Elections and Election Technologies

R. Michael Alvarez
Professor of Political Science, Caltech
Co-Director, Caltech/MIT Voting Technology Project

February 26, 2013

Caltech/MIT Voting Technology Project

- Formed in aftermath of 2000 presidential election, primarily to assess problems with voting technology.

- In last twelve years, we have published a number of books, scores of peer-reviewed academic papers, many working papers and reports.

- Prior to 2012 election, issued new report, Voting: What Has Changed, What Hasn't, & What Needs Improvement.

- Recently updated with post-election recommendations.

Four Important Principles

- Throughout the work of the VTP, we have focused on four important principles for voting systems:
  - Reliability
  - Security
  - Performance standards and evaluation
  - Sustainable business models

Improving Reliability: The Florida Recount

- When our project began in late 2000, there was no means for measuring the reliability of the equipment used for recording and tabulating votes during actual elections.

- Observationally, key problem seen in Florida recount seemed to be the large number of ballots on which the voter attempted to express a preference but for which no preference was recorded.

Improving Reliability: Residual Votes

- Enter the *Residual Vote*: the discrepancy between the number of ballots cast and the number of votes counted for an office.

- Many reasons for residual votes, voter mistakes, system failures and intentional under- or overvoting.

- But the frequency of residual votes should not be correlated with voting technology used.

Improving Reliability: Residual Votes

- Residual vote rate for president in 2000 nationwide was approximately 2% of all ballots cast.

- Was correlated with voting technology used.

- Improvements in procedures and technologies led to residual vote rates of approximately 1% in 2006 and 2008.

Improving Reliability: The Future

- Much research on reliability and residual votes have shown improvements since 2000 (Ansolabehere and Stewart 2005, Stewart 2009).

- But there is cause for concern. Increasing reliance on voting by mail in many states might cancel out these improvements (Alvarez, Beckett and Stewart, in press).

Improving Security

- Initial focus in the aftermath of the 2000 Florida recount was not on voting system security.

- Significant concerns arose, a wave of research and reporting began with Kohno et al. (2004).

Improving Security: Verifiability

- Voter verification:
  - Voter verified paper systems for electronic voting
  - Paper-based
- Software independence: changes/errors in voting system software can't cause undetectable changes/errors in election outcomes (Rivest and Wack 2006, Rivest 2008).

Improving Security: Verifiability

- End-to-end voting systems: systems that allow verifiability from beginning to end of process. A number of E2E systems in development and deployment.
- Election auditing.
  - Post-election ballot auditing
  - Performance audits

Improving Standards and Evaluation

- Federal voting systems standards process has stagnated recently.
- Should there be federal voting systems standards, or a strong set of state standards?
- Should standards focus on security and system testing, or should we focus on auditing election outcomes (e.g. Stark and Wagner 2012)?

Improving The Business Model

- In 2001, the VTP concluded that the biggest challenge to the future development of voting technologies was the industry's business model.

- Is the future a stronger business model for private industry? Or a robust state and local technology and development process (e.g., LA County's *Voting Systems Assessment Project*)?

Emerging Technology Issues

- There are many:
  - Technology of voting registration systems.
  - Improving system accessibility.
  - Voter authentication technologies.
  - Metrics for evaluation of technology and election administration.
  - Solutions for contingencies and natural disasters
- And there are those long lines for those trying to vote in person …

What Can Be Done About Long Lines?

- Long lines were an issue in 2012 election.
- Research from MIT colleague Charles Stewart III, "2012 Survey of the Performance of American elections"
  - 2012 survey: 200 respondents per state, fielded the week after November 6.
  - Previous rounds of the survey conducted in fall of 2007, spring and fall of 2009, and fall of 2009.

Waiting To Vote in 2012

- 35% did not wait at all to vote (2008, 42%)
- 13% waited more than 30 min. (2008, 14%)
- Longer lines for early voters!
  - Early voters averaged 20 minutes in line, compared to 13 minute average for Election Day voters

Who Waited Longer?
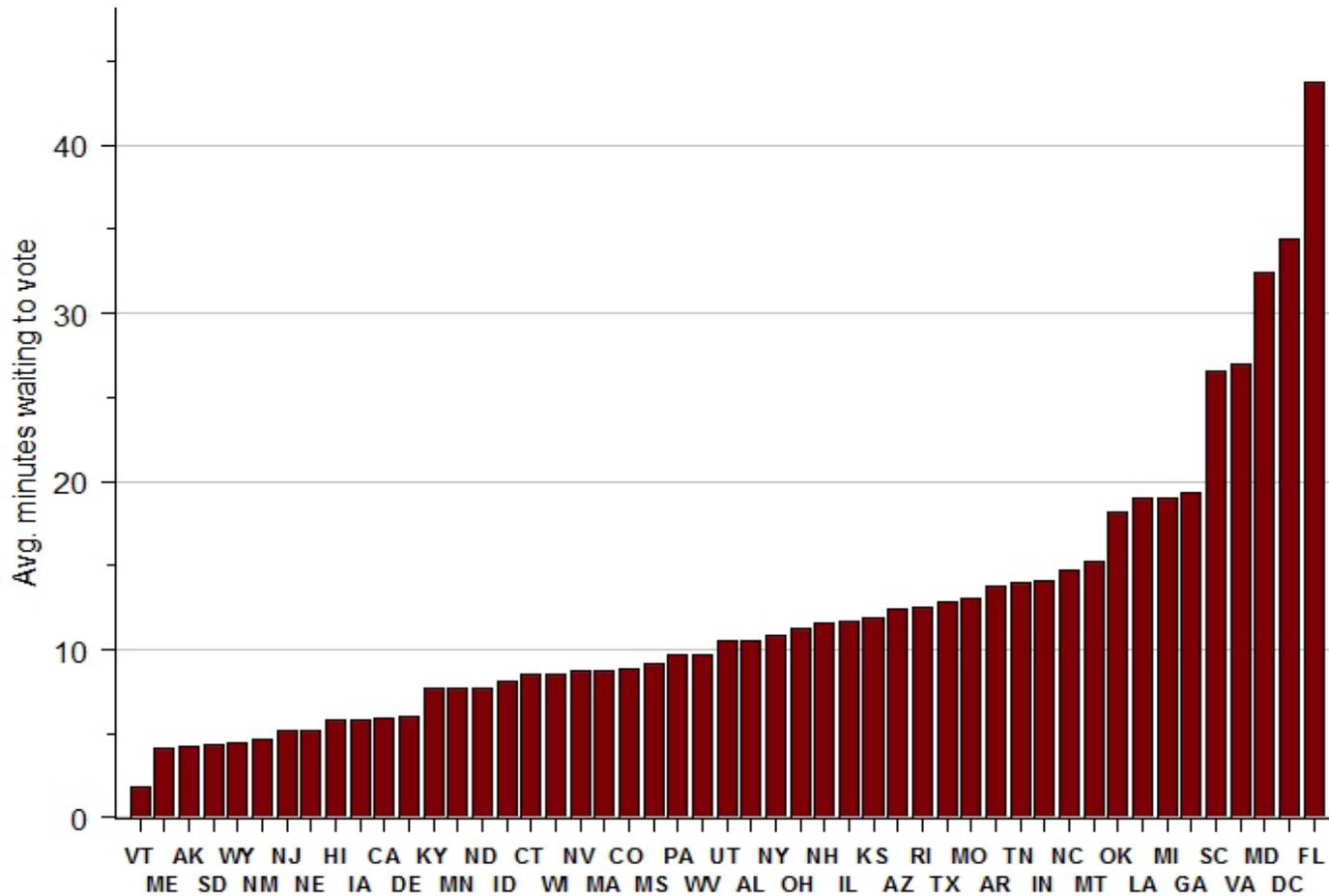
Average Wait Times

County population density

Density	E-Day	Early	Total
Least	6	5	6
2nd Qrt.	10	8	10
3rd Qrt.	13	18	14
Most	16	31	19
All	13	20	14

Race and ethnicity

	E-Day	Early	Total
White	11	16	12
Black	19	26	22
Hispanic	15	29	18
All	13	20	14

What Can Be Done About Waits?

- People and process
  - Procedures that slow voters down
  - Long ballots
- Investments
  - Number, size and location of voting places
  - Voting systems
- New Technologies
  - Disseminate information about long waits

Conclusions

- Caltech/MIT Voting Technology Project: http://vote.caltech.edu.

- Thanks to VTP colleagues, Jonathan Katz, Ron Rivest, Charles Stewart III.

- Thanks to the Carnegie Corporation of New York and the Pew Charitable Trusts.