%)	376.25 (8.39%)			108 (2.33%)	27.99 (0.61%)

Because of missing data, it was not possible to compute domestic absentee ballot non-return rates for the following states: Connecticut, Hawaii, Maine, Mississippi, New York, Oregon and West Virginia (2008); and Mississippi, New Mexico and West Virginia (2010).

Comparison of UOCAVA ballot non-return rates across time

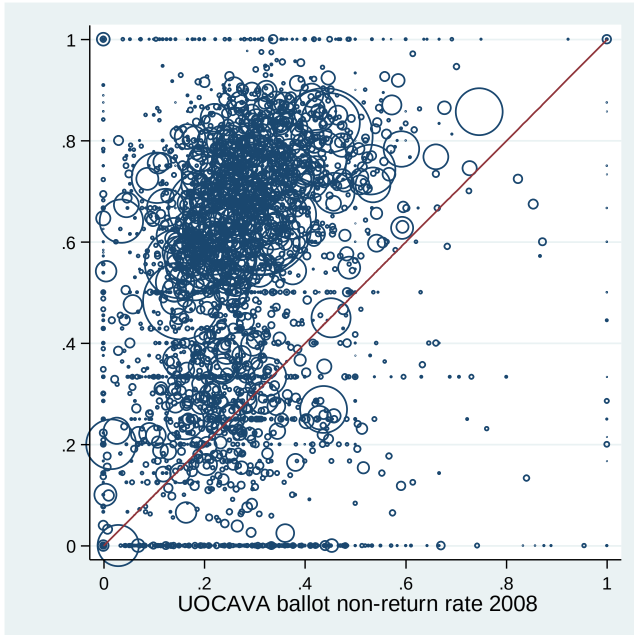
We begin by comparing UOCAVA ballot non-return rates, measured at the county level, for 2010 and 2008. Although there are outliers for both 2008 and 2010, on the whole the data series do not exhibit the pronounced skew that is evident with many indicators based on EAVS data. This is illustrated in the following two histograms, which show the distribution of non-return rates for 2008 and 2010 for each U.S. county for which we have the relevant data.[30]





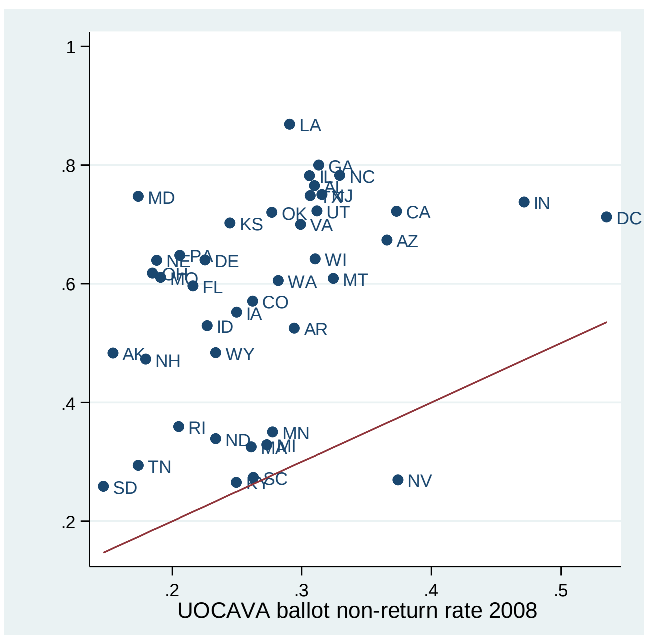
The scatterplots below show the non-return rates from 2010 plotted against non-return rates from 2008. Because the data do not exhibit a pronounced skew, we use the raw (rather than logged) rates. So that the influence of larger counties is visually greater than that of smaller counties, we weight the data tokens in proportion to the number of absentee ballots mailed out by the county.[31]

[30] The counties have been weighted in proportion to their size (the number of UOCAVA ballots sent out).
[31] More precisely, we weight the counties by the number of UOCAVA ballots transmitted in 2008.



As this graph illustrates, for counties that reported the data necessary to calculate non-return rates in both 2008 and 2010, there is a weak relationship between non-return rates in each year. (And, non-return rates are generally higher in 2010 than in 2008.) The Pearson correlation coefficient, which measures the degree of similarity across these two election cycles, is .35.[32]

The EPI reports UOCAVA ballot non-return rates at the state level. The following graph compares non-return rates at the state level in 2008 and 2010.



As with the measures calculated at the county level, the indicator calculated at the state level is not very stable when we compare 2008 with 2010. The Pearson correlation coefficient describing the

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[32] **The correlation coefficient was calculated weighting each county by the number of UOCAVA ballots mailed out in 2008.**

relationship across the two years is .38. However, visual inspection of this figure also suggests that a small set of states near the diagonal line (South Dakota, Tennessee, Kentucky, etc.) may have taken advantage of the provisions of the MOVE Act that limited the time in which ballot requests were operative. If we consider the states that had exceptionally high non-return rates in 2010 to have been operating under the older provisions of UOCAVA, then the correlation between states is higher (.48), though still not as high as for other indicators.

The differing performance of states between 2008 and 2010 remains ripe for further research,

Online Registration Available

Data sources: National Conference of State Legislatures and state election offices

More and more business transactions have migrated toward the Internet, which has resulted in savings for businesses and greater convenience for consumers. Voter registration is one such transaction that can benefit both election offices and voters by moving online. Compared with traditional paper processes, online registration has been shown to save money, increase the accuracy of voter lists, and streamline the registration process. In addition to reducing state expenditures, online tools can be more convenient for voters.[33]

We consider a state as having online voter registration if it offers the option of an entirely paperless registration process that is instituted in time for eligible voters to register online for the corresponding election. If the state has a tool that helps a voter fill out the form online but he or she still has to print it (and possibly physically sign it) before returning it to a local election office, this does not constitute online voter registration. This reasoning applies to states such as Alaska, for example, where a voter needs to mail a signed and printed voter registration form to the elections office in order register. States such as Delaware that have an eSignature program that electronically populates the voter registration record from a different state agency list (for example, Department of Motor Vehicles) also are not included.

North Dakota, the only state without voter registration, is not given a score for this indicator.

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[33] **Pew Center on the States, "The Real Cost of Voter Registration: An Oregon Case Study" (2009).**

Post-Election Audit Required

Data source: Statutory Overview of the Election Administration and Voting Survey

One of the lessons learned from the careful scrutiny of the 2000 election results is that many states did not have a systematic program of auditing the performance of voting equipment after an election. Auditing voting equipment performance requires different procedures and approaches than do counting and recounting ballots, and has different goals. States that have post-election audit requirements should be able to spot emerging problems with voting equipment before they produce crises, allowing election administrators to improve voting equipment.

Generally speaking, a post-election audit involves the close scrutiny of election returns from a sample of precincts and/or voting machines. The audit might involve simply recounting all of the ballots cast among the sample and comparing the recount with the original total. An audit might also involve the scrutiny of other records associated with the election, such as log books. Sampling techniques can follow different protocols, ranging from simple random samples of a fixed percentage of voting machines to "risk-limiting" audits that select the sample depending on the likelihood that recounting more ballots would overturn the election result.[63]

Although post-election audits are recognized as a best practice to ensure that voting equipment is properly functioning, that proper procedures are being followed, and that the overall election system is reliable, the practice of auditing is still in its relative infancy. Therefore, a consensus has not arisen about what constitutes the necessary elements of an auditing program.

As a consequence, this measure is based simply on the binary coding of whether state law provides for a post-election audit. The data source is the Statutory Overview portion of the EAC's Election Administration and Voting Survey. It is not based on a further coding of the specific provisions in state law, nor is it based on the findings of the audits themselves. (For instance, it is not based on measures of how close audited election results come to the original, certified results.) Future iterations of the EPI may go beyond this simple binary coding.

[63] **See Mark Lindeman and Philip B. Stark, "A Gentle Introduction to Risk-Limiting Audits," *IEEE Security and Privacy* (March 2012).**

Provisional Ballots Cast

Data source: Election Administration and Voting Survey

The provisional ballot mechanism allows voters whose registration status is in dispute to cast ballots, while leaving the registration status question to be resolved after Election Day. Provisional ballots have other uses, too. Some states have begun using them essentially as change-of-address forms for voters who have moved. Some jurisdictions allow provisional ballots cast in the wrong precinct to be counted.

Unless provisional ballots are being given to voters for other administrative reasons, a large number may indicate problems with voter registration records. The meaning of a small number of provisional ballots, from an election administration standpoint, is more open to question. On the one hand, a small number may indicate that registration records are up to date; on the other hand, small numbers may be the result of poll workers not offering voters with registration problems the provisional ballot option when appropriate.

Coding convention

Expressed as an equation, the provisional ballot rate can be calculated as follows from the EAVS datasets:

Pct. Turnout that Cast a Provisional Ballot

$$= \frac{\textbf{Total number of voters who submitted a provisional ballot}}{\textbf{Total number of people who participated in the general election}}$$

Data will be missing if a county has failed to provide any of the variables included in the calculation.

Correspondence between variable definition and EAVS variable names

Descriptive name	*2008 EAVS*	*2010 EAVS*
Total who submitted a provisional ballot	e1	qe1a
Total participants in general election	f1a	qf1a

Data availability, county data

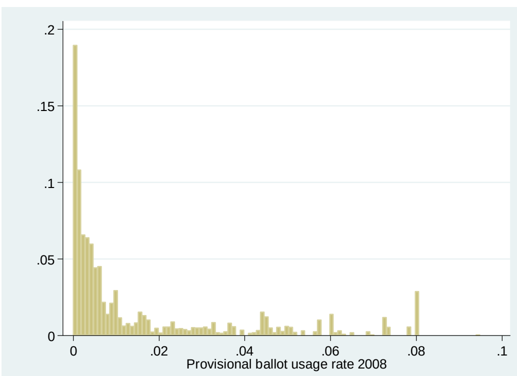
	2008 EAVS				2010 EAVS		
Descriptive name	Var. name	Missing cases, raw	Missing cases, weighted by registered voters		Var. name	Missing cases, raw	Missing cases, weighted by registered voters
Total who voted using provisional ballot	e1	585 (12.75%)	202.67 (4.52%)		qe1a	129 (2.79%)	243.77 (5.29%)
Total number of participants in the general election	f1a	144 (3.14%)	61.94 (1.38%)		qf1a	32 (0.69%)	4.91 (0.11%)

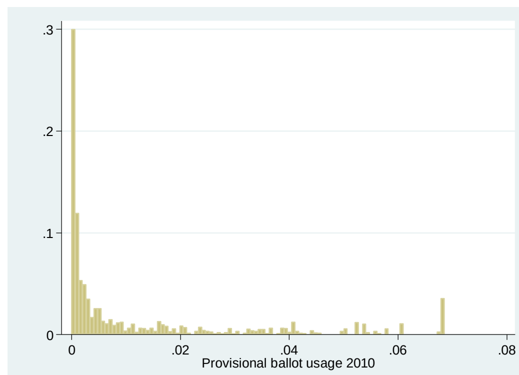
Overall		594 (12.95%)	254.13 (5.66%)			149 (3.22%)	244.67 (5.31%)

Because of missing data, it was not possible to compute provisional ballot usage rates for the following: Alabama, Illinois, Indiana, Mississippi, New York, West Virginia, and Wyoming (2008); and Illinois, Mississippi, New York, South Carolina, West Virginia, and Wyoming (2010). We also did not include provisional ballot rates for states with Election Day registration that do not use provisional ballots (Idaho, Minnesota, and New Hampshire) or for North Dakota, which does not require voters to register.

Stability of provisional ballot usage across time

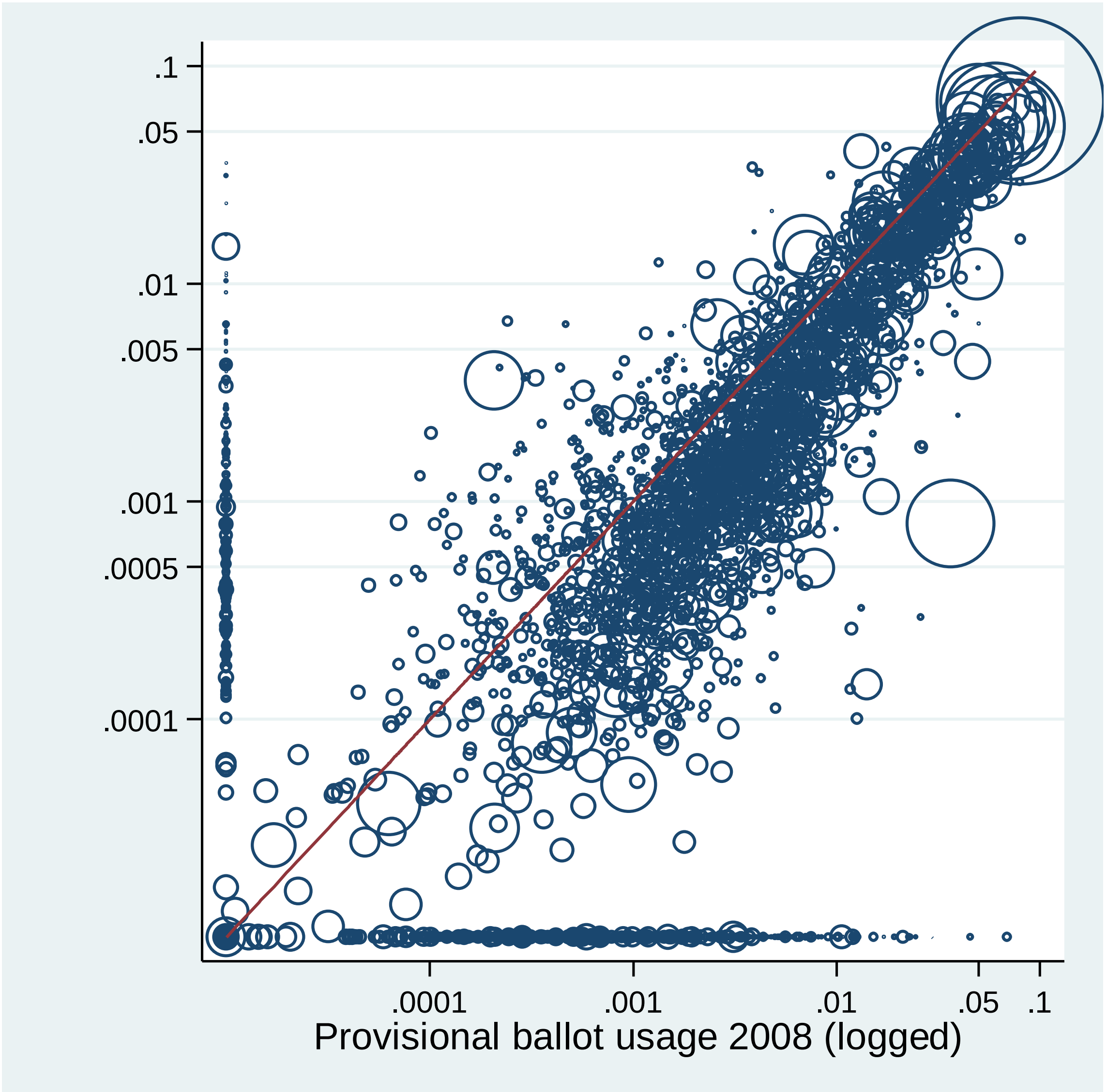
We begin by comparing provisional ballot usage rates, measured at the county level, for 2010 and 2008. The data are right-skewed; most counties have very low usage rates, while a few have relatively high rates. This is illustrated in the following two histograms, which show the distribution of usage rates for 2008 and 2010 for each U.S. county for which we have the relevant data.[34]





Because of this pronounced right skew, any scatterplot that compares 2010 values with 2008 values will be misleading—the bulk of observations will be clumped around the origin, with our eye drawn toward the small number of outliers with extremely large values. To deal with this problem, we transform the measures by taking logarithms. One problem that emerges is that a large fraction of counties had no provisional ballots in 2008 and/or 2010, and the logarithm of zero is undefined. Therefore, in the scatterplot below, counties with zero provisional ballots have been set to 0.00001, which is slightly below the largest nonzero usage rate that was actually observed. Finally, so that the influence of larger counties is visually greater than that of smaller counties, we weight the data tokens in proportion to the size of the counties.[35]

[34] The counties have been weighted in proportion to their general election participation in 2008.
[35] More precisely, we weight the counties by the number of general election participants in 2008.

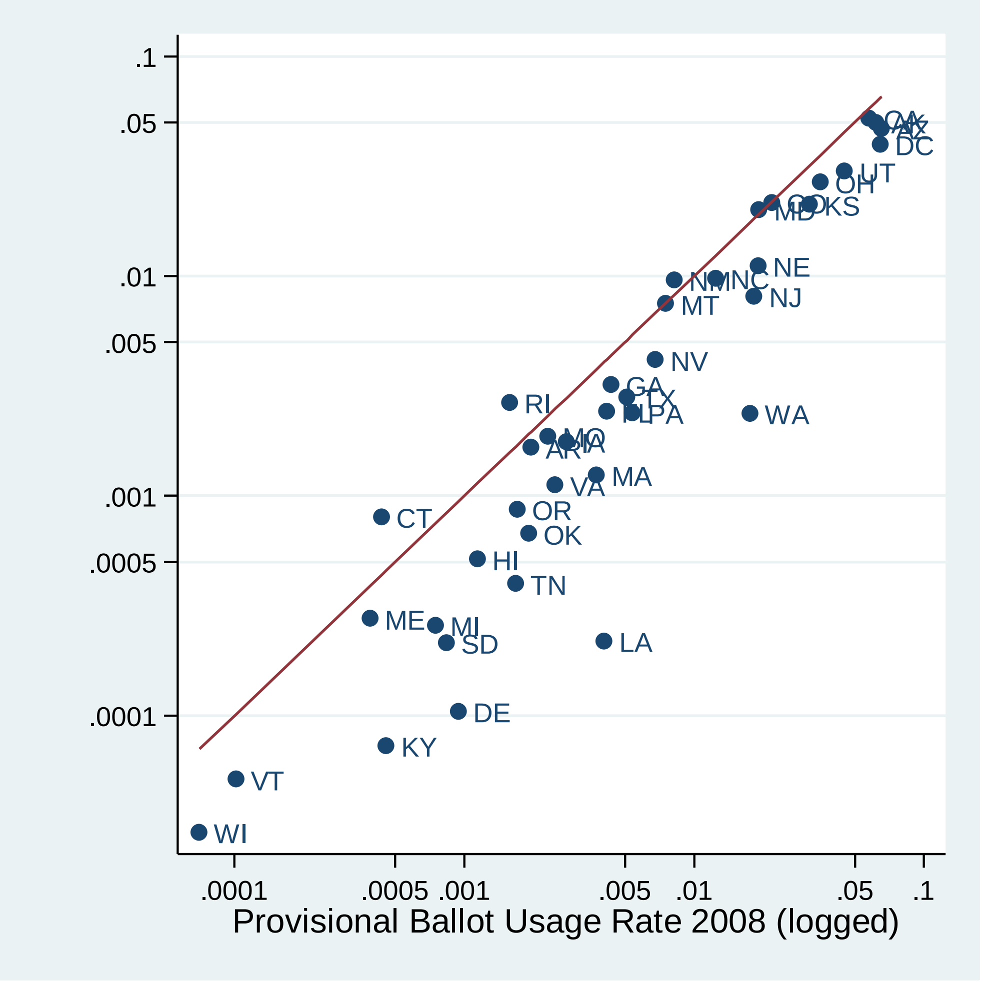


As this graph illustrates, for counties that reported the data necessary to calculate usage rates in both 2008 and 2010, rates are very similar these two years. The Pearson correlation coefficient, which measures the degree of similarity across these two election cycles, is .87.[36]

This graph also illustrates how counties that report no provisional ballots one election cycle often report a considerably greater usage rate the next cycle. Sometimes this is because the county is very small. With provisional ballot usage rates overall being relatively low—1.3 percent in 2008 and 1.2 percent in 2010—a county with only a few hundred registered voters might very well experience an election cycle in which no provisional ballots were used. However, relatively large counties will sometimes report zero provisional ballots in one election cycle and a relatively large number in the other cycle. This sort of behavior calls for further investigation and research. Until such research is conducted, this pattern alerts us to the need to be cautious when using data about the usage of provisional ballots.

[36] The correlation coefficient was calculated on the logged values, weighting each county by the number of general election participants in 2008.

The EPI reports provisional ballot usage at the state level. The statewide usage rates are similarly right-skewed; therefore it is necessary to translate the usage rates into logarithms before plotting the usage rate in 2010 against the rate in 2008.



As with the measures calculated at the county level, the indicator calculated at the state level is very stable when we compare 2008 with 2010. The Pearson correlation coefficient describing the relationship across the two years is .94, using the values that have been transformed into logarithms.

Provisional Ballots Rejected

Data source: Election Administration and Voting Survey

Provisional ballots are cast for a variety of reasons. Whether a provisional ballot is eventually counted depends on why the voter was issued such a ballot, and the rules for counting provisional ballots in the voter's state.

States vary in the criteria they use to determine if a provisional ballot should be issued and, later, counted. The most significant difference between states is that some will reject a provisional ballot if it's cast in the wrong precinct, while other states will count *part* of the ballot in this situation.

Coding convention

Expressed as an equation, the provisional ballot rejection rate can be calculated as follows from the EAVS datasets:

$$\textbf{Provisional Ballot Rejection Rate} = \frac{\boldsymbol{Rejected\ provisional\ ballots}}{\boldsymbol{Total\ participants\ in\ the\ general\ election}}$$

Data will be missing if a county has failed to provide any of the variables included in the calculation.

The decision was made to use total participants in the general election as the denominator, rather than number of issued provisional ballots, for two reasons. First, states that issue large numbers of provisional ballots, measured as a percentage of all votes cast in an election, tend to also accept a large number of those ballots, measured as a percentage of provisional ballots cast. Thus, the percentage of provisional ballots rejected as a percentage of provisional ballots cast only measures the legal context under which provisional ballots are used, and does little beyond that to illustrate the health of elections in a state. Second, the number of provisional ballots rejected represents voters who tried to vote and were turned away. Large numbers of such voters relative to the number of total participants in the election not only represent lost opportunities by voters to cast ballots, but also represent greater opportunities for disputes about an election's results. In other words, a large number of provisional ballots left uncounted for whatever reason, as a percent of total participants, indicates a mix of administrative problems and the potential for litigation, neither of which can be considered positive.

Correspondence between variable definition and EAVS variable names

Descriptive name	*2008 EAVS*	*2010 EAVS*
Rejected provisional ballots	e2c	qe1d
Total participants in the general election	f1a	qf1a

Data availability, county data

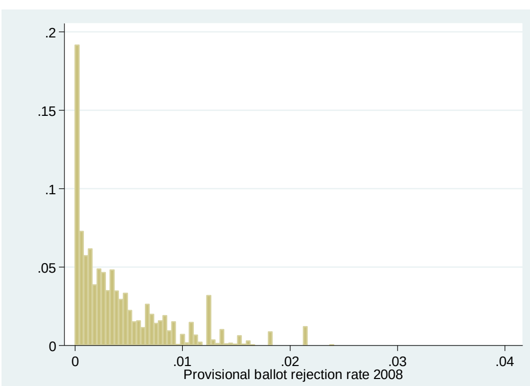
	2008 EAVS				2010 EAVS		
Descriptive name	Var. name	Missing cases, raw	Missing cases, weighted by registered		Var. name	Missing cases, raw	Missing cases, weighted by registered

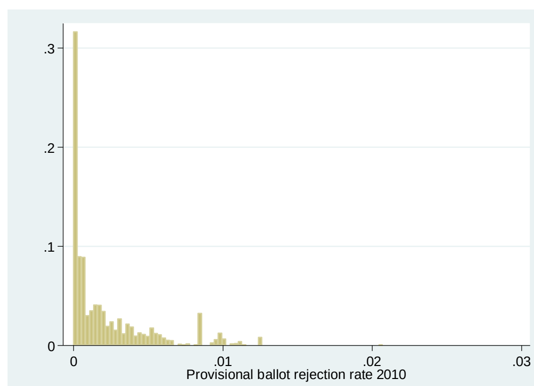
			voters				voters
Total provisional ballots rejected	e2c	734 (16.11%)	302.66 (6.75%)		qe1d	194 (4.19%)	275.24 (5.97%)
Total participants in the general election	f1a	144 (3.16%)	61.94 (1.38%)		qf1a	32 (0.69%)	4.91 (0.11%)
Overall		742 (16.28%)	354.00 (7.89%)			213 (4.60%)	276.08 (5.99%)

Because of missing data, it was not possible to compute provisional ballot rejection rates for the following: Alabama, Arkansas, Illinois, Indiana, Mississippi, New Mexico, New York, Oregon, West Virginia, and Wyoming (2008); and Mississippi, New York, South Carolina, and Wyoming (2010). We also did not include provisional ballot rejection rates for states with Election Day registration that do not use provisional ballots (Idaho, Minnesota, and New Hampshire), or for North Dakota, which does not require voters to register.

Stability of provisional ballot rejection rates across time

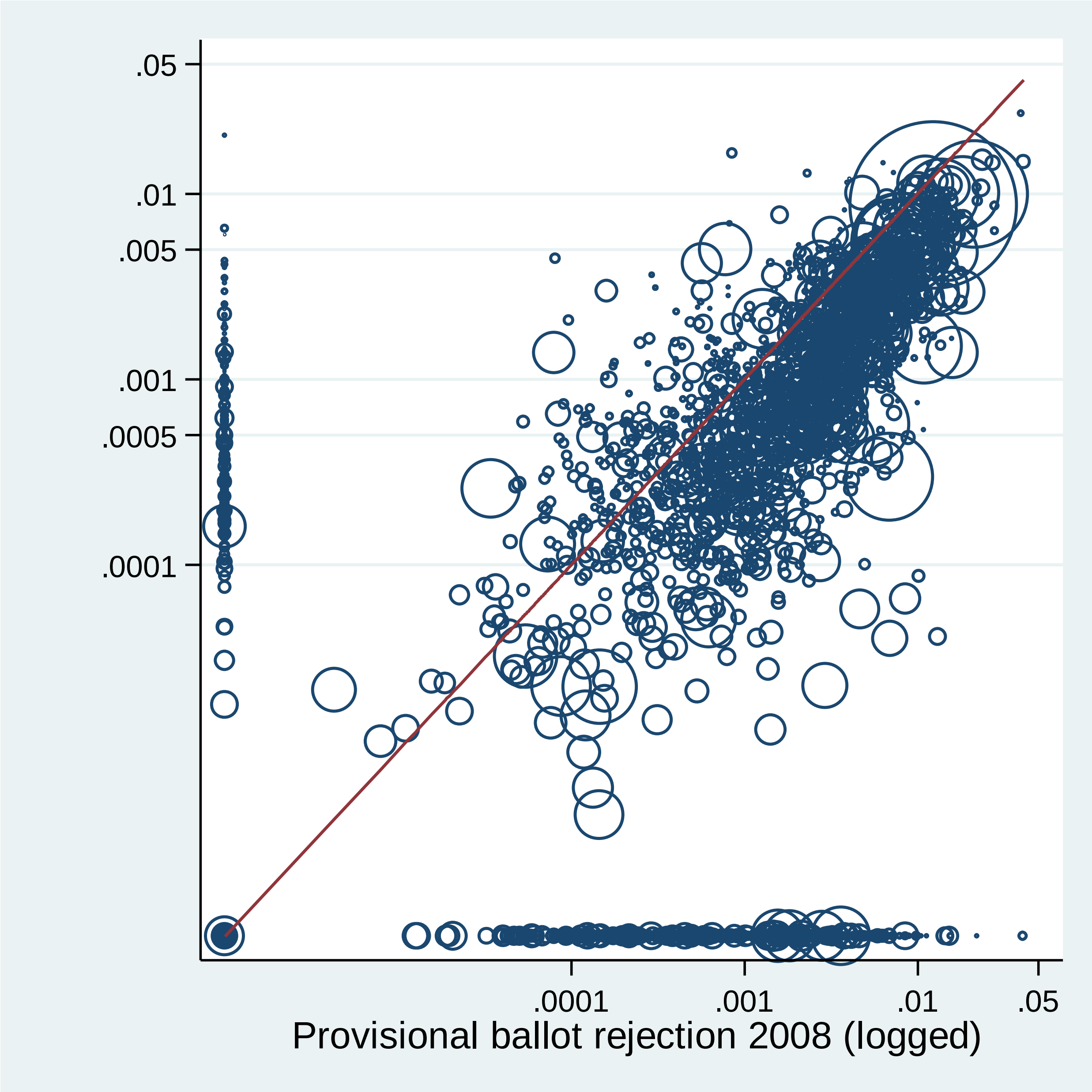
We begin by comparing provisional ballot rejection rates, measured at the county level, for 2010 and 2008. The raw data exhibit what is known as a pronounced "right skew." That is, most counties have very low rejection rates, while a few have relatively high rates. This is illustrated in the following two histograms, which show the distribution of rejection rates for 2008 and 2010 for each U.S. county for which we have the relevant data.[37]





Because of this pronounced right skew, any scatterplot that compares 2010 values with 2008 values will be misleading—the bulk of observations will be clumped around the origin, with our eye drawn toward the small number of outliers with extremely large values. To deal with this pronounced right skew, it is common to transform the measures by taking logarithms. One problem this creates is that a large fraction of counties had zero provisional ballots rejected in 2008 and/or 2010, and the logarithm of zero is undefined. Therefore, in the scatterplot below, counties with zero provisional ballots have been set to 0.00001, which is slightly below the smallest nonzero rejection rate that was actually observed. Finally, so that the influence of larger counties is visually greater than that of smaller counties, we weight the data tokens in proportion to the size of the county.[38]

[37] **The counties have been weighted in proportion to the number of general election participants in 2008.**
[38] **More precisely, we weight the counties by the number of general election participants in 2008.**



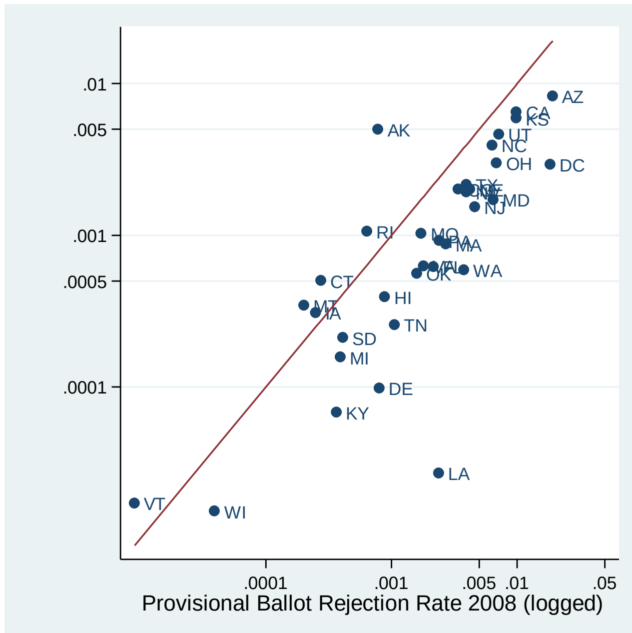
As this graph illustrates, for counties that reported the data necessary to calculate rejection rates in both 2008 and 2010, rates are very similar across these two years. The Pearson correlation coefficient, which measures the degree of similarity across these two election cycles, is .70.[39]

This graph also illustrates how counties that report no rejected provisional ballots one election cycle often report a considerably greater rejection rate the next cycle. Sometimes this is because the county is very small. With provisional ballot rejection rates overall being relatively low—0.4 percent in 2008 and 0.2 percent in 2010—a county with only a few hundred registered voters might very well experience an election cycle in which no provisional ballots were rejected. However, relatively large counties will sometimes report

[39] The correlation coefficient was calculated on the logged values, weighting each county by the number of general election participants in 2008.

zero provisional ballots in one election cycle and a relatively large number in the other cycle. This sort of behavior calls for further investigation and research. Until such research is conducted, this pattern alerts us to the need to be cautious when using data about the rejection of provisional ballots.

The EPI reports provisional ballot rejection rates at the state level. The statewide rejection rates are similarly right-skewed; therefore it is necessary to translate the rejection rates into logarithms before plotting the rejection rate in 2010 against the rejection rate in 2008.



As with the measure calculated at the county level, the indicator calculated at the state level is very stable when we compare 2008 with 2010. The Pearson correlation coefficient describing the relationship across the two years is .81, using the values that have been transformed into logarithms.

Registration or Absentee Ballot Problems

Data source: Voting and Registration Supplement of the Current Population Survey

Previous research has indicated that problems with voter registration present the greatest frustrations for voters trying to cast a ballot in an election.[40] Voters often believe they are registered when they are not, registered voters sometimes are not listed in the poll books, and voters are sometimes registered in a precinct other than the one where they show up to vote on Election Day. Reducing the number of people who fail to vote due to registration problems was a major goal of the Help America Vote Act.

Coding convention

This indicator is based on responses to the Voting and Registration Supplement (VRS) of the Current Population Survey (CPS), which is conducted by the U.S. Census Bureau. Specifically it is based on responses to item PES4, which asks of those who reported not voting: "What was the main reason you did not vote?" Response categories include the following:[41]

Response category	Pct. of respondents in 2008[42]
Illness or disability (own or family's)	16.1%
Out of town or away from home	9.5%
Forgot to vote (or send in absentee ballot)	2.8%
Not interested, felt my vote wouldn't make a difference	14.4%
Too busy, conflicting work or school schedule	18.9%
Transportation problems	2.8%
Didn't like candidates or campaign issues	13.9%
Registration problems (i.e., didn't receive absentee ballot, not registered in current location)	6.4%
Bad weather conditions	0.3%
Inconvenient hours or polling place, or hours or lines too long	2.9%
Other	12.2%

The eighth response category (registration problems) forms the basis for this indicator.

[40] Steven J. Rosenstone and Raymond E. Wolfinger, "The Effect of Registration Laws on Voter Turnout," *American Political Science Review* 72 (1) (1978): 22–45; G. Bingham Powell Jr., "American Voter Turnout in Comparative Perspective," *American Political Science Review* 80 (1) (1986): 17–43.
[41] In addition to the following categories, there are provisions in the data for "no response," "refused," "don't know," and "blank or not in universe."
[42] Based on weighting by variable PWSSWGT, which is the "final weight" given to each individual in the survey, which is constructed to be proportional to the inverse probability of being included in the survey. Percentages are based on respondents who gave one of these answers, excluding those who refused or said they did not know, did not respond, or were not in the sample universe.

Stability of rates across time

The rate at which nonvoters report they failed to vote because of registration problems or failure to receive an absentee ballot will vary across time, for a variety of reasons. Some of these reasons may be related to policy—for instance, a shift to a permanent absentee ballot list may cause an increase in the percentage of nonvoters giving this excuse for not voting. Some of these reasons may be unrelated to election administration or policy, and therefore can be considered random variation.

One advantage of VRS data is that it goes back many elections. The question about reasons for not voting has been asked in its present form since 2000. Therefore, it is possible to examine the intercorrelation of this measure at the state level across six federal elections—2000, 2002, 2004, 2006, 2008, and 2010—to test its reliability.

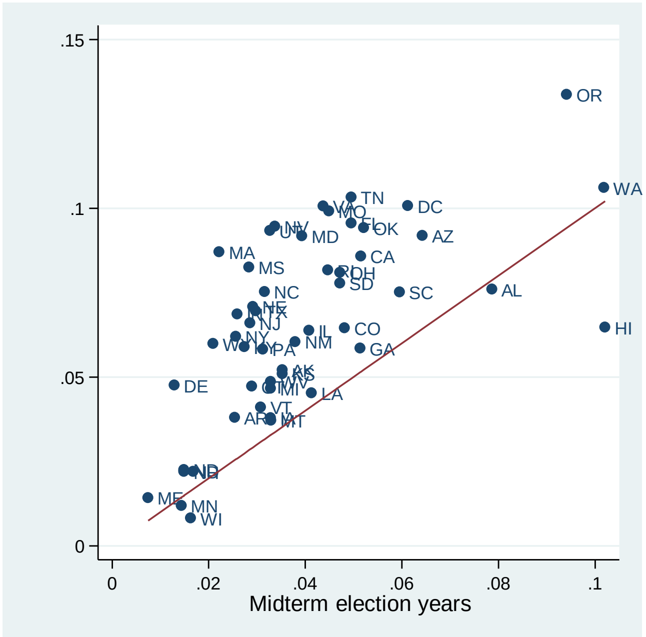
The following table is the correlation matrix reporting the Pearson correlation coefficients for values of this indicator across these six elections.

	Year					
Year	2000	2002	2004	2006	2008	2010
2000	1.000					
2002	0.452	1.000				
2004	0.370	0.634	1.000			
2006	0.287	0.533	0.319	1.000		
2008	0.390	0.295	0.349	0.578	1.000	
2010	0.205	0.462	0.526	0.473	0.318	1.000

The correlation coefficients between pairs of elections are moderately high, which suggests the underlying factor that is being measured by this indicator is stable within individual states; therefore, there is strong reliability to the measure. As a result, it may be prudent to consider combining data across years so that the reliability of the measure might be improved.

It is tempting to consider creating a single scale from this set of data because of the moderately high overall intercorrelations. However, comparing the *averages* for each year reveals that more nonvoters give the "registration problem" excuse in presidential election years (6.6 percent national average) than in midterm election years (3.9 percent national average). Consequently, a more prudent strategy is to treat presidential and midterm election years separately.

We created two scales from the dataset, one consisting of the average rates for presidential election years, and the other the average rates for midterm election years. The following graph shows the correlation across these two measures.



The Pearson correlation coefficient quantifying this relationship is .65, which is higher than any of the coefficients in the correlation matrix shown above. By combining data across several election years for midterm and presidential elections, we are able to create measures in which random noise is reduced.

Registrations Rejected

Data source: Election Administration and Voting Survey

Although in most states it is necessary to register ahead in order to vote, research into voter registration is in its infancy. As a consequence, it is not presently known how many rejected registration forms are the result of ineligible voters attempting to register versus eligible voters who are denied because of errors made in filling out or processing their registration forms.

Regardless of why registrations are rejected, a state or county that rejects a large fraction of registrations must devote a greater portion of its limited resources to activities that do not lead to votes being counted. This can be particularly challenging as an election approaches, since most registrations are received and processed in the weeks leading up to an election, when election offices also must deal with manyother tasks. If a locality has a high rate of rejected registrations because of administrative problems, the situation can lead to other problems such as people who think they have registered when they have not. This, in turn, could lead to more provisional ballots being cast, longer lines at the polls, and greater confusion on Election Day.

Coding convention

Expressed as an equation, the registration rejection rate can be calculated as follows from the EAVS dataset:

$$\textbf{Pct. Registrations Rejected or Invalid} = \frac{\textbf{\textit{Invalid or rejected}}\ (\textbf{\textit{other than duplicates}})}{\textbf{\textit{Invalid or rejected}}\ (\textbf{\textit{other than duplicates}}) + \textbf{\textit{New valid registrations}}}$$

Data will be missing if a county has failed to provide any of the variables included in the calculation. For the 2008 EAVS, the registration numbers include applications received from the close of registration for the November 2006 election until the close of registration for the November 2008 election.[43] For 2010, the range is the close of registration for the November 2008 election to the close of registration for the November 2010 election.[44]

Correspondence between variable definition and EAVS variable names

Descriptive name	*2008 EAVS*	*2010 EAVS*
Invalid or rejected (other than duplicates)	a5e	qa5e
New valid registrations	a5b	qa5b

[43] **U.S. Election Assistance Commission, "2008 Election Administration and Voting Survey."**
[44] **U.S. Election Assistance Commission, "2010 Election Administration and Voting Survey."**

Data availability, county data

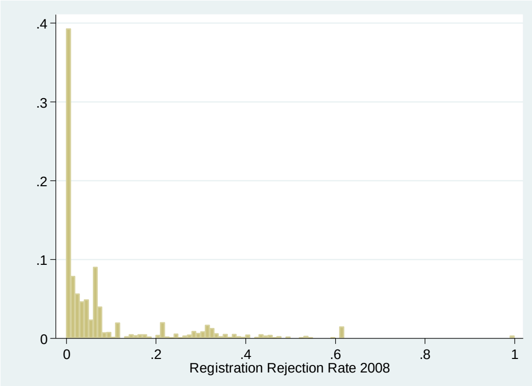
	2008 EAVS				2010 EAVS		
Descriptive name	Var. name	Missing cases, raw	Missing cases, weighted by registered voters		Var. name	Missing cases, raw	Missing cases, weighted by registered voters
Invalid or rejected (other than duplicates)	a5e	1748 (38.36%)	1181 (26.33%)		qa5e	1,356 (29.31%)	1,338.52 (29.05%
New valid	a5b	1218 (26.73%)	593.72 (13.24%)		qa5b	446 (9.6%)	390.14 (8.47%)
Overall		1795 (39.39%)	1301.03 (29.00%)			1,358 (29.36%)	1,340.26 (29.09%

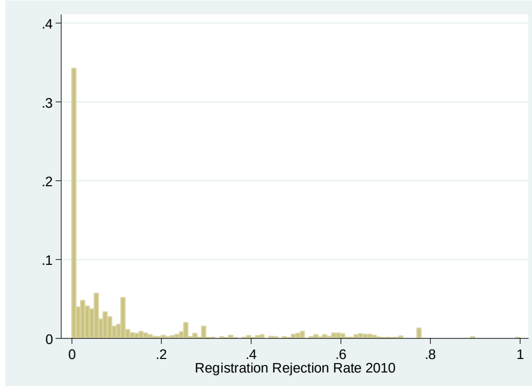
Because of missing data, it was not possible to compute registration rejection rates for the following: Arkansas, Arizona, California, Colorado, District of Columbia, Hawaii, Idaho, Kentucky, Massachusetts, Maryland, Missouri, Mississippi, New Hampshire, New Mexico, New York, Ohio, Oklahoma, Oregon, Rhode Island, South Carolina, South Dakota, Tennessee, Utah, Washington, Wisconsin, West Virginia, and Wyoming (2008); and Arizona, California, Connecticut, Florida, Hawaii, Idaho, Missouri, Mississippi, Nebraska, New Hampshire, New Mexico, New York, Oklahoma, Oregon, Rhode Island, South Carolina, Tennessee, Vermont, Washington, Wisconsin, and Wyoming (2010). North Dakota has no voter registration and therefore was not included in this measure.

Stability of rejection rates across time

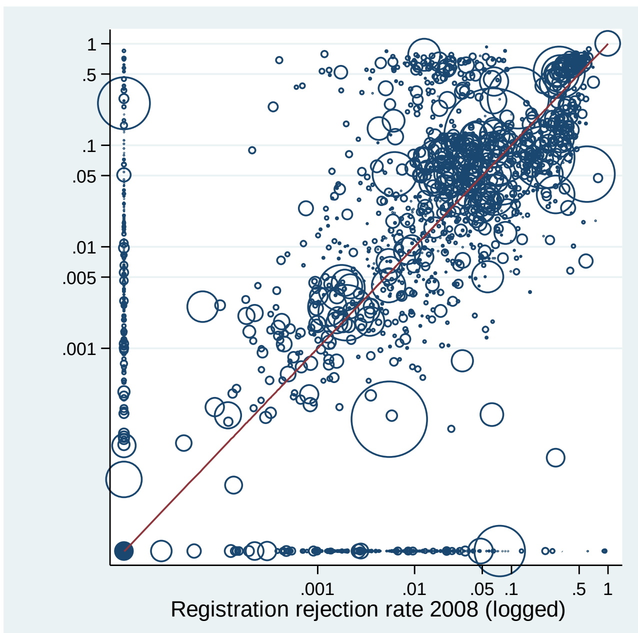
We begin by comparing registration rejection rates, measured at the county level, for 2008 and 2010. The following two histograms show the distribution of rejection rates for 2008 and 2010 for each county in the United States for which we have the relevant data.[45] The data exhibit what is known as a pronounced "right skew." That is, most counties have very low rejection rates (with a peak on the left of both histograms representing the large portion of counties with rejection rates at or near zero), while a few have relatively high rates (the small smattering of observations in the right-hand "tail" of each histogram).

[45] The county-level rejection rates have been weighted by the total number of valid and invalid registration forms submitted in 2008.





Because of this pronounced right skew, any scatterplot that compares 2010 values with 2008 values will be misleading—the bulk of observations will be clumped around the origin, but the viewer's eye will be drawn to the small number of outliers with extremely large values. To deal with this pronounced right skew, we rely on the common practice of transforming the measures by taking logarithms. However, one problem this creates is that a large fraction of counties had zero rejected registration forms in 2008 and/or 2010, and the logarithm of zero is undefined. Therefore, in the scatterplot below, counties with zero rejected registration forms have their rejection rate set to 0.00001, which is slightly below the lowest nonzero rejection rate that was actually observed. Finally, so that the influence of larger counties is visually greater than that of smaller counties, we weight the data tokens in proportion to the size of the county's registration activity.[46]



As this graph illustrates, for counties that reported the data necessary to calculate rejection rates for both 2008 and 2010, rejection rates are very similar these two years. The Pearson correlation coefficient, which measures the degree of similarity across these two election cycles, is .67.[47]

This graph also illustrates how counties that report zero rejections one election cycle often report a considerably greater rejection rate the next cycle. With rejection rates overall being relatively low (8.6

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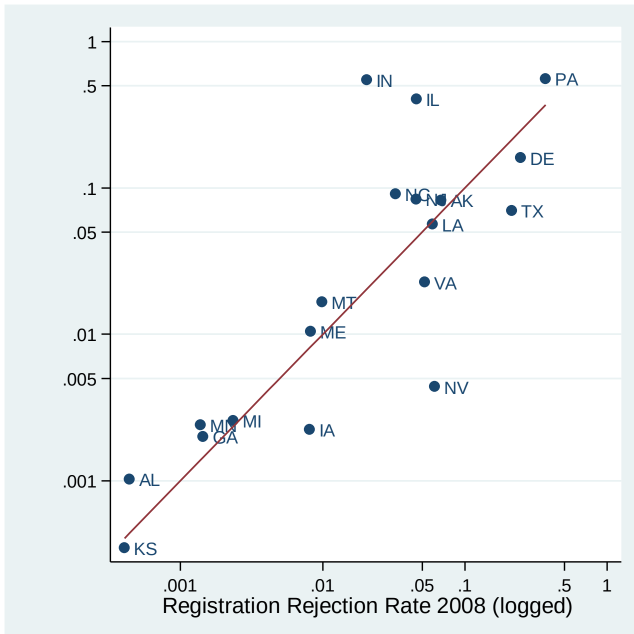
[46] More precisely, we weight the counties by the number of valid and invalid registration forms submitted in 2008.
[47] The correlation coefficient was calculated on the logged values, weighting each county by the number of valid and invalid forms submitted in 2008.

percent in 2008 and 13.4 percent in 2010), in many cases, the jump in rejection rate between years is simply because a county is very small. For example, a county that receives only 20 new registration applications per election cycle may easily reject none in 2008 but reject two, or 10 percent, in 2010. However, relatively large counties will sometimes report zero rejections in one election cycle and a relatively large number in the other cycle. This sort of behavior calls for further investigation and research. Until such research is conducted, this pattern alerts us to the need to be cautious when using data about the rejection rates of voter registration forms.

The EPI reports rejection rates at the state level. The statewide rejection rates are similarly right-skewed; therefore it is necessary to translate the rejection rates into logarithms before plotting the rejection rate in 2010 against the rate for 2008.



As with the registration rejection measure calculated at the county level, the indicator calculated at the state level is very stable when we compare 2008 with 2010. Using the state rejection rates that have been translated into logarithms, the Pearson correlation coefficient describing the relationship across the two years is .83.

Turnout

Data source: United States Elections Project Web site (elections.gmu.edu)

Perhaps the most highly visible measure of the health of elections is the turnout rate—that is, the percentage of eligible voters who vote. A very large body of academic literature has studied the factors that cause turnout rates to rise and fall, the classic study being *Who Votes?* by Raymond E. Wolfinger and Steven J. Rosenstone.[48] The most powerful predictors of who will turn out are demographic, most notably education and income. However, the presence of certain registration laws has been shown to affect turnout, as demonstrated by Wolfinger and Rosenstone and those who have followed in their footsteps.

<u>Coding Convention</u>

This indicator is based on data collected by George Mason University's Michael McDonald and reported on the United States Elections Project Web site. The measure of the numerator, turnout, is based on one of two factors. First, for states that report actual turnout, this figure is used. For states that do not report actual turnout, turnout is estimated by taking the number of votes cast for the statewide office receiving the most votes in an election. In presidential election years, this is almost always the presidential election. In midterm election years, this is most often the gubernatorial or U.S. Senate election.

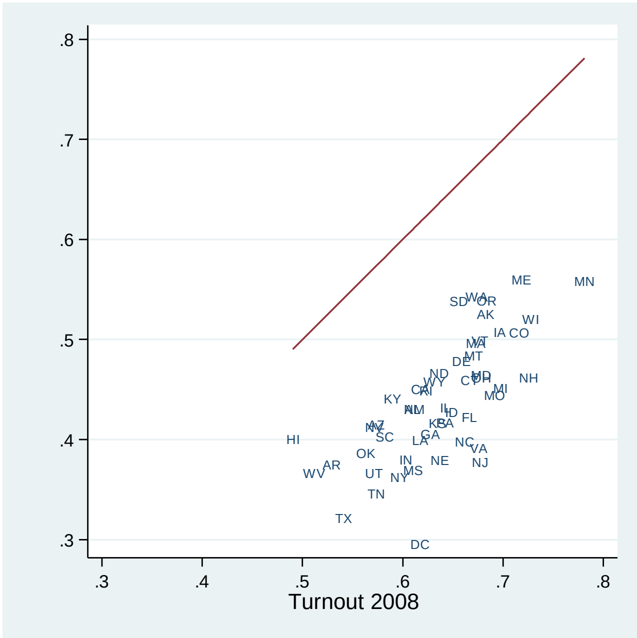
The denominator is *voting-eligible population* (VEP) as calculated by McDonald. VEP is an improvement on the *voting-age population* (VAP), which has long been reported by the Census Bureau. While VAP has the virtue of being easily calculated from Census Bureau reports, it is flawed because it includes individuals of voting age who are ineligible to vote, notably convicted felons (in most states) and noncitizens (in all states). Failure to account for ineligible voters among the voting-age population causes the turnout rate to be depressed, because the denominator is too large.[49]

Stability of turnout rates across time

The following graph shows the turnout rate for all states in the 2010 and 2008 general elections.

[48] Yale University Press, 1980.

[49] As McDonald and Samuel Popkin show in their research introducing the idea of the voting-eligible population (VEP), much of the so-called decline in turnout rates reported over the past several decades is due to the growth of the ineligible population included in the voting-age population (VAP). Once the inflation of the ineligible population in the VAP is accounted for, the decline in voter turnout that began in the late 1960s is not so pronounced, and the rebound that began in 2000 is more pronounced. See Michael P. McDonald and Samuel L. Popkin, "The Myth of the Vanishing Voter," *American Political Science Review* 95 (4) (2001): 963–974.



The Pearson correlation coefficient quantifying this relationship is .71. Therefore, the turnout rate exhibits stability over time.

Voter Registration Rate

Data source: Voting and Registration Supplement of the Current Population Survey

In nearly every state, the most basic requirement for voting, once age and citizenship requirements have been met, is registering to vote. Voter registration started becoming common in the late 19th century, but often applied only to larger cities and counties in a state. By the 1960s, however, universal registration requirements had become the norm across the United States. Today, only North Dakota does not require voters to register, although it maintains a list of voters, to help with the administration of elections.

If being registered to vote is a prerequisite to voting, then the percentage of eligible voters on the rolls is an important measure of the accessibility of voting. Registration rates vary across the states due to a combination of factors, some related to the demographic characteristics of voters, and some related to state registration laws. Although registration is necessary in order for most Americans to vote, little academic research has been done explaining why individuals register to vote; most studies focus on why registered voters turn out. An important exception is research by Glenn Mitchell and Christopher Wlezien.[50] Their study confirms that the factors influencing turnout are very similar to those influencing registration. Another study finds that the act of registration itself may stimulate turnout;[51] therefore, it is not surprising that the same factors will be found to influence both.

One factor hindering the direct study of voter registration rates, as opposed to using turnout as a proxy, is the inflated nature of voter registration lists. Official lists tend to over-report the number of registered voters because of the lag between the time when registered voters die or move out of state and when those events are reflected in the voter rolls. States differ in their method and frequency of removing dead registrants from the rolls, and many states do not have effective methods for definitively identifying voters who move out of state.[52]

The failure to immediately remove registered voters who have moved or died means that not only will registration rolls generally contain more names than there are actual registrants in a state, but the degree to which the rolls contain "deadwood" will depend on the frequency and diligence of registration roll maintenance across states. The number of people on voter registration rolls will sometimes exceed the number of eligible voters in a state. In the 2010 National Voter Registration Act report issued by the EAC, for instance, the District of Columbia and Michigan reported more active registrants than the estimated eligible population; and Alaska and California had registration rates that exceeded 100 percent, if inactive registrants were included (Table 1d in the NVRA report).

Because of the high variability in the manner in which voter registration lists are maintained, an alternative technique was used to estimate voter registration rates, relying on responses to the Voting and Registration Supplement (VRS) of the Current Population Survey (CPS). As shown below, registration rates calculated using the VRS are more stable over time than those calculated using official state statistics. This does not overcome the problem of overestimating registration rates due to inaccurate responses. However, under an assumption that respondents in one state are no more likely to misreport their registration status than residents of any other state, the registration rates calculated using the VRS are more likely to accurately reflect the relative registration rates across states than are the rates calculated using official reports.[53]

[50] Glenn E. Mitchell and Christopher Wlezien, "The Impact of Legal Constraints on Voter Registration, Turnout, and the Composition of the American Electorate," *Political Behavior* 17 (2) (1995): 179–202.
[51] Robert S. Erikson, "Why Do People Vote? Because They Are Registered," *American Politics Research* 9 (3) (1981): 259-276.
[52] According to the EAC's 2009–2010 NVRA report, 25.2% of removals from voter registration lists during the 2009–10 election cycle were due to voters "moving from jurisdiction" (Table 4b). This is in contrast with 40.7% of removals being because of "failure to vote."
[53] For more information about the difference between the VRS numbers and state-reported numbers of registered voters, see the Pew Center on the States report *Election Administration by the Numbers*.

Coding convention

This indicator is based on responses to the VRS of the Census Bureau's CPS. It is based on a combination of three variables:

- **PES1:** In any election, some people are not able to vote because they are sick or busy or have some other reason, and others do not want to vote. Did (you/name) vote in the election held on Tuesday, [date]?
- **PES2: [Asked of respondents who answered "no" to PES1]** (Were you/Was name) registered to vote in the [date] election?
- **PES3: [Asked of respondents who answered "no" to PES2** Which of the following was the MAIN reason (you/name) (were/was) not registered to vote?

Registered voters are those who answered "yes" to either PES1 or PES2 (the latter if the respondent answered "no" to PES1). In addition, respondents are removed from the analysis if they answered "not eligible to vote" to PES3 as they reason they were not registered.[54]

Using the combined answers to these three questions allows one to estimate the percentage of eligible voters in each state who are registered. North Dakota has been removed from this measurement because its citizens are not required to register in order to vote.

Comparison of survey-based registration rates with official rates

We first compare the registration rates calculated from the VRS with rates calculated from official registration rolls. The 2010 EAC National Voter Registration Act report contains an appendix that lists historical registration statistics from 1992 to 2010, based on state reports derived from their own registration records. The registration statistics we use here are from the "Registration Reported" column of Table 1a in the NVRA report ("Registration History"). The registration rate is calculated by dividing this number by the estimated voting-eligible population reported on the United States Elections Project Web site.[55]

The following four graphs compare the VRS estimates (y-axis) of registration rates with the official reports (x-axis). Below each graph is a report of the respective Pearson correlation coefficients for 2004, 2006, 2008, and 2010.

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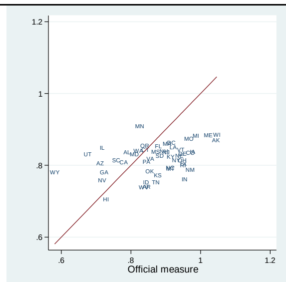
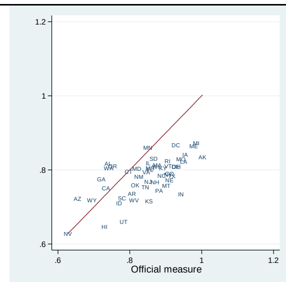
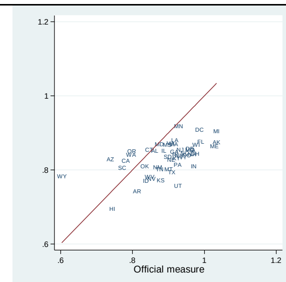
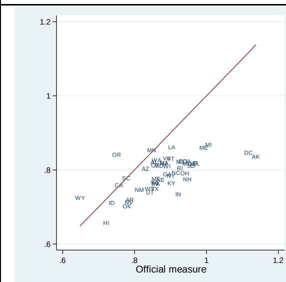
[54] In 2010, 0.6% of nonregistrants stated they were unregistered for this reason. Although respondents are screened for citizenship status before being asked the questions in the VRS, it is likely that some noncitizens made it past this screen and then reported not registering because they were ineligible. The other main reason for giving this answer is likely that the respondent was unable to register because of a prior felony conviction.
[55] elections.gmu.edu

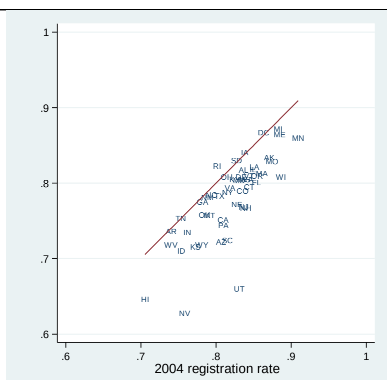
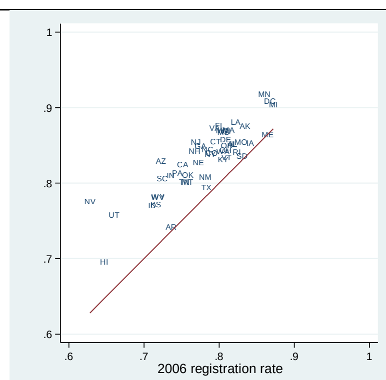
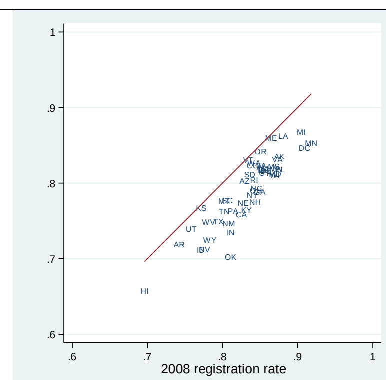
2004	2006	2008	2010
			
r = .39	r = .64	r = .56	r = .65

Two things are notable from these relationships. First, the correlations between the two methods of estimating registration rates are higher for midterm election years than for presidential election years. Second, on the whole, estimated registration rates using the VRS are lower than the rates derived from official sources, by 5 to 9 percentage points on average. If self-reported turnout rates in surveys tend to overreport actual turnout rates, the fact that official registration rates are generally greater than survey-derived registration rates is strong evidence that the actual percentage of eligible voters is significantly below the nationwide 78.7 percent registration rate reported in Table 1c of the 2010 NVRA report.

The significant correlation between the VRS estimate of voter registration rates and the registration rates calculated from the official rolls suggests that each method, in some way, captures the underlying, actual registration rate in each state. These correlations could justify an alternative method of rank-ordering states on their registration rates by taking an average of the two rates, after normalizing the measures to put them on a common scale. That method has not been chosen here, due to a desire to keep the indicator relatively simple.

Stability of registration rates across time

The following graphs show the estimated registration rate (using the VRS data) for all of the states across two adjacent election cycles. Below each graph is the corresponding Pearson correlation coefficient quantifying this relationship.

2006 vs. 2004	2008 vs. 2006	2010 vs. 2008
		
r = .78	r = .86	r = .89

The high correlation shows that this method produces estimates of voter registration rates that are reliable across time.

Voter Information Look-Up Tools Available

Data sources: Pew's *Being Online is Not Enough* (2008) and *Being Online is Still Not Enough* (2011)

Americans are increasingly incorporating the Internet into their daily lives; elections are no exception. These indicators measure whether citizens can find the official election information they need online. Web sites that quickly and easily deliver the information citizens seek about an upcoming election can improve the voting experience and ease the burden placed on election officials' limited resources.

For 2008, this indicator combines two measures: whether state election sites have voter registration verification and whether they have polling place locators. Both indicators are binary in nature and can be summed to create a score ranging from a minimum of 0 to a maximum of 2. For a state to receive credit for having any Web site tool, the resource must be a statewide tool available through an official state Web site such as that of the secretary of state, and it must have been available before the 2008 election.

In 2010, Pew expanded its examination of online tools to five measures, including the two from 2008 (voter registration verification and polling place locators). The new measures were whether state election sites let voters see their precinct-level sample ballots, whether absentee voters can check their ballot status online, and whether voters issued provisional ballots can check their ballot status online. The five indicators are binary and can be summed together to create a score ranging from 0 to 5. As in 2008, for a state to receive credit for having any Web site tool, the resource must be a statewide tool available through an official state Web site such as that of the Secretary of State, and it must have been available before the 2010 election.

Voting Technology Accuracy

Data source: State boards of elections

The controversies surrounding "hanging chad" and "butterfly ballots" after the 2000 election demonstrated to Americans how efforts to vote might be undermined by malfunctioning voting equipment or confusion induced by poor ballot design. The leading way to assess the accuracy of voting technology is using the residual vote rate, which measures votes that are "lost" at the point when ballots are cast for president. Efforts to improve the technology of voting should be evident by the reduction of the residual vote rate, the measurement in the Voting Technology Accuracy indicator.

The residual vote rate can be defined as the sum of over- and under-votes for a particular election, divided by the total number of voters who turned out. Pioneered by the Caltech/MIT Voting Technology Project, this measure has become a standard benchmark in assessing the overall accuracy of machines and documenting the improvement as old machines have been replaced by new ones.[56] Although there are other measures of voting machine quality, there is presently no other widely used metric that can be applied uniformly throughout the country.

Coding convention

Expressed as an equation, the residual vote rate can be calculated as follows:

$$\textbf{Residual Vote Rate} = \frac{\boldsymbol{Reported\ Total\ Turnout - Total\ Votes\ Counted}}{\boldsymbol{Reported\ Total\ Turnout}}$$

The residual vote rate must be calculated with respect to a particular election. The only election that is comparable across the entire country is the race for president, so this indicator is based on the residual vote rate for the president. Therefore, it is calculated only for presidential election years. In midterm elections, there is too much variability, in terms of which races are atop the ticket in each state and in terms of the competitiveness of statewide races, to make the residual vote rate a valid interstate measure of voting machine accuracy.

The data were gathered for this measure from the official returns of state election offices. Two special considerations must be kept in mind in calculating this measure. First, the residual vote rate can be calculated only if a state requires local jurisdictions to report turnout (the number of voters taking ballots in a particular election), In 2008, the most recent presidential election for which the residual vote rate has been calculated, five states were excluded for this reason: Alabama, Kansas, Mississippi, Oklahoma, and Texas. Connecticut also was excluded because its turnout report yielded implausible residual vote rates.

Second, the residual vote rate can be influenced by whether states publish tabulations of write-in votes. States that allow but do not publish write-in votes for president can have a higher residual vote calculated for them than is warranted. Therefore, special care was taken to ensure that write-in votes were included in the residual vote calculations reported here.

The most serious criticism of the residual vote rate is that it conflates under-votes caused by conscious abstention and inadvertent mistakes. Based on research utilizing various data sources, it appears that between 0.5 percent and 0.75 percent of voters abstain from voting for the office of president each

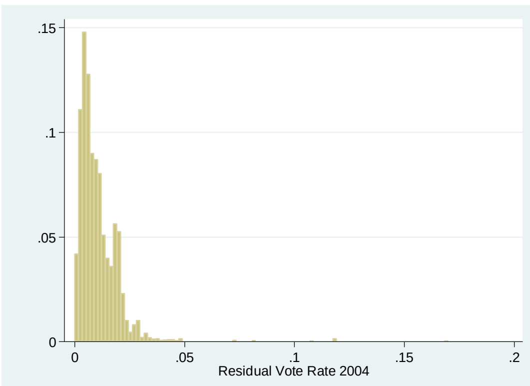
[56] For a review of the use of the residual vote rate, see Charles Stewart III, "Voting Technologies," ***Annual Review of Political Science*** **14 (2011): 353–378. A book that makes extensive use of this measure is Martha Kropf and David C. Kimball's** ***Helping America Vote: The Limits of Election Reform*** **(New York: Routledge, 2011).**

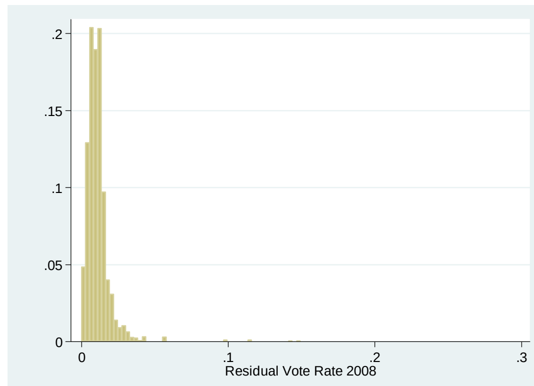
presidential election cycle.[57] The statewide residual vote rate has rarely dipped below 0.5 percent: six states and the District of Columbia had residual vote rates below this benchmark in 2008, for instance. (The states were Nevada, Delaware, Minnesota, Alaska, New Mexico, and Wisconsin.)

Finally, in calculating the residual vote rate for a state, counties that reported more votes for president than total turnout were excluded.

Stability of residual vote rates across time

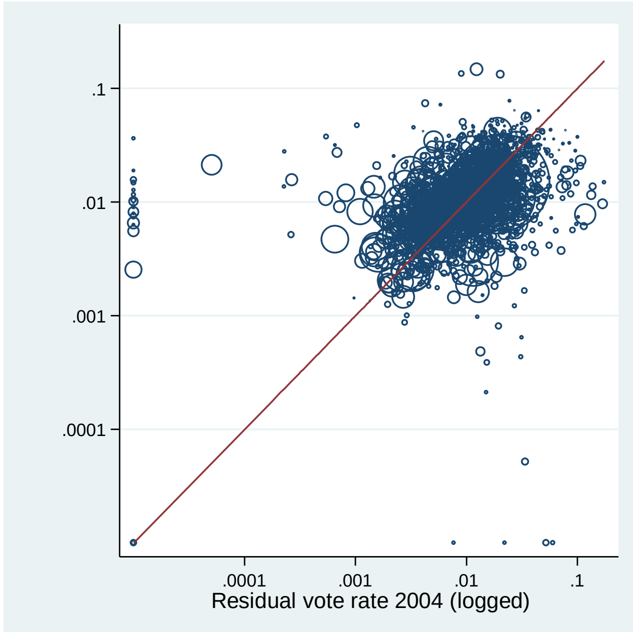
We begin by comparing residual vote rates, measured at the county level, for 2004 and 2008. The raw data exhibit what is known as a pronounced "right skew." That is, most counties have very low residual vote rates, while a few have relatively high rates. This is illustrated in the following two histograms, which show the distribution of residual vote rates in 2004 and 2008 for each U.S. county for which we have the relevant data.[58]





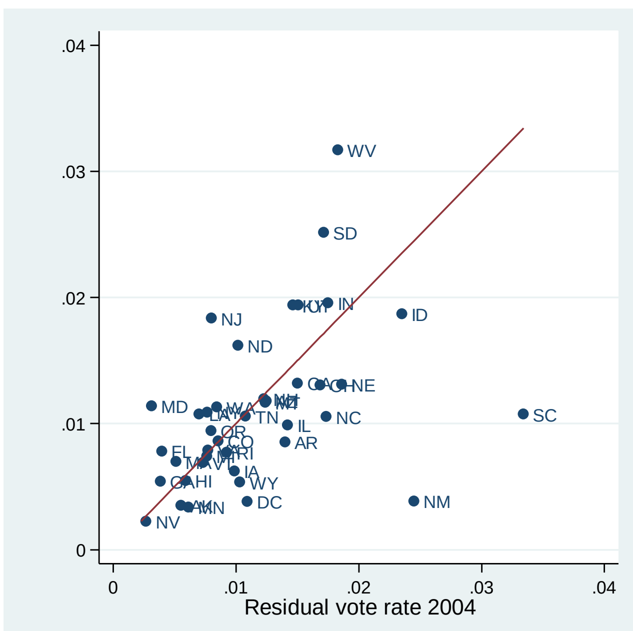
Because of this pronounced right skew, any scatterplot that compares 2008 values with 2004 values will be misleading—the bulk of observations will be clumped around the origin, with our eye drawn toward the small number of outliers with extremely large values. To deal with this pronounced right skew, it is common to transform the measures by taking logarithms. One problem this creates is that some counties (especially small ones) had zero residual votes in 2004 and/or 2008, and the logarithm of zero is undefined. Therefore, in the scatterplot below, counties with zero residual votes have been set to 0.00001, which is slightly below the lowest nonzero residual vote rate that was actually observed. Finally, so that the influence of larger counties is visually greater than that of smaller counties, we weight the data tokens in proportion to the size of the county.[59]

57 Charles Stewart III, "The Performance of Election Machines," paper presented at the conference on The Measure of American Elections, Cambridge, Massachusetts, June 17–18, 2012.
58 The counties have been weighted in proportion to turnout.
59 More precisely, we weight the counties by turnout in 2008.



As this graph illustrates, for counties that reported the data necessary to calculate residual vote rates in both 2004 and 2008, rejection rates are related to a moderate degree. The Pearson correlation coefficient, which measures the degree of similarity across these two election cycles, is .41.[60]

The EPI reports residual vote rates at the state level. The statewide residual vote rates are not especially right-skewed; therefore the following plot represents the comparison of residual vote rates using raw percentages rather than logged ones.



As with the measures calculated at the county level, the indicator calculated at the state level is fairly stable when we compare 2004 with 2008. The Pearson correlation coefficient describing the relationship

[60] The correlation coefficient was calculated on the logged values, weighting each county by the number of valid and invalid forms submitted in 2008.

across the two years is .44. There are two outliers, New Mexico and South Carolina, which exhibited significant improvements in residual vote rates in 2008, compared with 2004. When these two states are excluded, the Pearson correlation coefficient rises to .53.

Voting Wait Time

Data source: Survey of the Performance of American Elections

The time voters spend waiting to vote is a highly visible measure of voting convenience. Although long lines can indicate excitement surrounding an election, significant variation in polling place lines across communities can suggest the presence of factors that make it easier or harder for some to vote.

Coding convention

Respondents to the 2008 Survey of the Performance of American Elections (SPAE) were asked: "Approximately how long did you have to wait in line to vote?" Answers to the question are given as intervals by respondents. We recode the responses to the midpoint of the respective interval, using the following mapping:

Survey Code	Category	Recoded As
1	Not at all	0 min.
2	Less than 10 minutes	5 min.
3	10-30 minutes	20 min.
4	31 min. to 1 hour	45 min.
5	More than 1 hour	See below
6	Don't know	Missing

The survey contained an open-ended question for those answering "more than 1 hour," requesting the respondent to supply the exact amount of time spent waiting in line. For the respondents who supplied an exact time, we recoded the response to reflect the exact time. For the remaining respondents, we recoded the waiting time answer to be the mean of all the respondents who gave the "more than 1 hour" answer in that particular election year.

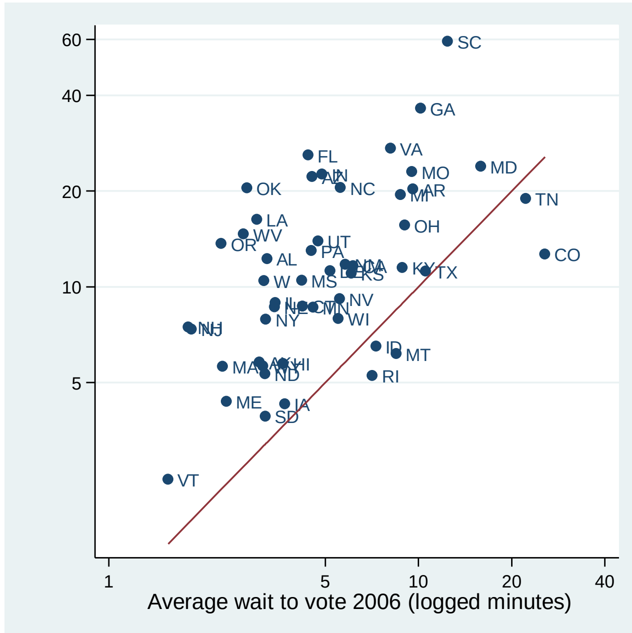
Reliability of the measure

Reliability pertains to the ability of a measure to be estimated consistently, when measured at different times or using different methods. The SPAE was first conducted for the 2008 presidential election; it was not conducted for the 2010 midterm election, so we cannot assess the reliability of wait time data using only SPAE data.

However, the "waiting time" question was originally asked on the 2006 Cooperative Congressional Election Study (CCES), which allows us to use cross-time correlation as one way to assess the reliability of this measure. We begin by comparing the 2006 CCES wait times with the 2008 SPAE wait times.

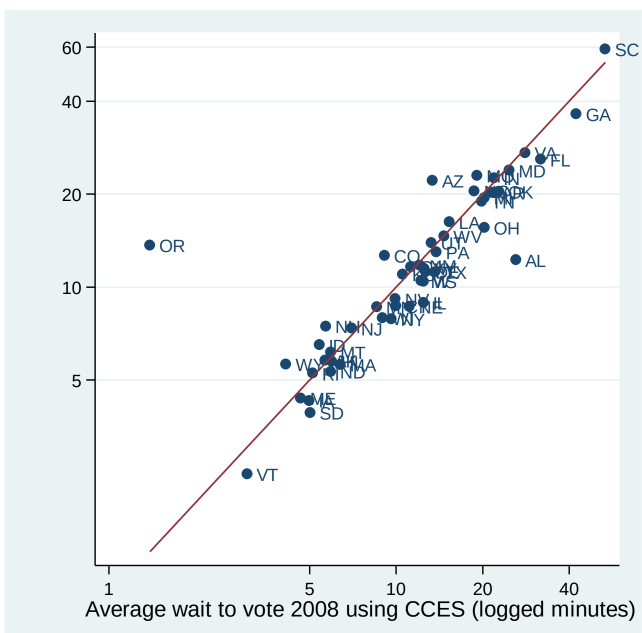
The average wait time to vote exhibits a strong right skew for both 2006 and 2008. Because of the right skew in the distribution of wait times, any scatterplot that compares 2008 values with 2006 values will be misleading—the bulk of observations will be clumped around the origin, with our eye drawn toward the outliers with extremely large values. To deal with this right skew, it is common to transform the measures by taking logarithms.

The following graph shows the scatterplot among states for the 2006 CCES and the 2008 SPAE wait times, plotting the variable on log scales.



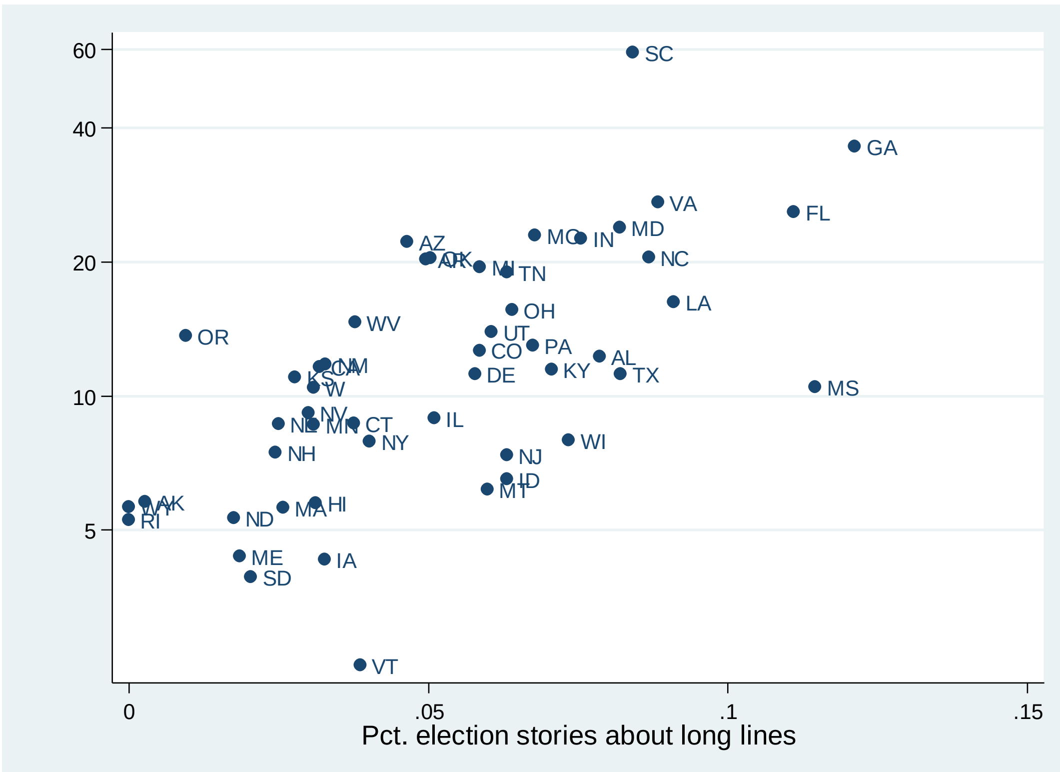
The Pearson correlation coefficient describing the relationship between the two years is .54 once the variables have been transformed by taking logarithms, and .40 before the transformation. Thus, there is a strong relationship between wait times to vote in the 2006 and 2008 elections. (With a few exceptions, wait times were longer in the presidential election year, 2008, than in the midterm election year, 2006, which is expected.)

The wait time question was also asked in the 2008 CCES, which allows us to compare results obtained across two different surveys (the SPAE and the CCES) at the same time (2008). The following scatterplot shows the different estimates from these two surveys, again after taking the logarithm of both variables.



The Pearson correlation coefficient describing the relationship between the methods is .84 once the variables have been transformed by taking logarithms, and .93 before the transformation. On the whole, average waiting times are quite similar in the two surveys, with the exception of Oregon. Because Oregon uses vote by mail for all ballots, only a very small number of Oregonians responded to this question: 22 respondents in the CCES and six in the SPAE. Because of the small number of respondents and Oregon's vote-by-mail policy, we can overlook this observation, and it has been removed from the EPI.

An entirely independent measure of waiting times was provided by Michael Peshkin on his "VoteBackHome" Web site in 2008, which used Google News to count the number of press accounts concerning long polling place lines in each state.[61] Peshkin wrote a program that aggregated all of the news stories about "voters" that appeared on Election Day, and then had the program count the number of articles that mentioned "long lines." The following graph shows the relationship between the logged SPAE estimates of the average wait to vote in each state plotted against Peshkin's estimate of the percentage of election news stories in each state that mentioned long lines.



The correlation between these two measurements is quite high: r=.65 for the logged values of wait time and r = .59 for the raw wait time. South Carolina is a clear outlier, at least in terms of the average wait time. However, South Carolina is not an outlier if we look at the rank-ordering of states along the two measures; it is in the top 10 states in both wait time and election stories about wait time. (The Spearman rank-order correlation coefficient is .67.)

The consistency of results across years and across different survey efforts is evidence of the validity of the question.

Validity of the measure

Average wait time is one measure of the ease of voting. On its face, the less time a voter waits to cast a ballot, the more convenient the experience.

[61] **http://www.votebackhome.com/longlines/(accessed July 20, 2010).**

However, one issue that might challenge the validity of this measure is whether survey respondents correctly recall how long they waited in line to vote. Thus far, there have been no studies that relate perceived time waiting in line with actual waiting time. However, the psychological literature on time perception is considerable. McMaster University Professor Lorraine Allan's 1979 literature review on time perception concluded that, in general, the relationship between perceived and actual time is linear, although the actual parameters describing the relationship vary across settings.[62] These results suggest that respondents who report waiting in line longer actually did wait in line longer, and that the averages of self-reported waiting times of different groups (race, sex, state of residence, etc.) in the survey are likely to reproduce the same relative ranking of the waiting times that were actually experienced by members of those groups.

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[62] **Lorraine G. Allan, "The Perception of Time," *Perception & Psychophysics* 26 (5) (1979): 340–354.**

Appendix

Advisory Group: The members of the advisory board were instrumental in thinking through how to create the Elections Performance Index. However, neither they nor their organizations necessarily endorse its findings or conclusions.

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