



## **CALTECH/MIT VOTING TECHNOLOGY PROJECT**

A multi-disciplinary, collaborative project of the California Institute of Technology – Pasadena, California 91125 and the Massachusetts Institute of Technology – Cambridge, Massachusetts 02139

**TITLE**      **Waiting to Vote in 2012**

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**Key words:**

**VTP WORKING PAPER #110**  
**April 1, 2013**

## Waiting to Vote in 2012

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Draft of April 1, 2013

Prepared for the conference on “The Voting Wars: Elections and the Law from Registration to Inauguration,” University of Virginia Law School, March 23, 2013, Charlottesville, Virginia. This paper uses data from the 2008 and 2012 Survey of the Performance of American Elections, which was generously funded by the Pew Charitable Trusts, which bears no responsibility for the analysis found herein.

## Waiting to Vote in 2012

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Waiting in line to vote is one of the clichés of Election Day, whether the venue is Kenya or the United States. The length of time waiting to vote has regularly been an issue in the voting wars of the past decade. Long lines have given both the left and the right heartburn. For the left, long lines can be evidence that service-starved neighborhoods of predominantly poor and minority voters are seeing their votes suppressed through the inadequate provisioning of voting machines and poll workers on Election Day. For the right, the sight of long lines are just an excuse used by Democratic lawyers to get polling hours extended in urban areas, solely for the benefit of Democratic candidates.

Long lines to vote played a bit part in the post-election controversies in 2004, when problems in Ohio led to charges that misallocation of voting machines had led to inordinately long lines in predominantly African American precincts across the state.<sup>1</sup> The length of lines took on even greater prominence in 2012, as reports of six- and seven-hour waits blanketed the media, prompting President Obama to thank his supporters who “waited in line a very long time,” noting in an aside that, “By the way, we have to fix that.”<sup>2</sup>

Long lines make for good pictures to post on Web sites. Long lines in Florida fit into a narrative that paints the Sunshine State as the closest thing America has to a banana republic —

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<sup>1</sup> A representative example of the charges in Ohio and in other states is found in ELECTION PROTECTION COALITION, *Shattering the Myth: An Initial Snapshot of Voter Disenfranchisement in the 2004 Election*, (2004). A thorough report of election difficulties in Ohio in 2004, from the perspective of the Democratic Party, may be found at DEMOCRATIC NATIONAL COMMITTEE VOTING RIGHTS INSTITUTE, *Democracy at Risk: The 2004 Election in Ohio*, (2005).

<sup>2</sup> WASHINGTON POST STAFF, *President Obama's acceptance speech (full transcript)*(2012), at [http://articles.washingtonpost.com/2012-11-07/politics/35506456\\_1\\_applause-obama-sign-romney-sign](http://articles.washingtonpost.com/2012-11-07/politics/35506456_1_applause-obama-sign-romney-sign).

unable to manage elections cleanly and fairly, and eager to manipulate the parameters of its elections to trample on the rights of voters.

Furthermore, this portrait has clearly stung Florida's political leaders, including Republican election officials who only three years ago were busy passing laws to restrict access to the polls — laws that have been blamed for the long lines in 2012. As a result, on the first day of its 2013 session, the Florida House passed a bill undoing many of the changes made in 2011 that were blamed for causing Florida's struggles to vote in 2012.<sup>3</sup> Upon passage of the bill, the Speaker of the Florida House told reporters that “the Legislature has some responsibility for some of the challenges we had in 2012. That's why we passed (this bill) on the first day.”<sup>4</sup>

While election reformers have cheered the quick about-face of Florida legislators, and have expressed guarded optimism about President Obama's interest to fix election lines, the cause of long lines in Florida, and throughout the country, still remains unknown. Indeed, the entire picture we have of why long lines form at the polls is misleading. It is driven by an over-reliance on anecdotal news accounts that single out sensational anomalies. To be clear, long lines, when they occur are bad and lead to lost votes.<sup>5</sup> They do not fall like rain, equally on all voters. But scientific approaches to the problem of long lines remain in their infancy. While there is a small literature that applies operations research and queuing theory to lines at the polls, that literature is thin, and has barely made a dent in the actual practice of election administration.<sup>6</sup> Empirical studies that document in a systematic manner the actual dynamics of

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<sup>3</sup> HB7013; the companion Senate bill is SB600. See JAMES L. ROSICA, *Fla. House passes election overhaul bill*(2013), at <http://www.miamiherald.com/2013/03/05/3268557/fla-house-passes-election-overhaul.html>. The previous bill passed in 2011 was HB 1355.

<sup>4</sup> *Id.*

<sup>5</sup> Voting: What Is/What Could Be. (2001).

<sup>6</sup> See THEODORE ALLEN & MIKHAIL BERNSHTEYN, *Mitigating Voter Waiting Times*, 19 *Chance* 25(2006); New Voting Systems for NY: Long Lines and High Costs. (2006); WILLIAM A EDELSTEIN & ARTHUR D EDELSTEIN, *Queuing and elections: long lines, DREs and paper ballots*, Proceedings of EVT/WOTE 2010 (2010); UGBEBOR O OLABISI & NWONYE

lines at the polls — distinct from press accounts of long lines that may be based on atypical outliers — are even scarcer.<sup>7</sup> Lacking a clear empirical and theoretical foundation of polling place lines, we are running a real risk of throwing good money after bad, raising expectations unreasonably, and continuing a cycle in which election reform is based on belief rather than analysis.

The purpose of this article is to provide an empirical grounding into the patterns of long lines, focusing on the 2012 presidential election and utilizing a unique public opinion survey. I show that two-thirds of voters in 2012 waited less than 10 minutes to vote, and that only 3% of voters waited longer than an hour. I show that there was considerable variation in line length, as a function of geography and race. Consistent with news reports, Florida's voters waited the longest to vote in 2012, nearly 40 minutes on average, while Vermont's voters waited less than two minutes. Urban voters waited longer than rural voters, early voters waited longer than Election Day voters, and African American and Hispanic voters waited longer than whites.

I also show that lines were nothing new in 2012. The states whose residents waited the longest to vote in 2012 also waited the longest in 2008. This fact cautions against blaming long wait times in the most recent presidential election primarily on factors specific to 2012. Reforms such as Florida's HB 7013, while welcome, will have only a small effect on reducing lines in future elections if they do not address deeper systemic factors that lead to long lines.

Unfortunately, the current state of research — including the facts reviewed in this paper — provides only minimal guidance about the most effective reforms for the reduction of long

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CHUKWUNOSO, *Modeling and Analysis of the Queue Dynamics in the Nigerian Voting System*, 6 Open Operational Research Journal (2012); MUER YANG, et al., *The Call for Equity: Simulation-Optimization Models to Minimize the Range of Waiting Times*, IIE Transactions (2012); M. YANG, et al., *Are all voting queues created equal?* (2009); DAVID C. KIMBALL, *Why Are Voting Lines Longer for Urban Voters?* (2013).

<sup>7</sup> See BENJAMIN HIGHTON, *Long lines, voting machine availability, and turnout: The case of Franklin County, Ohio in the 2004 presidential election*, 39 PS: Political Science & Politics (2006); DOUGLAS M SPENCER & ZACHARY S MARKOVITS, *Long lines at polling stations? Observations from an election day field study*, 9 Election Law Journal (2010).

lines. It seems intuitively obvious that shifting voters out of physical polling places into absentee balloting, decreasing the size of precincts, or increasing the number of voting machines will reduce lines. However, the best evidence we currently have only allows us to treat reforms such as these as hypotheses to be tested, not policy prescriptions to enthusiastically endorse. What is needed at present is not knee-jerk reactions, but serious, sober research into the administration of elections at the polling place level, and political will of legislators to support efforts to increase the convenience of voting by reducing lines, in those places where they are unreasonably long.

### *1. WHY SHOULD WE CARE IF LINES FORM?*

Why should we care that lines form at the polls? There are two reasons, one obvious, the other less-so. The obvious reason is that lines that are sufficiently long impose a burden on voters — a burden that at least one commentator has termed a “time tax.”<sup>8</sup> At what point lines move from a trivial inconvenience to a non-trivial burden is an open question. Public opinion research on this question is slight. Asked in 2008 “What is the longest amount of time, in minutes, that you would wait on line to vote?” a sample of 716 adults in a Marist Poll gave a bimodal set of responses.<sup>9</sup> The most common response, given by 41% of respondents, was “as long as it takes.” On the other hand, the second-most-common response was the minimal answer, “30 minutes or less.”

Answers to questions such as these do not establish what is a burden and what is not, but they do suggest that voters vary significantly in the degree to which they are willing to participate in elections, given the amount of time it takes to vote. If lines are sufficiently long, presumably some will either not join the line or leave it once they have joined (“balking,” in the terminology of queuing theory). If voters are deterred from voting, this could have an effect on

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<sup>8</sup> ELORA MUKHERJEE, *Abolishing the Time Tax on Voting*, 85 Notre Dame Law Review (2009).

<sup>9</sup> MARIST POLL, *Marist Poll, October 2008*(2008), at [http://www.ropercenter.uconn.edu/data\\_access/ipoll/ipoll.html](http://www.ropercenter.uconn.edu/data_access/ipoll/ipoll.html)

election outcomes, so long as being deterred from voting by long lines is distributed unevenly across the electorate.

Unfortunately, neither theory nor data are informative about the compositional effects of lines on election outcomes. Casual empiricism suggests that most people believe long lines deter lower-income voters, who have less flexibility in their days, and who are more likely to be hourly employees, and thus feel the wait in line pinch the pocketbook. However, a contrary argument could be made. Despite the fact that upper-income voters are less likely to be paid by the hour, on the margin their time is more valuable than that of low-income voters. Arguments like this justify rationing scarce resources by making consumers stand in line, rather than pay the market-clearing price, so that low-income consumers at least have a chance at acquiring high-demand items.

Either way, lines that get sufficiently long to deter participation cannot be regarded as a good in a democratic society. Even if we agree that lower-income voters may be *willing* to wait longer to vote than higher-income voters, it is hardly a ringing endorsement of existing electoral practices to *expect* lower-income voters to wait long periods in order to vote when upper income voters have a wider array of options to influence political outcomes than simply voting, such as contributing to campaigns and contacting their representatives directly.<sup>10</sup>

While it seems obvious that shorter waiting times are better than longer waiting times, it is fair to say that this intuition is more often asserted in the literature on elections than demonstrated empirically. However, we do not need to rest a concern with long lines at the polls solely on the relative value of time to voters or on the relative value that different types of voters place in the act of voting. A second reason we might be concerned about long wait times is that long waits can be an indicator of problems with the mechanisms of voting. If an in-precinct

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<sup>10</sup> SIDNEY VERBA & NORMAN H. NIE, *Participation in America* (University of Chicago Press, 1972).

scanner is jammed, a queue may form waiting for the jam to be cleared. With a line forming in the (often-crowded) precinct around the scanner, the polling place manager may put a hold on new voters checking in to vote, for fear of chaos breaking out in the secure area of the polling place.

In short, long lines can form for reasons *other* than a mis-match between arrival and optimal service rates, or a mis-match between the number of points-of-service and the number of voters. A long line can be a type of canary in a coal mine that identifies the presence of other problems, including malfunctioning machines or difficulties checking voter identification. These problems not only lead to lost votes,<sup>11</sup> but they also result in a decline in confidence among voters that their votes will be counted as cast.<sup>12</sup>

## *II. WHY DO LINES FORM?*

Why do long lines form at polling places, and how might these reasons be manifest in the data the election process produces?

The academic field of queuing theory provides one answer to the question of why lines form at the polls. Justin Levitt nicely summarizes this literature in the context of voting: “The basic contours are clear: the more people or items arriving for a given transaction within a given window of time, the fewer points of service, and the longer each transaction, the longer the line. . . . This means that there are three basic levers to reduce peak wait times: reduce the number of people arriving at any one time, increase the points of service, or decrease the length of the transactions.”<sup>13</sup>

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<sup>11</sup> CALTECH/MIT VOTING TECHNOLOGY PROJECT, *Voting: What Is/What Could Be*, (2001).

<sup>12</sup> THAD E. HALL & CHARLES STEWART, III, *Voter Attitudes toward Poll Workers in the 2013 Election* (2013); PAUL GRONKE, *Voter Confidence as a Metric of Election Performance*, in *The Measure of American Democracy* (Barry C. Burden & Charles Stewart, III eds., forthcoming).

<sup>13</sup> JUSTIN LEVITT, *Means to Reduce Lines at the Polls 1* (Loyola Law School 2012).



Levitt's summary of the application of queuing theory to voting is consistent with the small literature that has applied the field's tools to the matter of elections.<sup>14</sup> This literature, and Levitt's summary, has the powerful usefulness in its simplicity, but it is possible to apply queuing theory too simply. The fact is that, even if we want to simplify things to make them analytically tractable, the minimally useful simplification of in-person voting is more complicated than the extant applications of queuing theory to voting.

Take Election Day voting as an example. Even at a level of abstract simplification, voting in a precinct involves three processes: checking-in (showing identification, verifying that one is at the right place, associating the right ballot with the voter, etc.), voting (gaining access to a privacy booth or voting machine, marking the ballot, verifying the choices on the ballot, etc.), and casting the ballot (scanning the paper ballot, checking one's name off the list as having left the precinct, etc.). Exiting the first two processes is also entry into the last two processes. Downstream delays can cascade upstream. Larding extra resources upstream may not speed thing up if the delays are downstream.

I could have taken early voting as the example, which raises the second manner in which standard queuing approaches to long lines over-simplify: there are two paths to in-person voting, each of which has three major components. Thus, rather than one service component, in most states there are six, three associated with in-person voting and three associated with early voting.

Once we understand the basic physical set-up of in-person voting, it is clear that long lines can be the product of many factors. Starting at the beginning, and focusing on the major factors that have been the focus of the academic literature and popular commentary, long lines

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<sup>14</sup> See ALLEN & BERNSHTEYN; New Voting Systems for NY: Long Lines and High Costs; EDELSTEIN & EDELSTEIN, *Queuing and elections: long lines, DREs and paper ballots*; OLABISI & CHUKWUNOSO; YANG, et al., *The Call for Equity: Simulation-Optimization Models to Minimize the Range of Waiting Times*; YANG, et al., Are all voting queues created equal; SPENCER & MARKOVITS.

can form when too many people flood the polling places. In jurisdictions that allow for both early and in-person voting, this can occur because the relative distribution of resources or points-of-service has not corresponded with the relative number of people who voted early, compared to those who voted on Election Day. Within each mode of voting (early vs. Election Day voting), long lines can also occur if there are delays checking-in voters (due to voters not being on the list or the lists, the lists not being organized efficiently, etc.), shortages of machines or privacy booths, long ballots that detain voters, machine malfunctions that restrict service capacity (either at check-in, voting, or casting ballots), or long ballots that are difficult to scan.

These factors suggest empirical regularities that *should* hold if these speculations are correct. *Holding everything equal*, lines should be shorter under the following circumstances:

1. The number of in-person voters is reduced, through absentee voting. (As a corollary, Election Day lines should be reduced as early voting options are expanded.)
2. The number of poll books and the utilization are of *electronic* poll books are increased.
3. The number of voters per polling place is decreased.
4. The number of physical polling sites is increased.
5. The number of poll workers is increased.
6. The number of voting machines is increased.
7. The length of ballots is decreased.
8. The amount of information provided to voters ahead of the election is increased (so as to reduce the amount of time spent reading the ballot in the voting booth).

Of course, the important operative phrase in the previous paragraph is the “holding everything equal.” Increasingly, resources are moved within local jurisdictions for the purpose

of saving money, not increasing the quality of performance. Precincts may be consolidated to save money on pollworker salaries, resulting in more voters being squeezed into inadequate spaces, voting on the same number of voting machines as before. Early voting may be initiated in such a way that equipment is simply shifted from traditional Election Day precincts to early voting sites without regard for whether either site now has a sufficient amount of equipment to handle the load.

As far as I know, there is no published analysis of how the allocation of election resources has affected long lines at the polls, with the possible exception of one study of Franklin County, Ohio.<sup>15</sup> Thus, the empirical study of waiting in line to vote is still in its infancy.

The study of waiting times to vote is in its infancy also because the data available to test the types of relationships identified above often do not exist. The EAC's Election Day Survey is a start, at least as far as measuring the availability of resources — machines, poll books, etc. — at the county level. However, queuing theory operates at the level of the service location, not the county level. What is needed, therefore, is better data published by cities and counties about the allocation of resources at a very fine level of disaggregation, such as one sometimes finds in after-action reports published by county election supervisors.<sup>16</sup>

Finally, the study of waiting times is in its infancy because measures of waiting to vote are primitive. Occasionally, researchers will conduct observational studies of specific polling locations, such as the study by Spencer and Markovitz, but such studies are rare.<sup>17</sup> If they are conducted by election officials, their existence is hidden very well. It is possible to infer

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<sup>15</sup> ALLEN & BERNSHTEYN.

<sup>16</sup> PENELOPE TOWNSLEY, *After Action Report - November 6, 2012 General Election*, (2012).

<sup>17</sup> SPENCER & MARKOVITS.

something about net waiting times at the precinct level, but going so is labor intensive and involves accessing data from machine logs from specific jurisdictions, one county at a time.<sup>18</sup>

Absent reliable and consistent data at the level of the Election Day precinct or early voting level, it is necessary to rely on public opinion surveys to assess waiting times. Such surveys are insufficient for saying much about precinct-level behavior, though we can get close if we know the ZIP code of respondents.

For many reasons, empirical and theoretical, we are still in the infancy as far as understanding why some voters wait a long time to vote, while others waltz right in, do their business, and waltz right out. It is clear that if the nation is to respond to President Obama's election night promise to "fix that" when it comes to long lines, the path from here to there will be a long one. Yet, we must start somewhere. To get us started, I begin at a highly aggregated level, using survey research to ask people how long they waited to vote, and then associate those responses with geographic, demographic, and institutional variables. This is only a correlational study, but it is nonetheless valuable for helping to orient us to the task ahead.

### *III. DATA SOURCES: THE SPAE AND THE CCES*

The empirical core of this paper derives from answers to questions posed by two major nationwide election studies in 2008 and 2012. Most of the responses are to the Survey of the Performance of American Elections (SPAE), supplemented by responses to the common core of the Cooperative Congressional Election Study (CCES), both conducted in 2008 and 2012.

The purpose of the SPAE is to probe specifically into the experience that voters had on Election Day.<sup>19</sup> It samples registered voters nationwide, choosing 200 respondents in every

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<sup>18</sup> For the 2012 election, I have been blessed by a stream of information involving just such data from a private citizen, Amanda Cross in Lee County, Florida, who has been intrepid in trying to piece together the root causes of the long waiting times in that county in the presidential election.

state. (In 2012, an additional 200 respondents were interviewed in the District of Columbia.) The questionnaire asks respondents whether they voted in the most recent general election. If they did not, some follow-up questions are asked to probe why they did not vote. If they report they voted, a longer set of questions is asked, depending on whether the respondent reports voting on Election Day or in an early voting center. All respondents, whether or not they voted, are also asked about their attitudes toward election reform and other matters related to voting. To help contextualize the answers to the survey questions, the SPAE also gathers demographic information, such as race, sex, income, and education, along with geographic information, including the state, county, and ZIP code of the respondent's residence.

The CCES is a large national survey of adults conducted after each federal election since 2006. The CCES's purpose is broader than the SPAE's, in that it studies a wide range of political and social questions. In addition, its sampling strategy is more typical of national surveys, being organized around gathering a single national sample, rather than a series of state-by-state samples. Since its inception in 2006, the CCES has also asked about waiting times, using the same question utilized by the SPAE. In addition, the CCES is conducted the same way as the SPAE, through the Internet, utilizing the same polling firm to implement the survey, YouGov/Polimetrix. Therefore, it is possible to use the CCES in tandem with the SPAE to gain greater precision in our understanding of questions related to waiting in line to vote. In particular, the CCES's nationwide sample is larger than the SPAE's — 32,800 in 2008 and 54,535 in 2012, compared to 10,000 for the SPAE in 2008 and 10,200 in 2012. At the same time, because the SPAE draws a 200-person sample from each state, it actually has a larger

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<sup>19</sup> For a description of the 2008 study, see 2008 Survey of the Performance of the American Electorate. (2009).

sample size in smaller states than does the CCES. In 2012, for instance, seven states had more respondents in the SPAE than in the CCES.<sup>20</sup>

Thus, in the analysis in this paper, I take advantage of data from these parallel studies in the following way. For analysis that relies on state-by-state comparisons, I estimate state wait times as a weighted average of the state mean calculated by each survey. For analysis that makes claims about national averages, I rely simply on the CCES results.

Finally, the main survey question I analyze asks respondents to estimate how long they waited to vote in the most recent federal election. Respondents are given five response categories: “none at all,” “1-10 minutes,” “10-30 minutes,” “31 minutes-1 hour,” and “more than one hour.” Respondents who answer they waited more than an hour are asked to estimate how many minutes they waited, in a follow-up question. Average wait times are estimated by first recoding the response categories to the midpoint of the category (i.e., the “none at all” response is coded as zero minutes, “1-10” minutes is coded as 5 minutes, etc.). For respondents who waited more than an hour and answered the follow-up question, I use the actual estimate of waiting time, in minutes, for that respondent. For the small number of respondents who failed to respond to the follow-up question, I imputed their wait time by using the mean of all respondents who did answer the follow-up question.

Table 1 reports the distribution of waiting times for voters in 2008 and 2012, using responses from the CCES. The basic distribution of answers shows that for the typical voter, waiting in line was not an especially onerous problem in either year. Roughly two-third of voters waited ten minutes or less — the modal response was “not at all” — and only 6.3% of voters in 2008 and 3.9% of voters in 2012 waited for more than an hour. Expressed in terms of average minutes, the wait to vote fell from 17 to 13 minutes from 2008 to 2012

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<sup>20</sup> These states are Alaska, D.C., Hawaii, North Dakota, South Dakota, Vermont, and Wyoming.

[Table 1 about here]

However, it should be noted that for voters who waited more than an hour, the wait was especially long. Among those who waited longer than an hour, the average wait reported in the follow-up question was 109 minutes in 2008 and 110 minutes in 2012. The time standing in line among these “super waiters” is so great that if their times could all have been reduced to one hour, the national average wait time would have been reduced by at least two minutes in both 2008 and 2012.

National averages can both illuminate and conceal. At the national level, long lines to vote, whether measured by the number of voters who waited more than 30 minutes or more than an hour, affect a relatively small fraction of voters. However, this national average conceals the distribution of wait times, which is not uniform across the nation, whether measured in geographic or demographic terms. It is to the question of how waiting times were distributed across the country that this paper now turns.

#### IV. THE GEOGRAPHY OF LONG LINES

Of most interest is *where* the long lines were in 2012. If long lines were concentrated in a few states or counties, there is hope that concentrated effort could make quick progress in addressing the particular issues that led to the long waits. If long lines were dispersed, that would suggest that efforts to address long waits at the polls will require a more diffuse strategy.

Figure 1 reports the most basic set of geographic statistics, the average number of minutes voters waited to vote in-person in 2012. These state averages are calculated using the weighted average of CCES and SPAE reports, as discussed above.

[Figure 1 about here]

Waiting times varied tremendously across the states in 2012, ranging from less than two minutes in Vermont to 39 minutes in Florida. Four states had average wait times of greater than 20 minutes: Florida (39 minutes), D.C. (36), Maryland (36), Virginia (25), and South Carolina (25). Plotting the wait times on a map (not shown) reveals that the greatest times tended to cluster in the Eastern Seaboard, especially in the south, with wait times diminishing as one moves west.

On the whole, states with the smallest populations had the lowest waits. This is related to the fact that rural areas had the shortest wait times and cities had the longest. Among respondents living in the most rural ZIP codes in the study, the overall national average wait was 5.7 minutes; among those living in the most densely populated ZIP codes, the average wait was 17.7 minutes.<sup>21</sup> However, it should be noted that California had among the shortest wait times in the country, at an average of 7 minutes; Los Angeles County, the largest electoral jurisdiction in the nation, also averaged 7 minutes to vote. Thus, while large, urban areas may be prone to longer lines, they are not destined to have them.

Because of its large sample size, it is possible to use the CCES to illustrate the geographic variability within states. Florida provides a good example, because it has a number of counties with more than 25 respondents to the survey. Among Florida counties with 25 or more respondents in the 2012 CCES, average wait times range from  $131 \pm 2.3$ <sup>22</sup> minutes in Lee County (Ft. Myers) and  $106 \pm 1.9$  minutes in Miami-Dade to  $6.7 \pm 1.0$  minutes in St. Johns County (St. Augustine) and  $6.8 \pm 1.0$  minutes in Escambia County (Pensacola).

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<sup>21</sup> The most rural ZIP codes are those in the first quartile of population densities among all ZIP codes (between 1 and 75 people per square mile). The most densely populated ZIP codes here are defined as those in the fourth quartile of densities (between 2,739 and 34,000 people per square mile).

<sup>22</sup> The  $\pm$  figure represents the range of the 95% confidence interval around the mean estimate.



Even within counties, waiting times can vary. Based on data gathered in Lee County, the spot with the longest lines in the state, forty percent of precincts closed within a half hour of the statewide 7:00 p.m. poll closing time, suggesting that any long lines that had developed during the day had at least dissipated by the end. On the other hand, roughly a quarter of the county's precincts did not close until after 9:30, two and a half hours after the statewide end of voting.

Broward County provides another interesting contrast of geographic diversity, this time among its early voting centers. Based on frequently updated reports posted on the Supervisor of Election's Web site of how long the waits were in all of its early voting sites, it is possible to estimate that the average early voting wait time in that county was 1.2 hours.<sup>23</sup> However, the average ranged from a low of 18 minutes at the Supervisor of Elections branch office in Pompano Beach to over two and a half hours at the Tamarac Branch Library. (On the last day of early voting, the average wait time reported at the Pompano Beach branch office was 57 minutes, compared to Tamarac Branch Library, where the average was over five hours for the day.)

Such geographic diversity prompts two immediate reactions. The first pertains to the diversity itself. Not only is there an order-of-magnitude difference between the states in how long their citizens waited to vote in 2012, there is a similar degree of variation *within* many states. Efforts to shorten lines nationwide will have little effect on most places because the lines are already short to begin with. At the same time, not every county within the states with long lines were beset by problems. In these states, there is an opportunity for counties to learn from one another.

Returning to the state level, there is one other important pattern to note, which is illustrated in the scatterplot drawn in Figure 2. This plot shows the average wait time in 2012 (on the vertical axis) plotted against the average wait time in 2008 (on the horizontal axis). The

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<sup>23</sup> The real-time reports posted on the Web site were downloaded by the author and are available upon request.

two axes are drawn using a logarithmic scale. A diagonal line shows the region of equality between the two years; states plotted above the diagonal line waited longer to vote in 2012; state plotted below the line waited shorter.

[Figure 2 about here]

The first thing to notice in Figure 2 is the high correlation between the two years. (Numerically, the Pearson correlation coefficient measuring the association is .72.) What this suggests is that the factors leading to long lines in at the polls start with state-level laws, policies, and practices that persist from year-to-year. What these laws, policies, and practices are remain to be specified. However, the persistence of long lines in the same states across time suggests that simply leaving it to the initiative of local election officials to solve the long-line problem in states such as Florida will result in only marginal improvements, at best. In other words, in a state like Florida, even the best-performing counties are probably limited in how much better they could perform because of parameters imposed by state law.

This persistence at the state level also suggests strongly that the long lines observed in 2012 in states such as Florida, Virginia, and Maryland were not primarily due to one-off events unique to 2012, such as too much text on ballot measures or a shortening of the early voting period. True, the average wait to vote in Florida rose from an average 31 minutes in 2008 to 39 minutes in 2012, and it is not unreasonable to suspect that ballot measure length and early voting changes were the major reason waiting times rose *on the margin*. Still, given past experience with long lines at Florida, simply dialing back conditions to 2008 would lead Florida on a path from having the longest lines in the nation to merely having the third-longest lines. Improvements beyond that will require a more thorough top-to-bottom examination of Florida's polling place practices.

Where else do voters wait long times to vote? The evidence from the CCES and SPAE shows the next place to look, in addition to particular states, is in urban areas. This is first illustrated in Table 2, which reports average waiting times for respondents, broken down by population density of ZIP code. In the ZIP codes comprising the least dense neighborhoods, wait times are significantly below the national average, and wait times between Election Day and early voters are equivalent. As we move into higher-density suburban and urban areas, wait times accelerate, as do the difference between early and Election Day voters. In these more densely populated areas areas, not only are wait times greater than the national average, but early voting wait times are roughly 50% longer than those encountered on Election Day in equivalent communities.

#### V. THE DEMOGRAPHY OF LONG LINES

Of equal interest to *where* people waited in line to vote is *who* waited in line. Because of the Voting Rights Act, and American sensitivities to matters of race when it comes to voting, the primary demographic of interest is race. However, general political and academic interest opens up the categories of individuals we might be interested in to include factors such as party identification, income, and interest in politics.

There are two ways to think about the effects of demography on wait times. The first is at an individual level, and the second is at an aggregate level. Viewed the first way, we might expect next-door neighbors to vary in how willing or able they are to stand in long times to vote, depending on their individual demographic characteristics. Viewed the second way, we might imagine that next-door neighbors may end up encountering long lines, despite their demographic differences, because their neighborhoods are associated with factors that might lead to (for instance) worse public service provision, or even outright service neglect by local authorities.

At the individual level, the factor that stands out is race. Viewed nationally, African Americans waited an average of 23 minutes to vote, compared to 12 minutes for whites; Hispanics waited 19 minutes. While there are other individual-level demographic differences present in the responses, none stands out as much as race. For instance, the average wait time among those with household incomes less than \$30,000 was 12 minutes, compared to 14 minutes for those in households with incomes greater than \$100,000. Strong Democrats waited an average of 16 minutes, compared to an average of 11 minutes for strong Republicans. Respondents who reported they had an interest in news and public affairs “most of the time” waited an average of 13.2 minutes, compared to 12.8 minutes among those who had “hardly any” interest.

Aggregate demographic factors show many of the same patterns. Residents of ZIP codes with more than 75% nonwhite population waited an average of 24 minutes to vote, compared to residents of ZIP codes with less than 25% nonwhite population, who waited 11 minutes on average. Residents of the wealthiest ZIP codes (average household incomes of \$50,000 and up) waited 13 minutes, compared to residents of the poorest ZIP-codes (\$30,000 and below), who waited 12 minutes.

The strong influence of race — both at the individual and aggregate levels — clearly deserves greater attention from researchers. The preliminary analysis is that the differences are due to factors associated with where minority voters live, rather than with minority voters as individuals. This point can be illustrated in a couple of ways.

First, if longer waits by African Americans were due to discrimination against individual voters, rather than a reflection of the places where African Americans tended to live, then we would expect white voters who lived in predominantly African American neighborhoods not to

wait a long time to vote. But, this is not the case. White voters who live in the most racially diverse ZIP codes (with more than 50% non-white populations), waited an average of 13 minutes to vote, compared to white voters in the most racially homogeneous ZIP codes (with less than 5% non-white populations) who waited an average of 7 minutes.

Second, a more statistically sophisticated way to show this is to conduct what is known as a “fixed effects regression,” in which dummy variables are added to control for unmeasured factors that might lead to long lines at the polls. The raw difference in wait times between black and white voters nationwide is 9.5 minutes. When we control for the state the respondents live in, this difference falls to 7.7 minutes; controlling for county and then ZIP code reduces these differences to 4.7 and 0.8 minutes, respectively.<sup>24</sup>

#### *VI. ELECTION ADMINISTRATION AND LONG LINES*

Presumably, the purpose of the current interest in long wait times to vote is so that policies can be adjusted where they are unreasonably long. It would be wonderful to know whether, for instance, the use of electronic poll books actually speeds up check-in, whether having many small precincts is more efficient than large precincts, or whether shifting more voters from in-person voting to absentee voting will speed things up. Solutions such as these seem obvious. At the same time, a state or local jurisdiction will be unable to implement the complete laundry list of possible fixes, so it would also be good to know which proposals work best.

Unfortunately, the data simply do not exist to do any thorough analysis of election administration fixes as they relate to the 2012 election. Data about the most important administrative features of local administration, such as the number of voters per precinct, will not

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<sup>24</sup> With the exception of the last regression, all these racial differences are statistically significant at the  $p < .05$  level.

be published by the U.S. Election Assistance Commission until the end of 2013. Until then, the only evidence we have is from the aggregate evidence contained in the SPAE and the CCES.

One administrative feature of elections seems robustly related to wait times, early voting. As suggested in Table 2 above, early voters averaged wait times of  $17.9 \pm 0.4$  minutes, compared to the average wait time of  $12.0 \pm 0.2$  minutes for Election Day voters. (If we break our Election Day voters into those who voted in traditional neighborhood precincts and those who voted in Election Day vote centers, the times are very similar:  $11.9 \pm 0.3$  minutes for traditional precincts and  $13.0 \pm 0.4$  minutes for vote centers.)

That early voting produces long lines is a puzzle for those who consider it to be the more convenient mode of voting. Nonetheless, there appear to be structural features of early voting that conspire to create longer lines. First, the check-in and ballot acquisition functions are likely longer in early voting, since the voter must be checked-in against a comprehensive countywide voter list, rather than a subset tailored for a specific precinct, and the ballot itself must usually be printed on demand, rather than pre-printed. Thus, it is not surprising that respondents to the SPAE who voted early were slightly more likely than Election Day voters to report they waited to check in (as opposed to waiting for a voting machine to become available).<sup>25</sup>

In addition, early voters tend to be constrained to vote in a narrower period of time each day early voting is available, which takes off the table the opportunity for voters to take advantage of a lull in lines, and for election officials to catch a break between the early morning and late afternoon rushes. Early voting sites tend to be open business hours, while Election Day polls tend to be open a couple of hours before and after normal working hours. Thus, while 63%

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<sup>25</sup> The percentage of early voters reporting they primarily waited to check in (as opposed to gain access to a voting machine) was 68%, compared to 60% among Election Day voters. (The difference was statistically significant at the 95% confidence level.) This difference holds when we control for time-of-day when the ballot was cast, the amount of time the respondent waited to vote, and the respondent's state.

of Election Day voters report they cast their ballot between 9:00 a.m. and 5:00 p.m., 86% of early voters did so. Nationwide, waiting times actually decline throughout the day on Election Day, whereas they are constant throughout the day for early voting.<sup>26</sup>

Finally, despite the fact that local officials try to balance resources with anticipated turnout at early voting sites, the fact that voters can show up at any site (in counties with multiple sites) can lead to challenges in balancing turnout with resources. In other words, because voters are not assigned to early voting sites, as they are to Election Day precincts, it may not always be possible to anticipate demand ahead of the early voting period and to respond accordingly.

The example of Miami-Dade, which issued an after action report about the election in December 2012, is instructive.<sup>27</sup> Among other things, the report detailed the turnout at each early voting site, along with the number of scanners, electronic poll books, privacy booths, and ballot-on-demand printers at each site.<sup>28</sup> There is effectively zero correlation between the number of voters who appeared at each site and the resources available to serve them.<sup>29</sup> There is no analysis in the report about the average waiting times at each of the early voting sites, but it is hard to imagine that lines could have moved as swiftly at the West Kendall Regional Library,

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<sup>26</sup> This claim is based on the following analysis: I performed separate regressions (for Election Day voters and early voters) in which the dependent variable was the reported amount of time waiting to vote and the independent variable was the time of day the voter voted, normalized to the opening hour of the polls in the respondent's state. For Election Day voting, the intercept was 14.5 (s.e. = 1.3) and the time-of-day coefficient was -0.50 (s.e. = 0.19). Substantively, this means that the average waiting time on Election Day for a voter arriving when the polls opened was 14.5 minutes; waiting time declined, on average by half a minute for each additional hour the polls were open. For early voting, the intercept was 18.8 (s.e. = 3.1) and the time-of-day coefficient was -0.02 (s.e. = 0.53). Substantively, this means that the average waiting time in early voting for a voter arriving when the polls opened was 18.8 minutes, with waiting times failing to decline throughout the day. (The coefficient of -0.02 is not statistically significant at the 95% confidence level.)

<sup>27</sup> TOWNSLEY.

<sup>28</sup> Id. at Attachment 1.

<sup>29</sup> The number of voters at each site was calculated using data files posted on the web site of the Florida Division of Elections. The correlation coefficients between the number of voters and the number of scanners, booths, poll books, and printers were .04, -.21, -.21, and -.0001, respectively.

where there were 4,891 voters per electronic poll book, as they did at the Miami Beach City Hall, where there were 1,430 voters per electronic pollbook.

It is likely that if voting times are to be shortened in the states and local jurisdictions where waiting was a problem in 2012, some mix of law changes and changes in resource allocations will be necessary. However, given the state of knowledge at this point, it is simply too early to make sweeping prescriptions about how to fix what ails states and localities that are trapped in a pattern of long lines from one election year to the next.

### VII. CONCLUSION

In the aftermath of the 2000 election, it was quickly established that antiquated voting machines were the major culprit that led to millions of lost votes in each presidential election, and that the antiquated and malfunctioning machines were being used across the country.<sup>30</sup> It would be great fortune if the same would happen in the aftermath of the 2012 election, related to long lines. Unfortunately, the problem of lines is different from the problem of voting machines. First, long lines are not a universal problem. For most of America, long lines to vote are isolated. In *parts* of America, lines are a problem. These parts tend to be urban areas and areas in which large percentages of minority voters live. Where lines are long in one election, they tend to be long in the next.

Second, we as of yet know of no magic bullet that will fix the long line problem, where it does exist. This is in contrast with the problem with voting machines, which was addressed with great success through the replacement of punch card machines with optical scanners and DREs.<sup>31</sup> Intuition suggests that long lines, where they exist, might be mitigated through remedies such as

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<sup>30</sup> CALTECH/MIT VOTING TECHNOLOGY PROJECT.

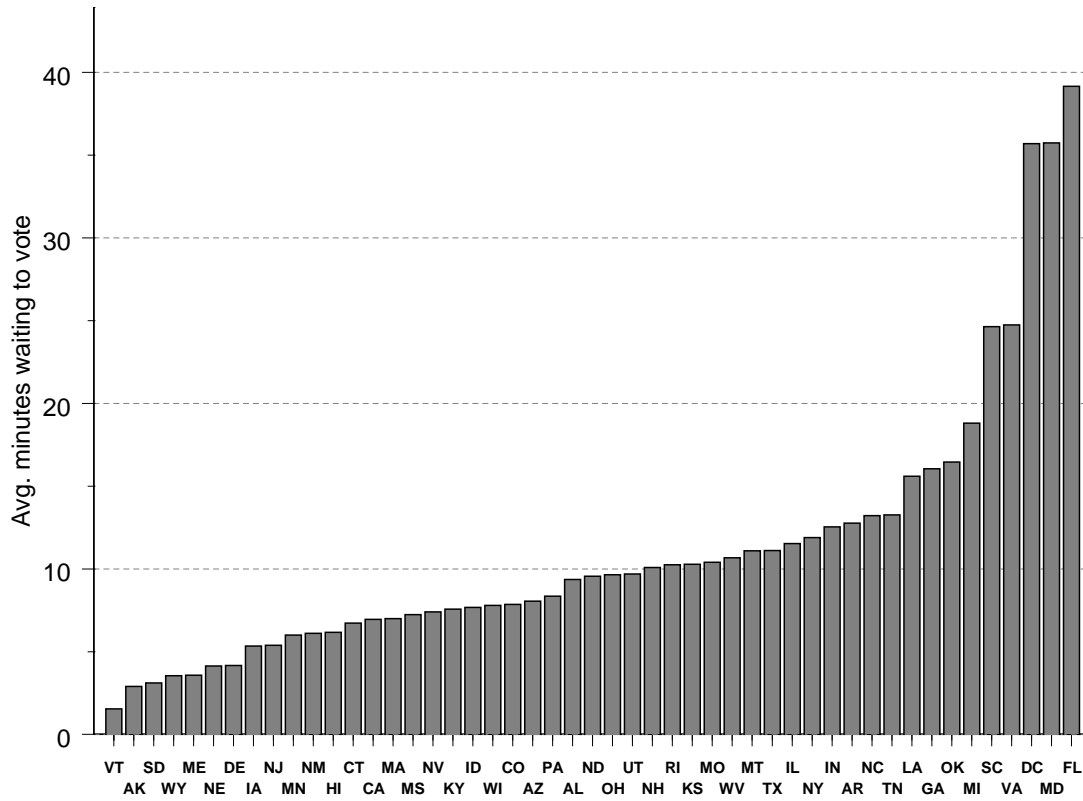
<sup>31</sup> S ANSOLABEHERE & CHARLES STEWART, III, *Residual votes attributable to technology*, 67 *Journal of Politics* (2005); CHARLES STEWART, III, *Residual vote in the 2004 election*, 5 *Election Law Journal* (2006).



better allocation of resources, the deployment of more modern technologies such as electronic poll books, or the use of larger polling facilities that can accommodate crowds better. But, the sad reality is that we simply do not know where to start in making things better.

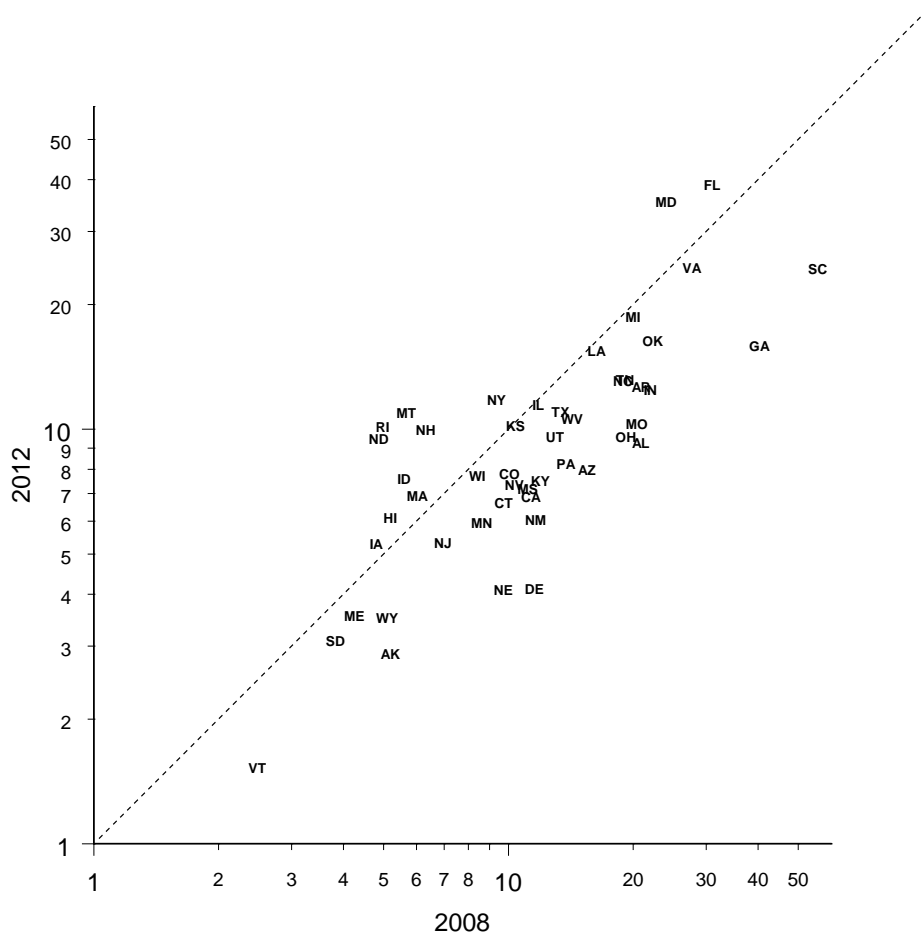
It is for answering questions such as this — how to shorten lines in urban areas and a few states where they exist statewide — that the Election Assistance Commission was created. Unfortunately, the EAC has become a “zombie commission,” without commissioners and therefore without a clear agenda for encouraging research that would answer this question. At this writing, the best we can hope is that the bipartisan commission announced by President Obama can jump-start the federal capacity to tackle issues such as this. Only then will it be possible to know how to direct federal, state, and local resources to the solution of the problem of long lines.

Figure 1. Average time waiting to vote, 2012.



Source: CCES and SPAE, 2012.

Figure 2. Average time waiting to vote, 2012 vs 2008.



Source: CCES and SPAE, 2012.

Table 1. Frequency distribution of wait times to vote, 2008 and 2012

	2008	2012
Not at all	36.8%	37.3%
Less than 10 minutes	27.6%	31.8%
10-30 minutes	19.0%	18.4%
31 minutes – 1 hour	10.3%	8.6%
More than 1 hour	6.3%	3.9%
Average	16.7	13.3
Standard deviation	31.4	27.3
Standard error	0.2	0.2
N	18,836	30,124

Source: CCES, 2008 and 2012.

Table 2. Average waiting times to vote, by population density of respondent's ZIP code, 2012.

	Average wait time		
	Election Day	Early voting	Total
1 <sup>st</sup> quartile (least dense)	5.9 (2,588)	4.9 (686)	5.7 (3,274)
2 <sup>nd</sup> quartile	9.5 (6,347)	11.4 (2,312)	9.9 (8,659)
3 <sup>rd</sup> quartile	12.7 (7,038)	21.5 (2,594)	14.9 (9,632)
4 <sup>th</sup> quartile	16.0 (6,527)	24.3 (1,986)	17.7 (8,513)
Total	12.0 (22,500)	17.9 (7,578)	13.3 (30,078)