Managing Polling Place Resources

Executive Summary

November 2015

The bipartisan Presidential Commission on Election Administration (PCEA) was appointed in 2013, following a national election in which long lines were emblematic of challenges facing election administration in the United States.

In its January 2014 report, the PCEA called for the development of models and tools to assist local jurisdictions in more effectively allocating resources, such as poll books and voting booths, so that lines might be made shorter and the voting process might unfold more smoothly.

In response to a request by the PCEA, the Caltech/MIT Voting Technology Project developed a web site that hosts three web-based tools that allow election officials to take information they have about the configuration of their polling places and find out whether they have sufficient resources to serve voters in a timely fashion.

The Web address that provides access to these tools is http://web.mit.edu/vtp/.

This report serves as a companion to those Web-based tools. It provides basic facts about where long lines were experienced in 2012 and which voters — based on race, voting mode, and residence — waited longer than others. Information about the 2014 election updates previous research, and underscores how long lines tend to be more prevalent in on-year (presidential) elections than in midterm elections. Beyond providing basic facts about the location of lines in American elections, the report provides a basic introduction to the science of line management, queuing theory, and a list of further readings for those who wish to delve more deeply into the subject. Finally, this report demonstrates how the Web-based tools can be used, by working through actual data from two local jurisdictions.

Basic facts

Long lines on Election Day can be a visible indicator that polling place resources have been inadequately deployed to serve the needs of voters in a polling place. The great visibility of lines in news reports on Election Day obscures the fact that long lines are far from universal, even in presidential elections, and tend to beset only a limited number of places. In 2012, 2/3 of all in-person voters waited less than 10 minutes to vote. Only about one voter in eight waited to vote longer than the PCEA benchmark of 30 minutes.

Problems with long lines in presidential elections are focused on readily identified places. Average wait times tend to be the longest in the states along the southeastern seaboard, in cities throughout the country, during early voting, and among African Americans.

Although some election officials and commentators prefer to blame long lines on one-off events, such as unusually long ballots or surges in voters brought on by political campaigns, the length of wait times in one election is highly predictive of the wait times in the next election. This suggests that in the parts of the country where lines are the longest, election officials should work to address structural matters (such as election laws) and fundamental resource levels (such as the number of poll books and scanners) that lead to chronic levels of long lines.

Queuing theory

Modern management science, particularly the field of operations research, provides a set of long-established insights and modes of analysis that help the private sector manage demand for services across a large swath of the modern economy. Unfortunately, queuing theory, which is the specific set of approaches to managing lines, has not penetrated very far into the management of resources for elections.

Although queuing theory is rigorous and mathematical, the basics are easily grasped through intuition. Most fundamentally, long lines occur when the resources are insufficient to handle demand. Line dynamics are *nonlinear,* that is, they can grow out of control even when the inputs to the system change only a little.

Lines can be managed if administrators focus on three quantities in the polling place: the arrival rates of voters, the number of places voters are served, and how long it takes to serve voters. It is these quantities that are the focus of the discussion about how to minimize polling place lines.

Applying Queuing Theory to Manage Actual Polling Places

Roughly half of the report is spent describing the practical aspects of putting queuing theory into practice in polling places. The application of queuing theory starts with carefully understanding how each polling place is organized and by carefully measuring the core quantities of interest that involve voters: arrival rates and service times. Then, using actual data from two jurisdictions, the report walks through how basic inputs can be used to analyze where problem areas might exist, and how "what-if" analyses can be performed to add or shift resources (e.g. poll books and voting booths) in order to reduce the lines voters experience.