Congestion at the Polls:

A Study of Florida Precincts in the 2012 General Election

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Executive Summary

This study uses precinct-level socio-demographics across Florida's counties to assess whether some precincts had greater congestion than others in the 2012 General Election. Our within-county analyses of precinct socio-demographics and closing times, covering more than 92% of the 3.7 million Floridians who voted on Election Day, reveal that precincts with greater proportions of Hispanics—and in several counties, with high proportions of Blacks as well as younger voters—had later closing times on Election Day relative to precincts with higher concentrations of White and elderly voters. We also find that in Miami-Dade County, early voting polling stations with the greatest concentrations of Hispanic and Black voters had disproportionately long wait times at both the start and close of polls each day, especially on the final Saturday of early voting.

Our examination of the correlates of precinct-level socio-demographics and congestion at the polls provides empirical evidence of the disparate impact in Florida of long lines on people of color during the 2012 General Election. Our findings enhance Advancement Project's effort to protect voters through an examination of the structural barriers that create and sustain disparate burdens for voters based on race and ethnicity.

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Michael C. Herron[1] and Daniel A. Smith[2]

"By the way, we have to fix that," President Obama *ad-libbed* during his victory speech on election night, responding to reports of excessive wait times at polling stations across the United States and particularly in Florida.[3] Personalizing the long lines in Florida during his State of the Union Address, President Obama highlighted the plight of Desiline Victor, a 102-year-old Haitian-American woman who was forced to wait in line nearly four hours on October 27 at the North Miami Public Library early voting facility. Acknowledging Ms. Victor in the audience, the President reiterated that the electoral process in the United States "definitely needs improvement" and announced the creation of a "nonpartisan commission to improve the voting experience in America."[4] Largely due to the persistence of Advancement Project and other advocates on the ground seeking to protect her right to vote, Ms. Victor ultimately was able to cast her ballot. By some estimates, though, thousands of other prospective voters in the Sunshine State were not so lucky.[5]

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[3] "President Obama's acceptance speech (Full transcript)," *The Washington Post*, November 7, 2012, at http://articles.washingtonpost.com/2012-11-07/politics/35506456_1_applause-obama-sign-romney-sign.

[4] "State of the Union 2013: President Obama's address to Congress (Transcript)," *The Washington Post*, February 12, 2013, at http://www.washingtonpost.com/politics/state-of-the-union-2013-president-obamas-address-to-congress-transcript/2013/02/12/d429b574-7574-11e2-95e4-6148e45d7adb_print.html

[5] There seems to be little doubt that many prospective voters who endured long lines ended up leaving the queue; others, upon seeing a long line, decided not to join the queue in the first place. See Scott Powers and David Damron, "Analysis: 201,000 in Florida didn't vote because of long

Images of long lines stretching outside polling stations and into the Florida night in November, 2012 may be forever etched in the public's mind.[6] Yet when asked in Orlando about the extraordinary wait times at some polling stations during the state's early voting period and on Election Day, Florida Governor Rick Scott told reporters, "Well I'm very comfortable that the right thing happened."[7] Even so, the governor conceded that improvements to the state's election process were needed, and he tasked Secretary of State Ken Detzner, "to meet most immediately with those election supervisors who experienced lines in excess of four hours and those who took several days to tabulate votes and report results."[8] Secretary Detzner—who had been a defender of

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lines," *Orlando Sentinel*, January 29, 2013, at http://articles.orlandosentinel.com/2013-01-29/business/os-voter-lines-statewide-20130118_1_long-lines-sentinel-analysis-state-ken-detzner. In the analysis for the *Orlando Sentinel*, Ohio State University professor Theodore T. Allen estimated that "at least 201,000 voters likely gave up in frustration on Nov. 6." For a more extensive discussion of queuing theory, see Theodore T. Allen, *Introduction to Discrete Event Simulation and Agent-based Modeling: Voting Systems, Health Care, Military, and Manufacturing*. London: Springer, 2011. For a precinct-level study assessing the relationship between the number of registrants per available voting machine and turnout in a single county (Franklin) in Ohio in 2004, 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: 65-8.

[6] Jonathan Piccolo claimed he waited to vote eight hours on Election Day at a Miami-Dade County polling station. "When I got there," Piccolo told a reporter, "the line was around the building." Jeremy W. Peters, "Waiting Times at Ballot Boxes Draw Scrutiny," *New York Times*, February 4, 2013, at http://www.nytimes.com/2013/02/05/us/politics/waiting-times-to-vote-at-polls-draw-scrutiny.html?smid=pl-share. For many other examples of long wait times in Florida, see Amanda Terkel, "Florida Early Voting Fiasco: Voters Wait For Hours At Polls As Rick Scott Refuses To Budge," *The Huffington Post*, November 4, 2012, at http://www.huffingtonpost.com/2012/11/04/florida-early-voting_n_2073119.html.

[7] Tony Pipitone, "Gov. Rick Scott on early voting: 'The right thing happened,'" WKMG, November 8, 2012, at http://www.clickorlando.com/news/Gov-Rick-Scott-on-early-voting-The-right-thing-happened/-/1637132/17333236/-/1d8ork/-/index.html.

[8] Jim Turner, "Rick Scott: Ken Detzner Directed to Restore Voter 'Confidence,'" *Sunshine State News*, November 14, 2012, at http://www.sunshinestatenews.com/story/rick-scott-ken-detzner-directed-restore-voter-%E2%80%98confidence%E2%80%99. In particular, Secretary Detzner singled out the supervisors in five counties–Broward, Lee, Miami-Dade, Palm Beach and St. Lucie–as "under-performing." See Dara Kam, "GOP proposal: Give Gov. Scott power to remove county election supervisors if problems arise," *Palm Beach Post*, February 5, 2013, at http://www.palmbeachpost.com/news/news/state-regional-govt-politics/gop-proposal-give-governor-power-to-remove-county-/nWGgn/.

the controversial legislative changes made to Florida's election code in May, 2011[9]—embarked on a fact-finding mission to gather information about what went wrong in during the 2012 General Election voting process. His ensuing report, issued in March, 2013, acknowledged that "many voters found themselves waiting in line for hours to cast a ballot both during the early voting period and on Election Day," and that "most, if not all, counties experienced longer wait times than in previous elections due to factors including the record number of voters, a shortened early voting schedule, inadequate voting locations, limited voting equipment and a long ballot."[10]

Despite Secretary Detzner's post-election report and an extensive debate during legislative hearings on a bill[11] aimed at reversing several of the election administration changes that date to 2011, little is known about what actually caused the long lines—dubbed electoral "inefficiencies" by Governor Scott—across Florida polling stations during the 2012 General Election.[12] This is perhaps not surprising, as systematic efforts to establish the causes of congestion at polling places in Florida—or elsewhere—are fraught with difficulties. As Massachusetts Institute of Technology professor Charles Stewart summarizes, "it is clear that long lines can be the product of many factors," yet "the empirical study of waiting in line to vote is still in its infancy."[13] Indeed, few

[9] For an overview of House Bill 1355, see Michael C. Herron and Daniel A. Smith, "Souls to the Polls: Early Voting in Florida in the Shadow of House Bill 1355," 11 *Election Law Journal* 2012: 331-47.

[10] Ken Detzner, "Recommendations for Increased Accessibility & Efficiency in Florida Elections," Florida Department of State, February 4, 2013, pages 4, 12, at http://www.dos.state.fl.us/pdf/2-4-2013_Recs_for_Increased_Accessibility_and_Efficiency_in_FL_Elections.pdf.

[11] House Bill 7013, at http://www.flsenate.gov/Session/Bill/2013/7013.

[12] Mary Ellen Klas, "Gov. Rick Scott signs elections bill to fix long voter lines," *Miami Herald*, May 21, 2013, at http://www.miamiherald.com/2013/05/21/3409387/gov-rick-scott-signs-elections.html#storylink=cpy.

[13] Charles Stewart III, "Waiting to Vote in 2012," April 1, 2013, *Journal of Law and Politics* (forthcoming), at http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2243630, pages 8-10.

studies have tried to navigate these choppy waters, as a singular explanation of wait times will likely omit numerous confounding factors.[14]

With these difficulties in mind, the goal of this report is not to explain what caused long wait times at polling stations across Florida's 67 counties during the 2012 General Election. For the moment, we leave it to others to answer this question and to uncover the multitude of factors that complicate election administration at the precinct level.[15] Rather, our aim here is more modest: identifying precinct-level socio-demographic correlates—focusing in particular on race, ethnicity, and age—and assessing if precincts with particular socio-demographic profiles are associated with either long or short wait times. Judging by the abundant contemporaneous media reports in Florida during the 2012 General Election, there is good reason to suspect there were indeed sizeable

[14] There are many reasons why lines form at polling stations, including 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." See Stewart (2013), page 7. One can easily oversimplify this subject. For example, Lawrence Norden, Deputy Director of the Brennan Center's Democracy Program and author of a recent report on long lines at the polls, writes, "The long lines we saw on Election Day in states like Florida, Virginia, and Ohio were the result of an outdated election system." "The ramshackle voter registration system is a prime cause of long lines and Election Day chaos," Norden summarizes. "By modernizing registration, offering more early voting, and setting national standards," he continues, "we can ensure no voter has to wait seven hours to make their [sic] voice heard." See Lawrence Norden, "How to Fix Long Lines," *Brennan Center for Justice*, February 4, 2013, at http://www.brennancenter.org/press-release/how-fix-long-lines-new-brennan-center-voting-proposal. While we concur with the general sentiment of the Brennan Center that the system of voter registration is outmoded in the United States, it is highly unlikely that an "outdated" voter registration system was the culprit for long lines in Florida, given that the state's registration system is uniform across a county's precincts, yet wait times and poll closings clearly were not. For a discussion of the legal challenges and effects of changes to the voter registration system in Florida, see Michael C. Herron and Daniel A. Smith, "The Effects of House Bill 1355 on Voter Registration in Florida," 13 *State Politics & Policy Quarterly* 2013, forthcoming at http://spa.sagepub.com/content/early/2013/04/22/1532440013487387.

[15] An innovative study using observational data to determine if voters in line "renege" (that is, leave the line prior to voting), draws on data from 30 polling stations in three California counties in the 2008 General Election. See Douglas M. Spencer and Zachary S. Markovits, "Long Lines at Polling Stations? Observations from an Election Day Field Study," 9 *Election Law Journal* 2010: 3-17. See also Robert Stein and Greg Vonnahme, "When, where and how we vote: Does it Matter?" 93 *Social Science Quarterly* 2012: 692-712.

differences in the length of time various demographic groups had to wait to vote.[16] Still, we know of no research that has systematically identified where within Florida precinct congestion was most problematic in the 2012 General Election and, perhaps more importantly, whether variance in precinct wait times was related to the race and ethnicity or age of the voters assigned to precincts.[17]

Others share our aim of identifying the socio-demographic profiles of precincts with disproportionately long wait times. Concerned about possible voting rights violations, four United States Senators—Barbara Boxer (D-CA), Chris Coons (D-DE), Mark Warner (D-VA), and Bill Nelson (D-FL)—asked Robert F. Bauer and Benjamin L. Ginsberg, co-chairmen of the recently created Presidential Commission on Election Administration, "to examine whether the long voting lines were the result of discriminatory behavior," especially with regard to a study showing that "African-American and Hispanic voters [who] waited twice as long to vote as White voters during the 2012 election."[18]

In order to determine which types of voters in Florida actually experienced long wait times during the 2012 General Election, our analysis focuses on precinct congestion on Election Day and during the associated early voting period. We would prefer to be able to present a study of actual voter wait times as they evolved across Florida precincts over the course of November 6, 2012 and

[16] As with measuring wait times, it has proven quite difficult to determine whether young adults (relative to elderly) and Black and Hispanic (relative to White) voters are more or less likely to pay a "time tax" when queuing to vote. For an extensive and enlightening "time tax" discussion, as well as an extensive empirical look into wait times from the 2008 CCES survey, see Elora Mukherjee, "Abolishing the Time Tax on Voting," 85 *Notre Dame Law Review* (2009): 177-246.

[17] In Florida, elections are administered by independently-elected county Supervisors of Elections. All SOEs in Florida are elected in nonpartisan elections, except Miami-Dade's, who is appointed by the Governor. See Heather Gerken, *The Democracy Index: Why Our Election System Is Failing and How to Fix It* (Princeton: Princeton University Press, 2009), for other election administration areas lacking available or reliable data.

[18] Press Release of U.S. Senator Barbara Boxer, "Senators Boxer, Coons, Warner, Nelson Urge Presidential Election Commission to Take Steps to Reduce Voting Wait Times," June 11, 2013, at http://www.boxer.senate.gov/en/press/releases/061113.cfm.

during the 2012 early voting period, and ideally such a study would assess whether precincts with long wait times were representative of all Florida precincts or whether they were different in some important fashion. Unfortunately, we cannot offer such an assessment because, to the best of our knowledge, there are no systematic sources of data on 2012 General Election precinct wait times in Florida.[19] Such a general dearth of data (there are a few exceptions with respect to early voting wait times) means that many important questions about voting and waiting at precincts are at present simply not answerable. For example, which precincts in Florida had the longest average wait times on November 6, 2012? Given a particular precinct, was there a point on Election Day when the line to vote was longer than an hour? Or, how did precinct line length variability evolve during the course of Election Day? No one can be confident of answers to these questions because of the lack of sufficiently nuanced data on precinct wait times in the state.

Notwithstanding the lack of actual or systematic wait time data for precincts across Florida, the subject of voters and precinct lines clearly demands attention. In response to this demand, we rely here on an indirect measure of wait times, and in particular much of the analysis that follows relies on what are called precinct closing times. As we explain later, there are some subtleties in what a closing time means, but intuitively the idea is simple. A Florida precinct can have closed on time on November 6, 2012, meaning that all voters had left the precinct by 7:00pm on Election Day; such a precinct has a closing time of 7:00pm. On the other hand, a precinct can have closed at 7:45pm on Election Day because it took 45 minutes to clear the voting lines that existed at 7:00pm; such a precinct has a closing time of 7:45pm.

We assembled a collection of precinct closing times, and our closing time data cover 5,194 of the roughly 6,100 precincts in use in Florida during the 2012 General Election. This means, simply, that we know when each of these precincts closed—but recall that there are subtleties even in

[19] We know of no systematic wait time data for states other than Florida.

assessing closing times, and we touch on these subtleties shortly. We are particularly interested in the precinct-level correlations between closing time and voter pool composition. Did people of color and younger voters vote disproportionately in precincts that had late closing times? And, were the hundreds of Florida precincts that had closing times extending beyond the official end of voting on Election Day comprised disproportionately of people of color and those who are younger? These are the types of questions that our data allow us to address.

As discussed below, we merge our dataset of precinct closing times with an official Florida statewide voter file, and this enables us to examine the socio-demographic profiles of Florida precincts and assess whether certain precinct profiles are associated with late closing times. With our data we are also able to assess whether precinct closing time is correlated with the sheer number of available registered voters who actually voted in a precinct on Election Day.[20] We know of no other study that uses precinct-level data to examine the relationship between the socio-demographics of voters in precincts and the closing times of polling stations.

As will be clear shortly, we have actual wait time data from 20 polling stations in Miami-Dade County that operated during Florida's eight-day early voting period prior to the 2012 General Election. We analyze these data after presenting our closing time results, and the implications we draw from both our data sources (closing times over much of Florida, wait times from early voting in Miami-Dade County) are similar. This suggests that the patterns we identify are meaningful and do not reflect idiosyncrasies from, say, one county in Florida.

[20] David Kimball, "Why are Voting Lines Longer for Urban Voters?" March 29, 2013, at http://ssrn.com/abstract=2255009 or http://dx.doi.org/10.2139/ssrn.2255009.

Researching Wait Times

Beyond anecdotal evidence of congestion at select precincts across Florida during early voting and on Election Day, much of what we know about who was affected by wait times during the voting process in the 2012 General Election is derived from post-election survey data. Two national, on-line surveys asking voters about their wait times in this election have garnered particular attention,[21] and Charles Stewart's study, "Waiting to Vote in 2012," draws on both of them. In particular Stewart combines the 2012 Survey of the Performance of American Elections (SPAE), a post-election survey of 200 people sampled from each state and Washington, D.C., with the 2012 Cooperative Congressional Election Study (CCES). According to Stewart, voter-reported wait times across the United States varied greatly.[22] Floridians reported enduring some of the longest wait times in the country; on average, Florida respondents reported waiting 39 minutes to cast a ballot in 2012, three times the national average, according to Stewart.[23] Like other voter surveys, including

[21] See, for example, Kevin Drum, "Guess Who Waits Longest to Vote?" *Mother Jones* April 9, 2013, at http://www.motherjones.com/kevin-drum/2013/04/guess-who-waits-longest-vote.

[22] Stewart (2013), page 13. Stewart calculated average state wait times from the two surveys as follows:

> "Respondents were 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."

[23] Stewart (2013), pages 13-15. It appears that wait times among the 200 Florida respondents in the 2012 SPAE was even higher—45 minutes—according to data Stewart provided to *The New York Times*. See the graphic, "How Long It Took Different Groups to Vote," *New York Times*, February 4, 2013, at http://www.nytimes.com/interactive/2013/02/05/us/politics/how-long-it-took-groups-to-vote.html?smid=pl-share.

those using exit polls,[24] self-reported wait times can serve as a valuable barometer to gauge both individual-level and regional distributions of voting delays.[25] With regard to race, Stewart found that, nationally, a respondent's race was an important "individual-level demographic difference" that helps to explain wait times. "African Americans waited an average of 23 minutes to vote," Stewart found, "compared to only 12 minutes for Whites; Hispanics reported waiting 19 minutes, on average," though assessing the apparent racial disparity in wait times, Stewart reasons "that the differences are due to factors associated with where minority voters live, rather than with minority voters as individuals."[26] As evidence of the geospatial disparity in wait times, he notes that the average wait time for White voters living in racially heterogeneous neighborhoods (as indicated by self-reported ZIP codes) was nearly twice that of Whites living in predominantly homogenous, White neighborhoods.[27]

One limitation of Stewart's wait time study lies in its reliance on voter self-reports, meaning that the wait time data used by Stewart assume that voters when surveyed accurately remembered how long they waited in line before voting. In addition, the study does not distinguish between the wait times of voters who cast in-person ballots during early voting and those who voted on Election

[24] For an example of an exit poll, see, Ryan Claassen, et al., "'At Your Service": Voter Evaluations of Poll Worker Performance," 36 *American Politics Research* 2008: 612-34. Drawing on responses from roughly 2,400 voters surveyed leaving approximately 50 polling stations in two Ohio counties, the authors find that voters' positive evaluations of poll worker are inversely related to wait times.

[25] Stewart does not break down respondents' reported wait times by their methods of voting—in-person early or on Election Day. This in theory muddles an important election administration distinction. According to an earlier survey, conducted by Stewart and his collaborators following the 2008 election, "Lines were shorter at [election day] polling places than they were at early voting sites," with "8% of those who voted at early polling stations reported that they waited in line at least an hour, compared with 4% of those who voted at precincts on Election Day." See Michael Alvarez, et al., "2008 Survey of the Performance of American Elections," 2009, pages 17 and 1-2, at http://www.vote.caltech.edu/sites/default/files/Final%20report20090218.pdf. See also, Robert M. Stein, et al., "Voting Technology, Election Administration and Voter Performance," 7 *Election Law Journal*, 2008: 123–35.

[26] Stewart (2013), page 19.

[27] Stewart (2013), pages 19-20.

Day.[28] Moreover, and of particular interest here, the survey at the heart of Stewart's findings on the 2012 General Election covered only 200 Florida voters. Notwithstanding these concerns, national "surveys are insufficient for saying much about precinct-level behavior," though as Stewart suggests, "we can get close if we know the ZIP code [sic] of respondents."[29] Stewart reports the results of a regression analysis aimed at determining what factors cause long lines at precincts, and he finds that "the raw difference in wait times between Black and White voters nationwide is 9.5 minutes." When controlling for a respondent's state, though, the "difference falls to 7.7 minutes; controlling for county and then ZIP code reduces these differences to 4.7 and 0.8 minutes, respectively." As Stewart notes, "With the exception of the last regression, all these racial differences are statistically significant at the $p < .05$ level."[30] The statistically insignificant differences Stewart finds at the ZIP-code level, however, may be misleading as there is often considerable racial segregation among precincts within a single ZIP code. For instance, there are roughly 1,500 geographic ZIP codes in the state of Florida but more than 6,000 precincts as of November, 2012; Miami-Dade County, for example, has fewer than 80 ZIP codes but nearly 800 precincts. As such, any analysis of wait times using ZIP code-level of analysis risks considerable ecological fallacies. As we show, precinct closing

[28] There is good reason to expect, and considerable evidence to support, that in-person early voting lines tend to be longer than Election Day voting lines. See Kimball (2013), page 6, for a discussion of the literature, and Table 5 (page 26), where he presents an ordinal logit model with 7,457 survey respondents from the 2008 SPAE, showing voters who reported voting early in-person had longer wait times, *ceteris paribus*.

[29] Stewart (2013), page 11. Drawing on the 2008 SPAE, Kimball (2013) finds that nationally, "non-white and urban voters tend to face longer voting lines," but that habitual voters, those living in states with multiple methods of voting, and most notably, those residing in smaller jurisdictions (as indicated by their ZIP code), tended to have shorter voting lines.

[30] Stewart (2013), page 20. Intriguingly, Stewart offers some anecdotal evidence from "frequently updated reports posted on the [Broward] Supervisor of Election's Web site of how long the waits were in all of its early voting sites," which indicates an "interesting contrast of geographic diversity, this time among its early voting centers." According to Stewart's calculations from the data he downloaded from the county's website, "average early voting wait time in that county was 1.2 hours," but "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."

times can range considerably across a single county and ZIP code. We thus fully agree with and endorse Stewart in his call for "reliable and consistent data at the level of the Election Day precinct or early voting level."[31]

Measuring Precinct Closing Times within Florida's Counties

What we present here is a study of one state during one General Election. We recognize, of course, that, innumerable factors can affect closing and wait times at the polls. These factors include precinct-level variables such as the number of dedicated and competent staff, the existence of language barriers, the availability of registration and voting machines, the occurrence of machinery problems or technical glitches, a lack of adequate voting materials and voting booths, and the design and length of ballots. Related factors, such as frequent challenges to voter registrations, heavy use of provisional ballots, the presence of voters requesting inter-county registration transfers, the location and physical space of polling stations, the availability of parking, and even local weather patterns can also affect wait times.[32] Despite this set of possible complications, our results on precinct performance in Florida during the 2012 General Election point toward a research agenda aimed at both identifying precincts that have the most difficulty servicing voters and understanding why. Our results also highlight disparities across precincts in Florida that are troubling, and at the very least the variability in precinct closing times that we find across the state is striking. In particular, we see significant variance in precinct closing times even conditional on county, and this suggests a misallocation of resources in some vein. Future research will hopefully be able to identify

[31] Stewart (2013), page 11.

[32] See, for example, Advancement Project, "Issue Brief: Legislative Reforms to Remove Barriers to Voting in Florida," June 1, 2010, at http://www.advancementproject.org/resources/entry/legislative-reforms-to-remove-barriers-to-voting-in-florida. For a discussion of factors that might lead to shorter or longer lines, see Stewart (2013), pages 8-9.

key chokepoints in precinct performance, and with this in mind our objective here is highlighting a problem that needs to be systematically addressed.

Before turning to our assessment of the socio-demographic correlates of precinct-level closing times across Florida, we explain how we have assembled our data. Insofar as there appear to be few standards in Florida dictating how precincts report performance measures (e.g., their closing times after Election Day), this constitutes an important part of our analysis.

Election administration in Florida is conducted principally at the county level. We have found that counties define precinct closing times somewhat differently and accordingly record different types of closing data in their official records. Among the definitions of closing time we have encountered are the following: the time the last voter in line was recorded as casting a ballot on a voting machine; the time a polling station clerk reported precinct results to his or her county Supervisor of Elections; the time the last voter checked in to vote via a paper poll book or on an electronic poll book (EViD); and, the time the last optical scan machine in a polling station was turned off. These times are different yet are presumably positively correlated. Nonetheless, because Florida counties use different standards for reporting closing times, we cannot in general make across-county comparisons with our data. That is, one county in Florida may appear to have precincts with late closing times compared to another county, but this may reflect a different definition of closing time. This means that our analysis for the most part examines variability of closing times across precincts and within counties.[33]

[33] As we note earlier, and as Miami-Dade's post-election review of 2012 General Election problems makes clear, "There can be broad variations in the closing times reported to Election Central, as there are occasions where the Clerk does not call as instructed. Staff in Election Central will begin calling those locations that have not yet called in after they have heard from a majority of precincts. Once it is confirmed that the precinct has been closed, that information is updated in the ePrecincts system at that time. In these cases, it does not reflect the actual time that the precinct closed, but rather the time that Election Central learned of the closing." Although the absolute values differ across these measures, the correlation is quite high. In Miami-Dade, according to the December 19,

Through extensive county-level public records requests to Florida's Supervisors of Election conducted in April and May, 2013, we have cataloged precinct closing times for nearly 6,000 precincts in 41 of Florida's 67 counties, which are listed in both Table 1 and Table 2, below. From our requests we obtained closing time data from 18 counties, and we merged these data with precinct-level closing times obtained by the *Orlando Sentinel* immediately following the 2012 General Election.[34] With one exception, if we received closing time data directly from a county that was present in the *Orlando Sentinel* data, we used the public records data that we obtained.[35] Appendix A reports the type, source, and date we received the closing time data, by county.

Given a precinct's closing time we calculated the elapsed time in minutes between the official 7:00pm close of polls and when said precinct closed (using whatever definition of precinct closure that we obtained from the Supervisors of Elections). A precinct, therefore, with a ten minute

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2012 "After Action Report – November 6, 2012 General Election," among the polling stations that closed after midnight the correlation between the time the last voter cast a ballot and when the clerk contacted the SOE that the polls were closed (Attachment 4) is quite strong. See Penelope Townsley, "After Action Report – November 6, 2012 General Election," December 19, 2012, at http://www.miamidade.gov/mayor/library/elections-after-action-report.pdf.

[34] In addition to our own public records requests for wait time data from the 67 SOEs, we received wait time data from Scott Powers and David Damron at the *Orlando Sentinel*. Following the 2012 General Election, Powers and Damron collected Election Day precinct closing times, measured in theory as the number of minutes after the 7:00pm close of polls that a precinct's results were transmitted electronically to the relevant Supervisor of Election. Powers and Damron's data collection effort covered Florida's 25 most populated counties. In all, the *Sentinel* obtained precinct-level data from the more than 5,000 precincts in Alachua, Brevard, Broward, Clay, Collier, Duval, Escambia, Hillsborough, Lake, Lee, Leon, Manatee, Marion, Miami-Dade, Orange, Osceola, Palm Beach, Pasco, Pinellas, Polk, Sarasota, Seminole, St. Johns, St. Lucie, and Volusia Counties. With the permission of *Sentinel* reporter Scott Powers, for the counties from which we have not received close of poll data, we draw on the *Sentinel's* precinct-level closing times. Our analysis does not rely on any other data collected by the *Sentinel*. See "Compiling data: How the Sentinel did it," *The Orlando Sentinel*, January 29, 2013, at http://articles.orlandosentinel.com/2013-01-29/business/os-voter-lines-statewide-box-20130118_1_data-turnout-precinct-by-precinct-results.

[35] The exception to this is Miami-Dade County, and this is because we believe the *Orlando Sentinel* data from Miami-Dade is more comprehensive than the data we received from the county. Included in our analysis is data obtained by the *Orlando Sentinel* from Volusia and St. Lucie Counties, despite some questions about the quality of their close of poll data. See Powers and Damron (2013).

closing delay is one that reported closing at 7:10pm. Some of our precincts reported closing after midnight on Election Day, and these precincts thus suffered from closing delays of over five hours.

As made clear in the introduction, we need to assess the socio-demographic profiles of precincts with long and short closing times. This requires that we merge our precinct-level closing data with the individual-level voting records from an official Florida statewide voter file, and for this purpose we acquired a voter file dated December 31, 2012. Florida vote files are updated on a monthly basis and are maintained by the Florida Department of State. The December 2012 file was the first to contain information on voter participation in the 2012 General Election, and this is why we use it. The file contains a list of all registered voters in Florida, and it indicates which voters voted in the 2012 General Election, who voted early, who voted at the polls on Election Day, and so forth.

After receiving our December 2012 voter file we subsequently learned via communications from the Florida Department of State that this file contains serious errors that affect a number of counties, namely, Broward, Duval, Lee, Leon, Palm Beach, Polk, and Sarasota.[36] For example, the December file reports that Polk County had a total of 94 Election Day voters. The Department of State informed us that the March 2013 statewide voter file fixes these errors, and hence for the aforementioned counties we use data from this latter file in place of data from the December 2012 file. For example, according to the March 2013 voter file, more than 128,000 voters in Polk County voted on Election Day, considerably more than the previously misreported 94.

[36] Many were simple clerical errors, including wrong or duplicate precinct numbers provided to us or the *Orlando Sentinel* in our public records requests made to the county election supervisors. For example, Polk County provided us with "the time that final results were tallied at each precinct," but there were several scrivener errors in the county's internal "Upload Report," including some precincts being listed twice and others missing entirely. (We appreciate the quick assistance of Polk County SOE Lori Edwards and her staff to rectify these clerical errors.)

We thus assembled a hybrid voter file, most of which is based on the December 2012 statewide voter file but some of which draws from the March 2013 voter file.[37] From this hybrid file we calculated three quantities for each Florida precinct: the number of registered voters; the number of voters who voted on Election Day; and, the number of voters who were available to vote on Election Day. This latter number is defined as the number of registered voters in a precinct minus the precinct's voters who had already voted early or who cast an absentee ballot. Moreover, because Florida voter files include data on voter race/ethnicity[38] and age, among other things, we calculate the above three quantities for many different groups of individuals and for each Florida precinct, e.g., the number of White registered voters in a precinct, the number of White votes on Election Day, the number of available White voters on Election Day, and so forth.[39]

Our analysis includes data from 41 of Florida's 67 counties, including the 25 most populated counties, and a random assortment of medium and smaller ones.[40] As such, our coverage of Florida's precincts is not complete but is nevertheless quite comprehensive; we have closing times for 5,194 precincts in the state, slightly less than 85% of all the Election Day precincts deployed by the state's 67 Supervisors of Elections during the course of the 2012 General Election. Additionally, the precincts in our study account for more than 90% of the roughly 12.6 million voters who were

[37] The reason that our hybrid file uses the both December 2012 and March 2013 files, as opposed to the latter only, is because the errors in the December 2012 file are, we have been told, in voter participation codes and involve selected counties only. The December 2012 list of voters by precinct does not have systematic errors, and we prefer this list to the March 2013 list of voters by precinct since its date is closer to November 6, 2012.

[38] Throughout this paper we use the terms Black, Hispanic, and White to refer to categories of voters. This follows the convention found in Florida voter files, which code African Americans as "Black, Not Hispanic," Latinos as "Hispanic," and Whites as, "White, Not Hispanic."

[39] Our hybrid voter file contains 1,987 individuals who have contradictory voting codes. We drop these individuals from our analysis. It also contains several thousand individuals with redundant records for the 2012 General Election, and we adjusted our hybrid file so that each such individual is only counted once.

[40] Despite public records requests, we have not as of June 24, 2013, received precinct-level Election Day closing time data from the 26 counties excluded from this study.

registered in Florida in 2012, and they encompass more than 92% of the 3.7 million voters who cast in-person ballots in precincts on Election Day.[41]

Table 1 reports precinct-level descriptive statistics for the counties used in this study. Table 2 similarly reports the precinct-level voter registration and socio-demographics of Election Day voters by county. Both Tables 1 and 2 are ordered by number of merged precincts, and thus the rows at the top of each Table are more meaningful than those at the bottom. This is because averages taken over many precincts are, all things equal, more informative than averages taken over few.

We caution against comparing closing times across counties since they are measured differently. For example, in Palm Beach County a precinct's closing time is defined as the time that an electronic unit is read by a processing machine in one of many centralized locations in the county. Because of this, the 84 minute average across Palm Beach County precincts cannot be directly compared to Miami-Dade's average. Having said this, Table 1 reveals that 11 of the 41 counties reported that all of their precincts closed at precisely 7:00pm. At the other extreme, seven counties (Miami-Dade, Orange, Lee, Volusia, Pasco, St. Lucie, and Collier) reported having at least one precinct that did not close until after midnight.

Within counties, we find considerable variation in closing times. Across the nearly 800 precincts in Miami-Dade County, for example, an average of 73 minutes elapsed before the final voter in line cast a ballot after the 7:00pm close of polls, with at least one precinct processing its last voter seven hours after the polling station was closed.[42] Other large counties also had late closing

[41] There are precincts that exist in our hybrid voter file but have no associated closing times in the data provided to us by county officials. We do not use these precincts in our analysis.
[42] Some of our data appear consistent with other published closing time data. For example, the Miami-Dade "After Action Report – November 6, 2012 General Election," summarizes "the timing of polls 'closed' on Election Day according to the ePrecincts system," revealing that by 8:00pm, 18% of precincts were closed, by 10:00pm, 81% of precincts were closed, and by 2:00am, 100% of precincts were closed.

times, but so too did several smaller counties. For example, the average closing time in Sumter County (as measured by the time the DS200 optical scan machine in each precinct printed its results), was 46 minutes with at least one polling station shutting down 162 minutes after the close of polls. Some large counties had on average relatively insignificant closing times after 7:00pm. Just to the north of Miami-Dade County, precincts in Broward County reported closing on average just 25 minutes after 7:00pm, although at least one of Broward's more than 600 precincts did not close until more than three hours after 7:00pm

Socio-Demographics and Precinct Closing Times

We turn now to the socio-demographics of precincts so as to assess possible correlations between precinct profiles and Election Day closing times from the 2012 General Election. For the most part we analyze counties separately, recalling that many counties had considerable variation in the closing times of their precincts. We are particularly interested here in whether this variation is associated with the proportion of Black, Hispanic, and Whites voters who voted in those precincts on Election Day.[43] We are also interested in whether precinct closing times are related to the ages of those who voted in them on Election Day, to the number of registered voters assigned to a precinct who were available to vote (i.e., had not already cast an in-person early or absentee ballot), and to the number of people who actually voted on Election Day.

To assess the correlates of a precinct's socio-demographics with its closing time, we present a series of plots for a selected set of counties. As will be clear when we start discussing the plots, each such plots use a common scale for the vertical axis—the number of minutes a precinct was

[43] With our hybrid statewide voter file we are able to screen from our analysis all voters assigned to a precinct in a county who cast a ballot during early voting (October 27 to November 3, 2012) or who cast an absentee ballot. When we subtract these voters from the set of registered voters in a precinct, what is left is the set of available voters, i.e., those who could cast a vote on Election Day.

open beyond 7:00pm. The scale ranges from zero to 400 minutes, and this upper bound covers all but the most extreme precinct closing times.

Table 1: Election Day Precincts and Closing Times by County, Sorted by Number of Precincts

County	Number of Merged Precincts	Percent of Precincts Covered	Minimum Number of Minutes After Polls Closed	Maximum Number of Minutes After Polls Closed	Number of Precincts with No Wait Time After Polls Closed	Average Number of Minutes After Polls Closed
Miami-Dade	796	99.4	1	420	0	73
Palm Beach	760	98.7	27	285	0	84
Broward	619	77.9	0	190	34	25
Hillsborough	347	100	19	219	0	72
Pinellas	293	98.0	8	121	0	40
Orange	227	97.4	4	318	0	86
Duval	197	99.5	0	170	1	35
Polk	167	100	4	128	0	35
Leon	129	94.9	14	137	0	41
Marion	127	100	6	144	0	27
Lee	125	99.2	3	474	0	115
Volusia	125	100	10	458	0	75
Brevard	116	69.9	11	216	0	63
Manatee	112	99.1	14	202	0	53
Pasco	109	98.2	0	308	1	41
Lake	102	98.1	5	84	0	20
Seminole	80	100	2	87	0	25
Escambia	79	100	0	33	1	11
Charlotte	79	100	0	0	79	0
Osceola	71	100	0	242	13	37
St. Lucie	65	100	17	381	0	96
Collier	61	98.4	0	305	44	8
Alachua	61	87.1	14	117	0	34
Clay	48	98.0	0	52	3	13
St. Johns	46	97.9	0	0	46	0
Indian River	37	100	6	56	0	18
Citrus	31	100	0	0	31	0
Martin	31	100	0	0	31	0
Sumter	24	100	9	162	0	46
Nassau	16	100	0	3	15	0
Jackson	14	100	1	21	0	8
Taylor	14	100	0	0	14	0
Bradford	14	100	0	0	14	0
Wakulla	12	100	0	0	12	0
Okeechobee	11	100	0	0	11	0
Union	11	100	0	0	11	0
Baker	9	100	0	15	5	5
Holmes	8	100	1	16	0	8
Hamilton	8	100	1	17	0	5
Franklin	8	100	0	0	8	0
Lafayette	5	100	0	0	5	0

Table 2: Socio-Demographics of Election Day Voters by County, Sorted by Number of Precincts

County	Total Merged Registered Voters	Total Merged Election Day Voters	% Election Day Voters	% Black E.D Voters	% Hispanic E.D. Voters	% White E.D. Voters	% 30 and Under E.D. Voters	% 65 and Over E.D. Voters
Miami-Dade	1,339,280	402,798	30.1	18.9	52.3	22.5	20.3	16.1
Palm Beach	1,413,443	540,585	38.2	9.4	10.0	74.5	12.7	25.1
Broward	951,165	278,374	29.3	18.4	19.2	54.4	16.1	17.6
Hillsborough	787,669	204,300	25.9	13.3	15.0	65.1	21.1	13.9
Pinellas	644,300	168,703	26.2	9.4	4.2	81.4	16.0	18.8
Orange	727,498	204,670	28.1	16.1	20.3	54.8	22.0	11.1
Duval	596,097	149,063	25.0	30.0	3.6	60.1	21.6	11.5
Polk	382,277	127,072	33.2	12.5	9.4	73.3	15.8	22.9
Leon	201,447	70,005	34.8	27.8	3.2	63.8	29.1	12.4
Marion	233,422	79,585	34.1	9.1	5.3	82.7	11.3	34.5
Lee	409,462	125,254	30.6	4.3	7.6	84.3	11.4	30.4
Volusia	365,805	110,359	30.2	8.3	6.4	80.7	14.1	23.4
Brevard	340,080	120,437	35.4	6.3	4.0	85.7	13.1	23.8
Manatee	218,526	90,605	41.5	7.1	4.6	85.2	10.5	32.2
Pasco	318,561	93,081	29.2	2.7	6.5	86.8	13.1	23.6
Lake	219,127	63,835	29.1	6.6	5.1	84.9	11.4	33.0
Seminole	291,905	88,661	30.4	8.0	12.6	71.9	18.9	11.6
Charlotte	124,261	24,946	20.1	3.8	3.4	89.1	10.7	30.9
Escambia	218,121	66,869	30.7	21.3	1.5	71.6	19.4	18.4
Osceola	179,632	41,493	23.1	6.2	35.4	52.4	19.9	13.3
St. Lucie	186,257	49,100	26.4	12.3	8.0	75.8	14.0	26.8
Alachua	166,241	52,570	31.6	16.1	4.9	71.8	28.6	12.5
Collier	205,605	48,957	23.8	3.1	9.5	84.6	10.8	30.9
Clay	138,078	36,344	26.3	6.9	4.2	83.9	17.4	14.1
St. Johns	159,883	39,520	24.7	4.2	2.8	89.5	15.5	14.3
Indian River	99,789	23,658	23.7	4.8	4.4	87.3	11.7	28.5
Citrus	103,279	26,636	25.8	2.1	2.2	92.1	10.5	32.5
Martin	107,917	21,725	20.1	5.2	5.0	87.3	13.1	23.7
Sumter	75,740	16,539	21.8	6.3	1.8	89.6	8.3	43.9
Nassau	55,435	11,670	21.1	4.9	1.4	90.0	16.5	14.7
Jackson	29,618	8,912	30.1	21.7	0.8	75.0	16.9	18.7
Bradford	16,513	5,864	35.5	13.2	0.8	84.2	16.7	18.4
Taylor	13,326	4,530	34.0	11.0	0.9	85.9	15.1	23.0
Wakulla	20,144	5,914	29.4	6.6	0.7	91.4	13.9	18.6
Union	7,549	2,640	35.0	14.0	0.9	84.0	18.6	13.6
Okeechobee	19,673	5,892	29.9	4.6	7.3	84.4	13.6	23.8
Baker	15,273	4,104	26.9	9.5	0.5	87.4	18.3	13.0
Franklin	7,950	2,618	32.9	6.1	0.7	92.7	9.1	29.2
Hamilton	8,356	2,672	32.0	32.8	1.4	64.5	15.5	20.3
Holmes	11,768	4,087	34.7	1.3	0.6	96.5	15.3	21.7
Lafayette	4,600	1,892	41.1	9.4	1.7	88.2	15.0	19.8

For plots that describe the relationship between closing time and precinct socio-demographic composition, the horizontal axis is the proportion of Black, Hispanic, or White Election Day voters in a precinct, the proportion of such voters under the age of 30, or the

proportion older than 65.[44] By construction, all five socio-demographic proportions range from zero to one, with zero indicating no voters of a socio-demographic in a precinct and one indicating that the precinct is comprised wholly of voters from said socio-demographic category. For plots describing the relationship between precinct closing time and the number of registered voters assigned to a precinct who were eligible to vote on Election Day (so-called "available voters") or the number of individuals who actually voted on Election Day in a precinct, the horizontal axis is scaled based on either election day or available voter counts.

In all of the forthcoming plots, each dot represents a precinct. Furthermore, the plots have tobit regression lines superimposed over the dots in them. Tobit regression lines are akin to regular linear regression lines except that they incorporate the fact that closing time delays are bounded below by zero. Why? The earliest a precinct could have closed on Election Day was 7:00pm. It would not be strictly appropriate to superimpose a linear regression line on closing time data because ordinary regressions do not recognize constraints on a variable being modeled, i.e., in our case, that the lowest possible closing delay is zero.

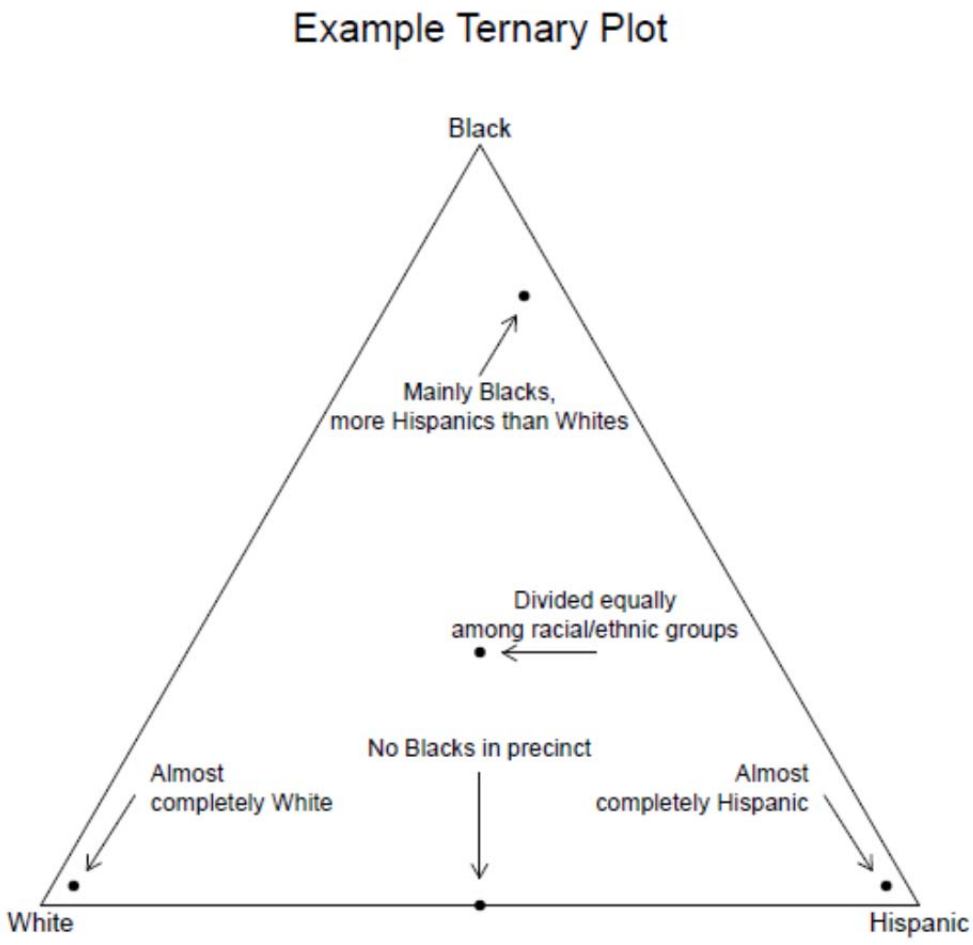
Finally, we present ternary plots for our selected counties. For a given county, a ternary plot describes the distribution across precincts of fraction Black, fraction Hispanic, and fraction White over each precinct's voter pool. We provide an example of a ternary plot below, and this example shows how ternary plots are interpreted.

As illustrated in the example below, a ternary plot consists of a triangle, and each vertex of the triangle represents one racial/ethnic group. Recall that a ternary plot contains dots, each of which represent precincts. If a precinct is uniformly divided between Black, Hispanic, and White

[44] As mentioned previously, we use the terms Black, Hispanic, and white because these are the racial/ethnic identifiers used by the Florida Department of State in the official Florida statewide voter file.

voters, then the dot for the precinct will be in the middle of the triangle. If, in contrast, a precinct contains no Blacks, then its associated dot will be directly on the line between Hispanic and White. Finally, if a precinct contains many Hispanics and some, albeit not many, Blacks and Whites, then the dot for the precinct will be near this Hispanic vertex but in the interior of the triangle.

Finally, for the ternary plots that follow, shading of precinct dots—one dot per precinct—represents the number of minutes past 7:00pm that the precinct closed. Darker shades represent later closing times, and lighter shades of gray, earlier closing times.



We begin our county-by-county investigation of the relationship between precinct-level socio-demographics and closing times by examining the largest counties in Florida—Miami-Dade, Palm Beach, Broward, Hillsborough, Pinellas, Orange, and Duval—all of which had more than half a million registered voters in the 2012 General Election. In addition to revealing residential segregation patterns that impact the distribution of voters across Election Day precincts, most of the plots display considerable variance in the number of minutes that precincts were open past 7:00pm. As Table 2 shows, all seven of these counties have sizeable numbers of people of color and younger voters who turned out on Election Day. Across precincts the average percent of Election Day voters in these counties who were Black ranges from 9.4% in Palm Beach and Pinellas to 30% in Duval. The average percent by precinct of Election Day voters who were Hispanic ranges from 3.6% in Duval to 52.3% in Miami-Dade. And for Whites, the average percent of Election Day voters by precinct ranges from 22.5% in Miami-Dade to 81.4% in Pinellas. Orange led the way with the highest average percent of Election Day voters under the age of 30, at 22.0%; Palm Beach had the lowest average percent of Election Day voters by precinct under the age of 30, at just 12.7%, and not surprisingly, also had by far the highest average percent of Election Day voters over the age of 65 (25.1%). Of these large counties, Orange had the lowest average percent of elderly voters by precinct casting ballots on Election Day (11.1%), edging out Duval.

Miami-Dade County

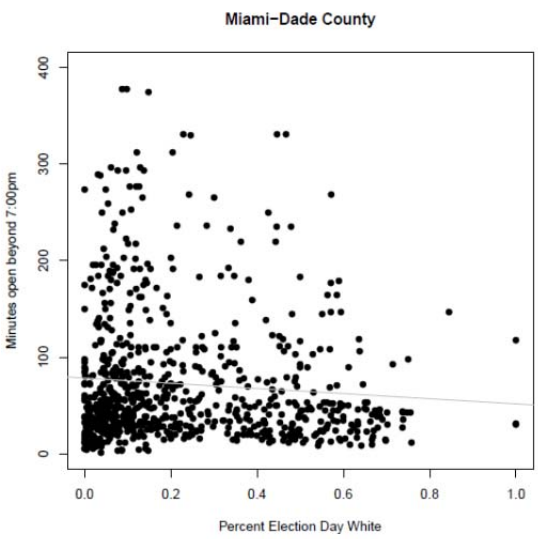
Beginning in southeast Florida with Miami-Dade County, we find that Miami-Dade precincts heavily subscribed with Hispanic voters on Election Day had considerably later closing times than those with greater proportions of Black or White voters. The Percent Election Day Hispanic plot reveals that many of the precincts with Election Day closing times farthest past 7:00pm had very high concentrations of Hispanic voters, and the superimposed tobit regression line in the plot has a positive slope, indicating that as a precinct's proportion of Hispanic voters increased, the precinct

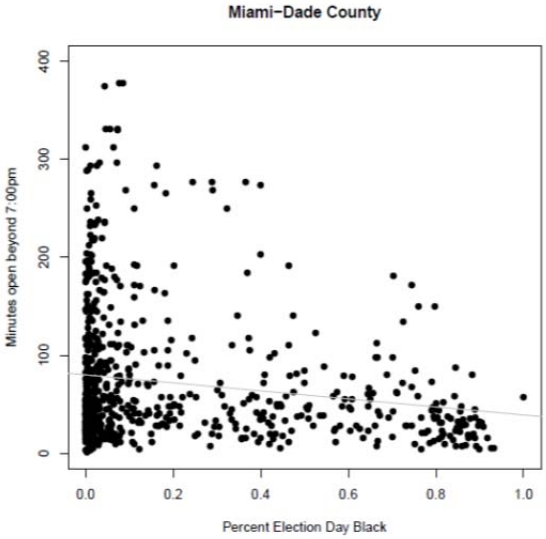
stayed open later. The other plots generally show that closing times were spread fairly evenly across precincts with either predominately White or predominately Black voters. The Miami-Dade ternary plot confirms that precincts with the latest closing times had mostly Hispanic voters, and that precincts that shut down operations closer to the 7:00pm close of polls had more diverse mixture of White and Black voters. As we discuss later in this study, it is certainly plausible that the heavy use of early voting by Blacks in Miami-Dade mitigated the impact of Election Day congestion in predominantly Black precincts.

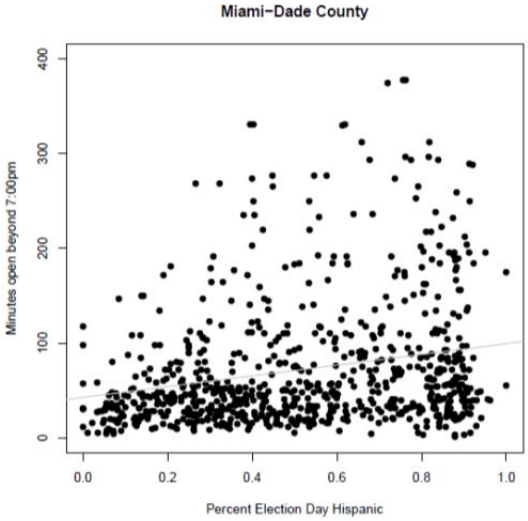
In addition, we find that precincts with higher concentrations of younger voters tended to stay open longer after 7:00pm; in contrast, those with more elderly voters tended have fewer minutes open after the official close of polls. We also find that precincts that had more voters turn out on Election Day had considerably later closing times.[45] This is not that surprising, even though there is some evidence that the Miami-Dade Supervisor of Elections, Penelope Townsley, and her staff apparently had planned for such an occurrence. Based on data made available from a post-election evaluation conducted by Ms. Townsley, it appears that the precincts that serviced the highest number of voters and experienced later closing times were adequately supplied with privacy booths and optical scanners; however, they appear to have been housed in smaller polling stations and had relatively fewer poll workers.[46]

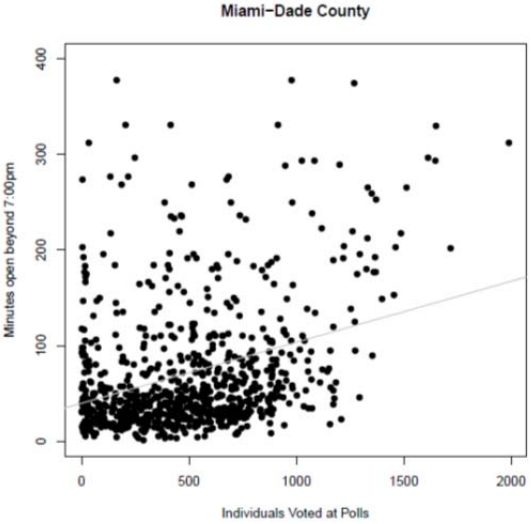
[45] As with other counties, the Miami-Dade plot (not shown) displaying the number of registered voters assigned to a precinct who had yet to vote and the associated precinct closing time is quite similar to the plot showing a precinct's actual Election Day voters.

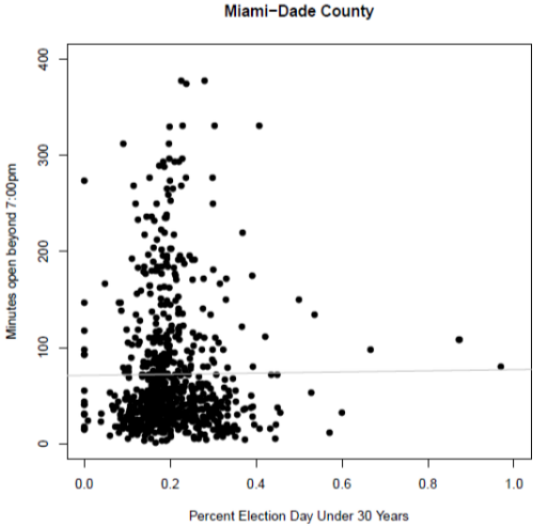
[46] Drawing on data provided in Attachment 4 of the Miami-Dade "After Action Report," which reports closing time, machinery, and poll worker figures from the 24 polling stations (some housing more than one precinct) closing after midnight, the correlation measuring the association between a polling station's Election Day voters and the number of optical scanners and the number of privacy booths was 0.56 and 0.91, respectively, but the correlation between Election Day voters and the number of poll workers and the square footage of a polling station was just 0.31 and 0.14, respectively.

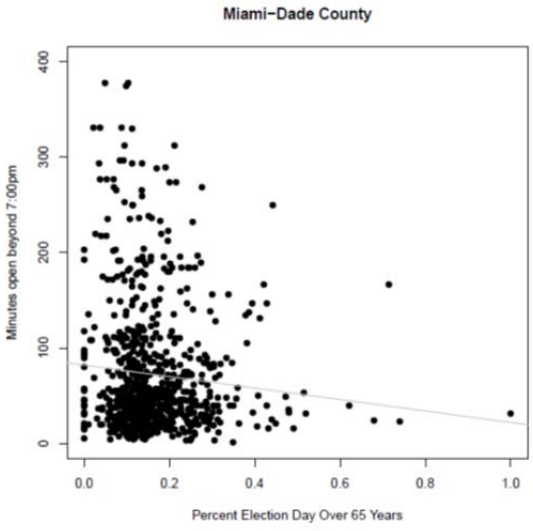

Miami-Dade County
Minutes open beyond 7:00pm
Percent Election Day White

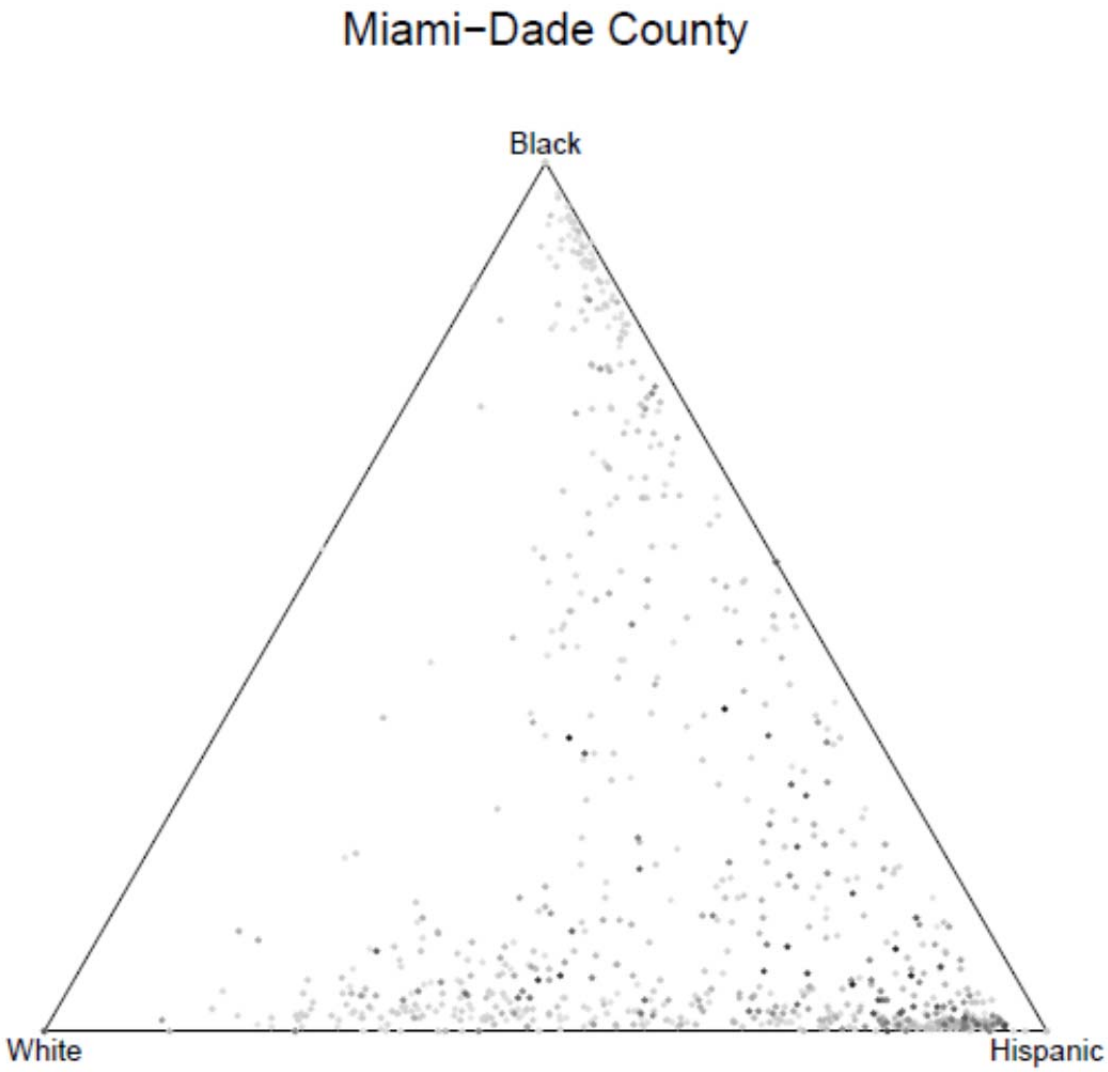

Miami-Dade County
Minutes open beyond 7:00pm
Percent Election Day Black


Miami-Dade County
Minutes open beyond 7:00pm
Percent Election Day Hispanic


Miami-Dade County
Minutes open beyond 7:00pm
Individuals Voted at Polls


Miami-Dade County
Minutes open beyond 7:00pm
Percent Election Day Under 30 Years


Miami-Dade County
Minutes open beyond 7:00pm
Percent Election Day Over 65 Years

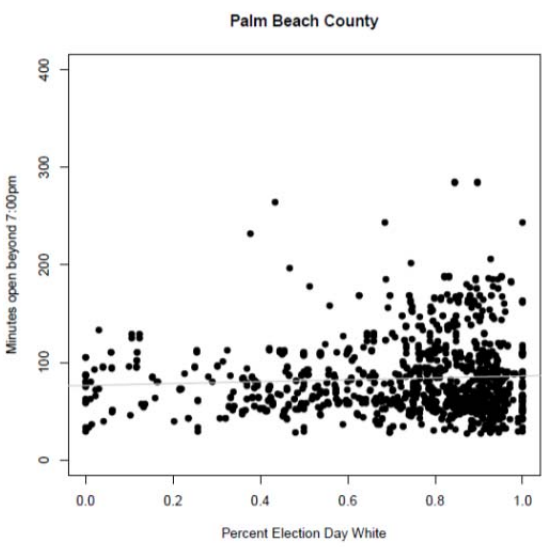

Miami−Dade County
Black
White
Hispanic

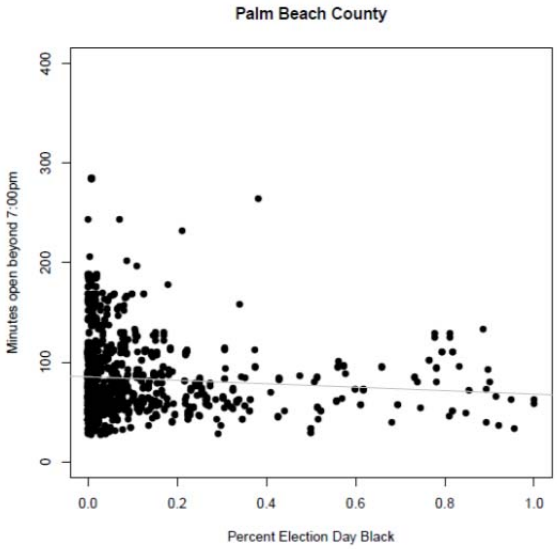
Palm Beach County

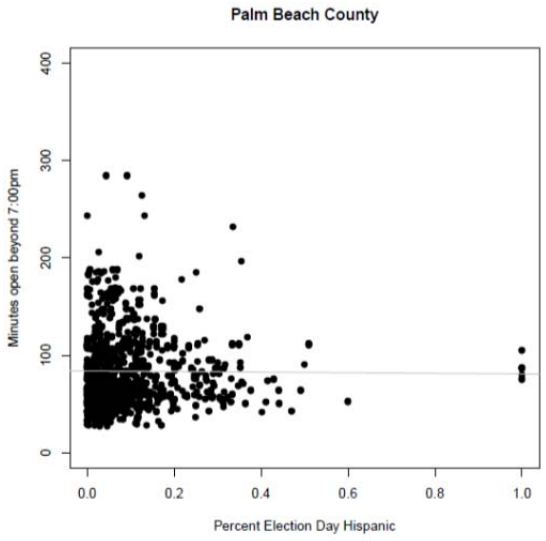
Despite having fewer precincts on Election Day than Miami-Dade County, Palm Beach County processed nearly 140,000 more Election Day voters than did the former. Election Day voters in 760 Palm Beach County precincts were on average nearly three-quarters White, and on average less than 13 percent were under the age of 30. As the Palm Beach plots show, there is very little variance between precinct socio-demographics and the time an electronic unit was read by a centralized processing machine. This is true in precincts heavily concentrated with people of color, and it is true as well in precincts with many young or old voters. In other words, precincts comprised nearly exclusively of either Black voters or Hispanic voters did not close significantly later than those comprised mostly of White voters. The ternary plot for Palm Beach reveals the distribution of precinct closing times across Black, Hispanic, and White Election Day voters.

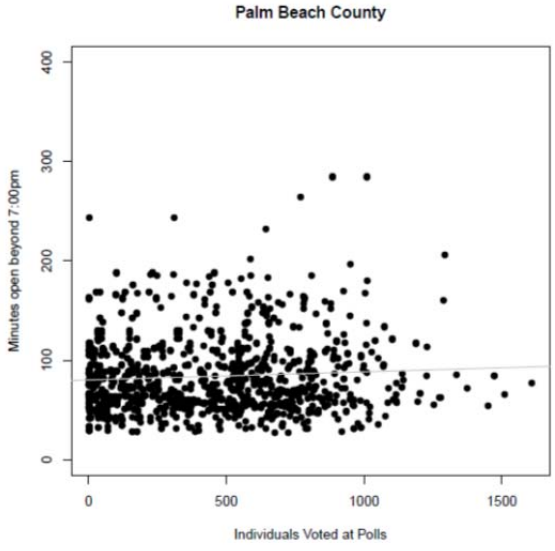
Moreover, we do not find in Palm Beach County a strong relationship between the sheer number of voters who cast ballots on Election Day and long a precinct stayed open after 7:00pm.[47] That is to say, precincts that processed more than 1,000 Election Day voters did not have appreciably later closing times than those that processed far fewer voters. None of this is to say that there were not precincts in Palm Beach that closed very late; indeed, some precincts waited to relay their results to the Supervisor of Elections more than five hours after the official close of polls.

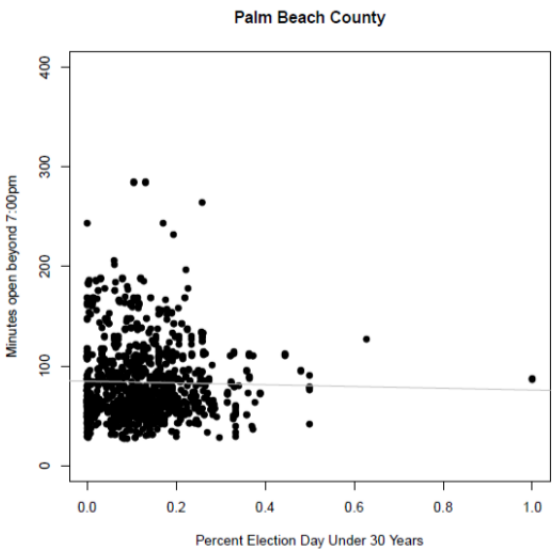
[47] This null finding of the relationship between the number of voters processed in a precinct on Election Day and the time polls closed runs counter to some recent findings using survey data to gauge the size of an election administration jurisdiction (but not the actual number of voters in a precinct) and wait times. See Kimball (2013), page 24 (Table 3).

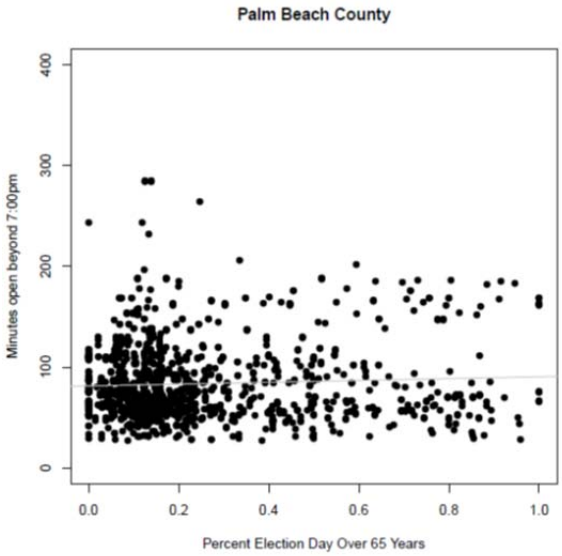

Palm Beach County
Minutes open beyond 7:00pm
0
100
200
300
400
0.0
0.2
0.4
0.6
0.8
1.0
Percent Election Day White


Palm Beach County
Minutes open beyond 7:00pm
0
100
200
300
400
0.0
0.2
0.4
0.6
0.8
1.0
Percent Election Day Black

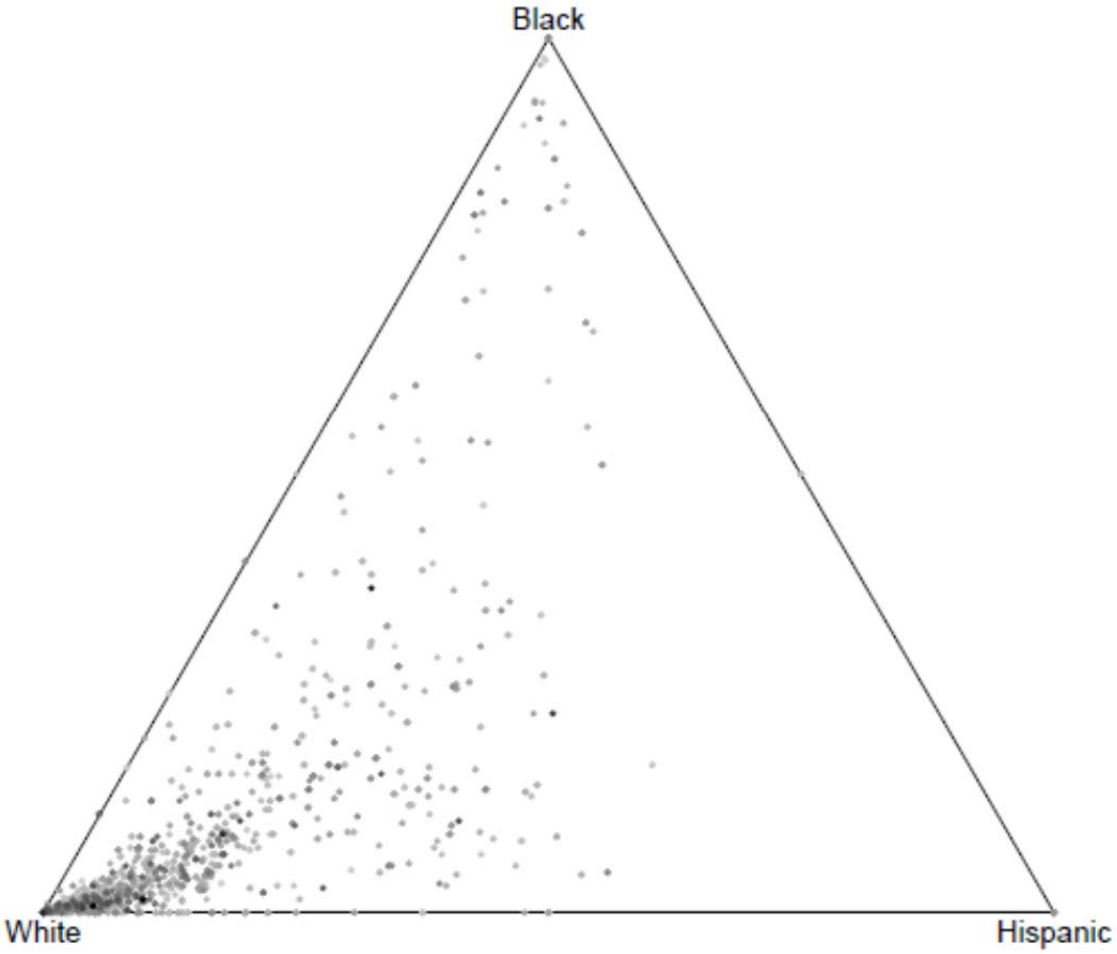

Palm Beach County
Minutes open beyond 7:00pm
0
100
200
300
400
0.0
0.2
0.4
0.6
0.8
1.0
Percent Election Day Hispanic


Palm Beach County
Minutes open beyond 7:00pm
0
100
200
300
400
0
500
1000
1500
Individuals Voted at Polls


Palm Beach County
Minutes open beyond 7:00pm
0
100
200
300
400
0.0
0.2
0.4
0.6
0.8
1.0
Percent Election Day Under 30 Years


Palm Beach County
Minutes open beyond 7:00pm
0
100
200
300
400
0.0
0.2
0.4
0.6
0.8
1.0
Percent Election Day Over 65 Years

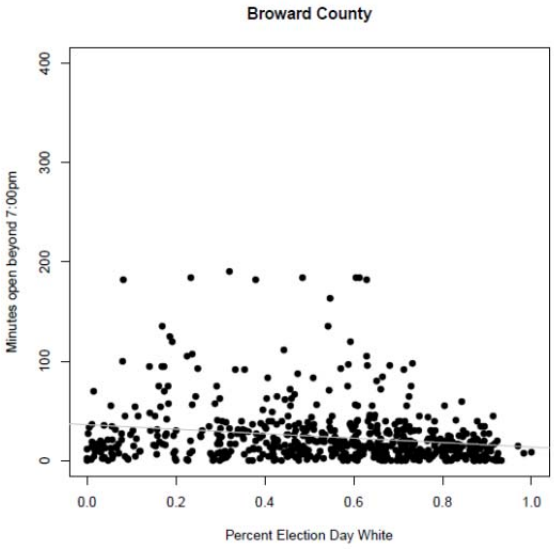
Palm Beach County

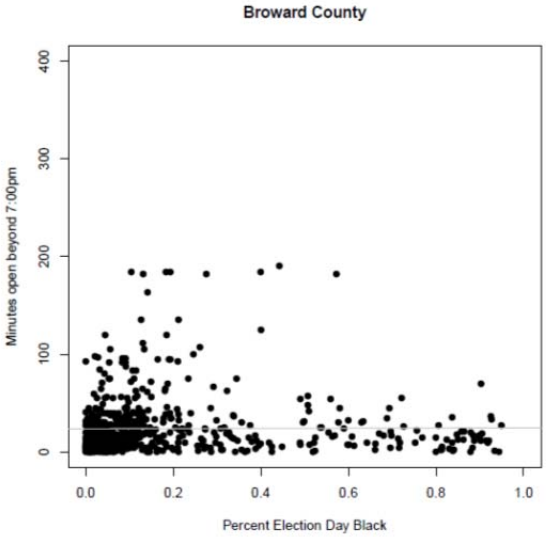


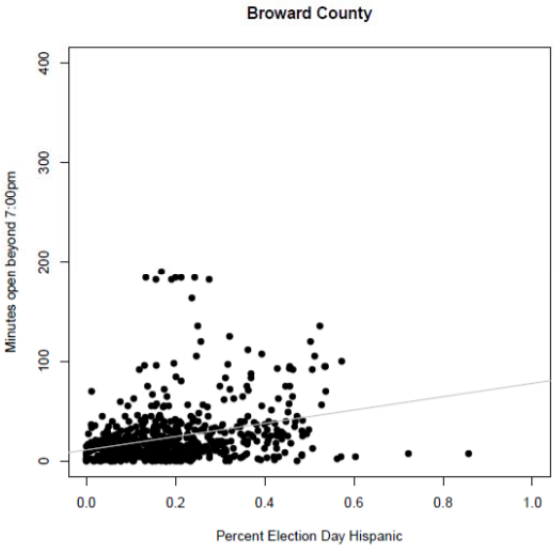
Broward County

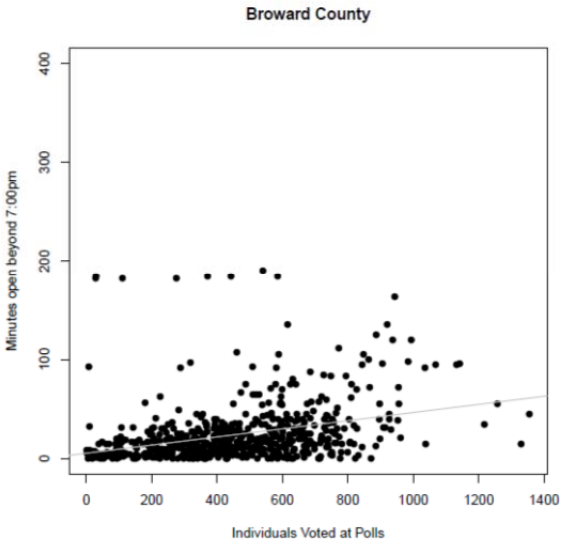
Also located on Florida's Atlantic seaboard, Broward County borders Miami-Dade to the south and Palm Beach to the north. Of the more than 275,000 registered voters in our Broward County dataset who turned out to vote on Election Day, across precincts on average about 55% were White. Overall, our data show that the times precincts closed in Broward County cluster not appreciably far from 7:00pm, although there were some outlying precincts in Broward that reported results three hours after the official close of polls. As with Miami-Dade, Broward precincts with more than 90% Black or White Election Day voters tended to close earlier than those concentrated heavily with Hispanic voters. The Broward ternary plot reinforces this finding, revealing that many of the darker dots (indicating later closing times) are clustered in the area stretching from the triangle's centroid to the ternary plot's Hispanic vertex.

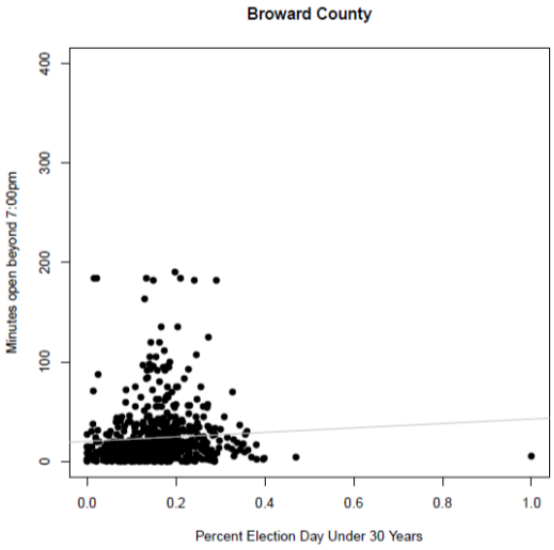
Precincts in Broward that processed higher numbers of Election Day voters generally had slightly longer closing times. And finally, it does not appear that precincts with sizeable proportions of Election Day voters under the age of 30 had closing times that were much later than those with sizeable proportions of voters over the age of 65.

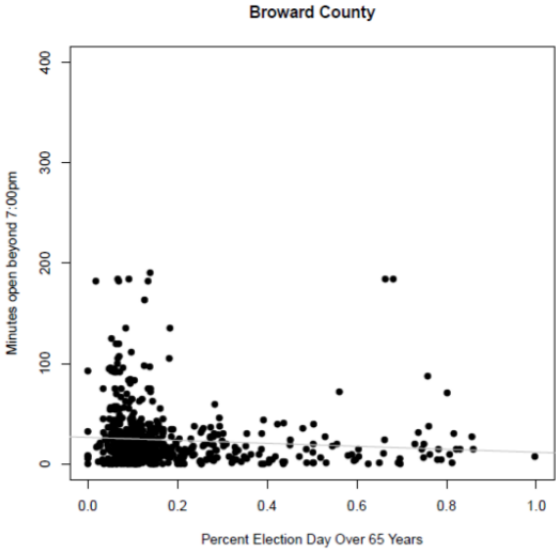

Broward County
Minutes open beyond 7:00pm
Percent Election Day White

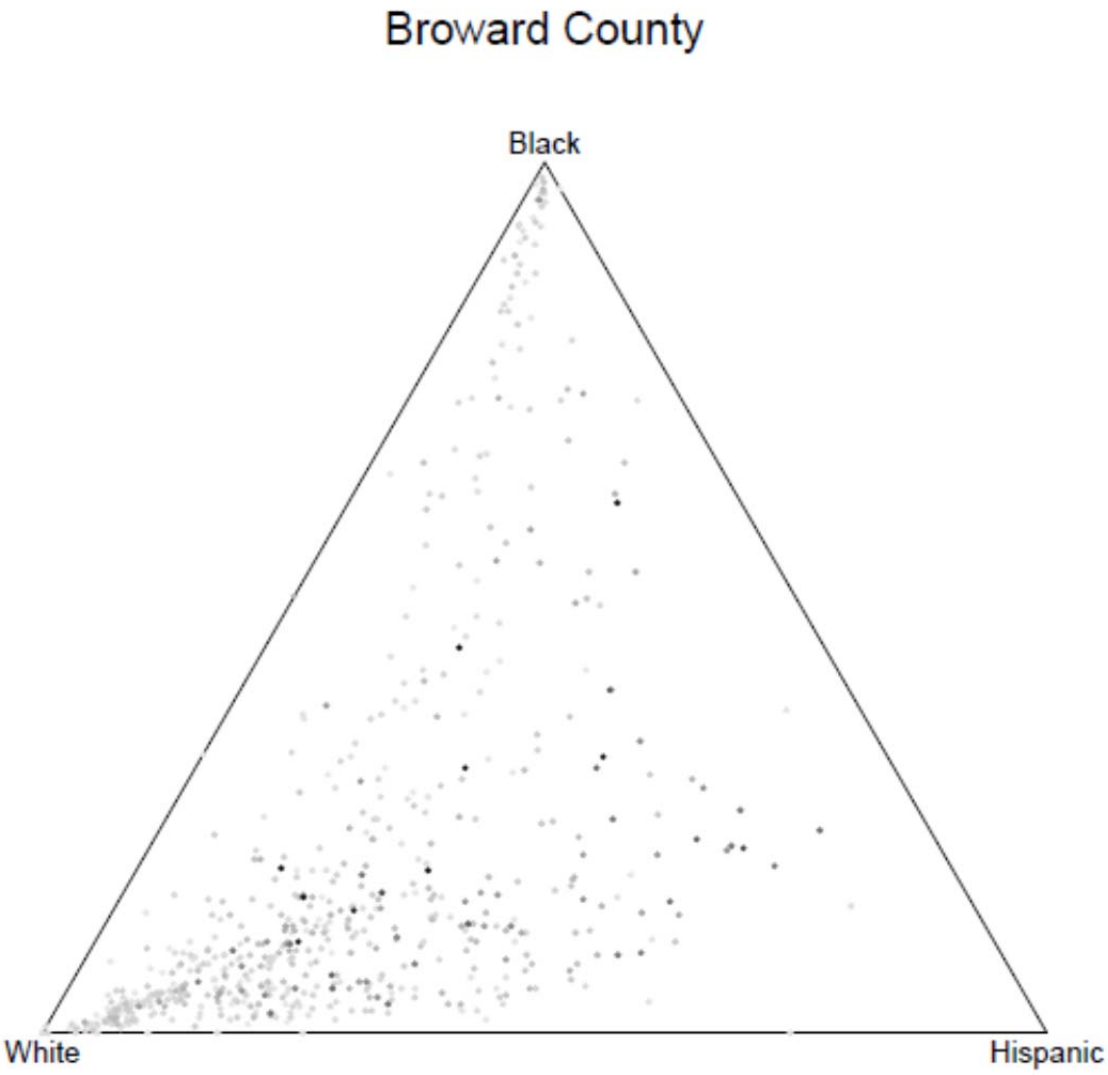

Broward County
Minutes open beyond 7:00pm
Percent Election Day Black


Broward County
Minutes open beyond 7:00pm
Percent Election Day Hispanic


Broward County
Minutes open beyond 7:00pm
Individuals Voted at Polls


Broward County
Minutes open beyond 7:00pm
Percent Election Day Under 30 Years


Broward County
Minutes open beyond 7:00pm
Percent Election Day Over 65 Years


Broward County
Black
White
Hispanic

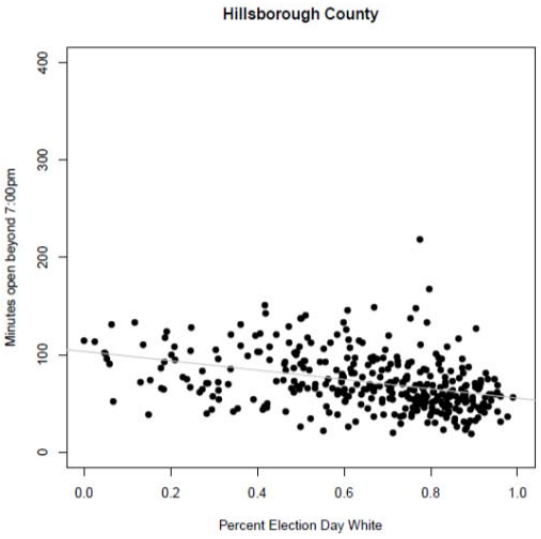
Hillsborough County

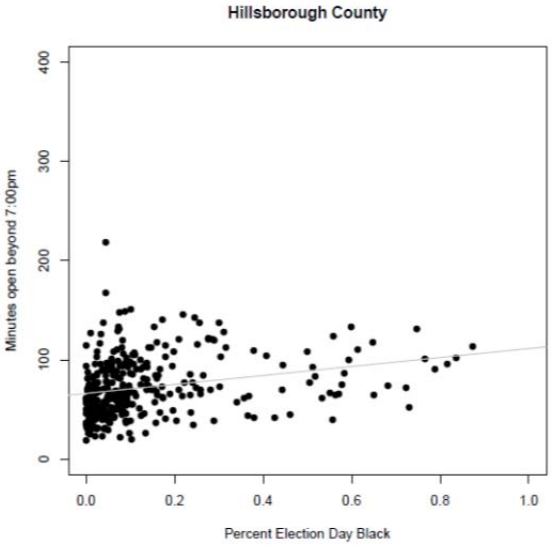
Turning to the Tampa Bay area, Hillsborough County is covered by Section 5 of the Voting Rights Act and includes the city of Tampa. Of the slightly less than 800,000 registered voters in our dataset, on average and across precincts about 26% cast ballots on Election Day. Blacks and Hispanics comprised on average 13.3% and 15.0% of Election Day voters by precinct, respectively, and on average by precinct slightly more than 21% of Election Day voters were under the age of 30.

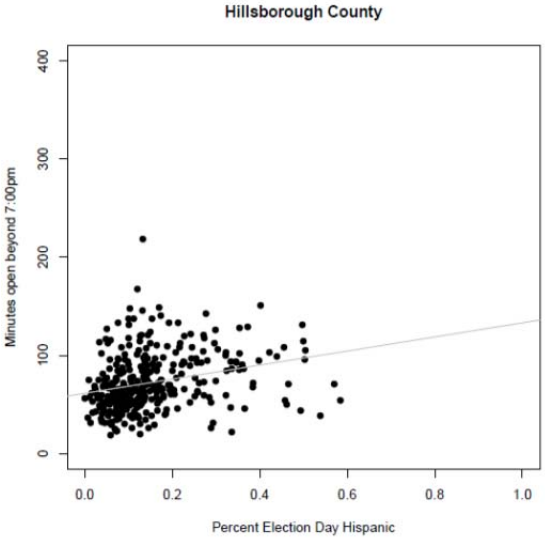
The plots of Election Day voters across the county's 350 precincts show unmistakable correlations between heavily Black, Hispanic, and White precincts and closing times. As the composition of Hillsborough precincts becomes more Black or Hispanic, these precincts had lengthier closing times. Note that the superimposed tobit regression lines in both the Black and Hispanic plots below have positive slopes. In sharp contrast, precincts comprised disproportionately of White voters closed closer to 7:00pm. The Hillsborough ternary plot reinforces these findings insofar as dark dots are not clustered around the White vertex in the plot.

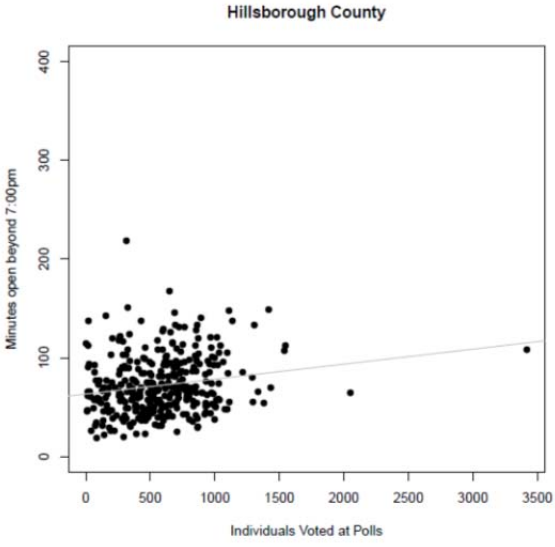
Finally, Hillsborough precincts with more registered voters who cast ballots on Election Day had only slightly later closing times than those with fewer voters. However, we find that those with greater proportions of younger voters had later closing times, especially two precincts comprised almost wholly of voters under the age of 30.

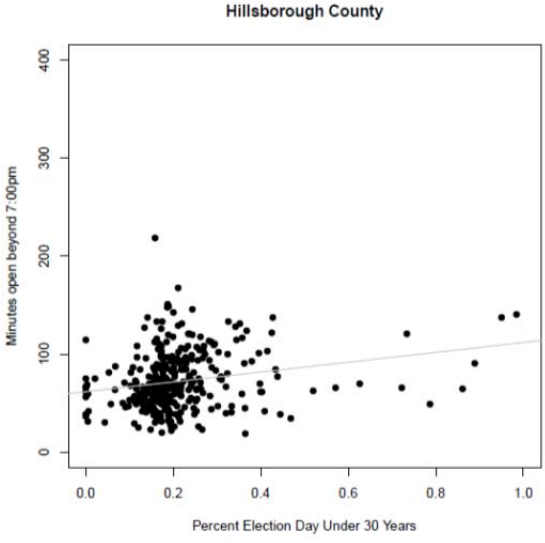
In Appendix B we offer the same series of plots using alternative closing time data—the time when a precinct's optical scan machine was shut down—provided by Hillsborough County. As we discuss in Appendix B, the patterns of these alternative plots are strikingly similar to those immediately below.

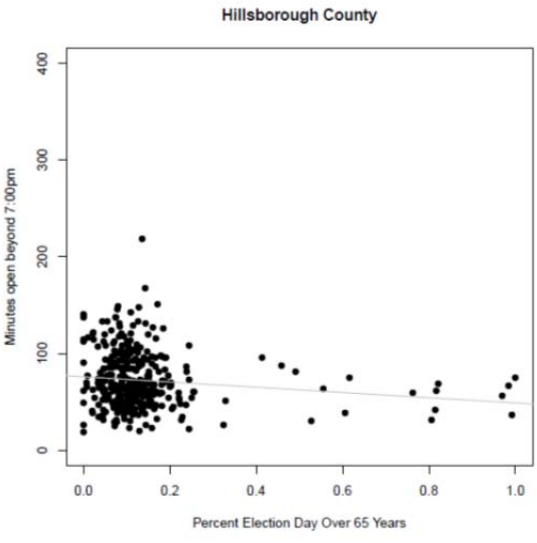

Hillsborough County
Minutes open beyond 7:00pm
Percent Election Day White

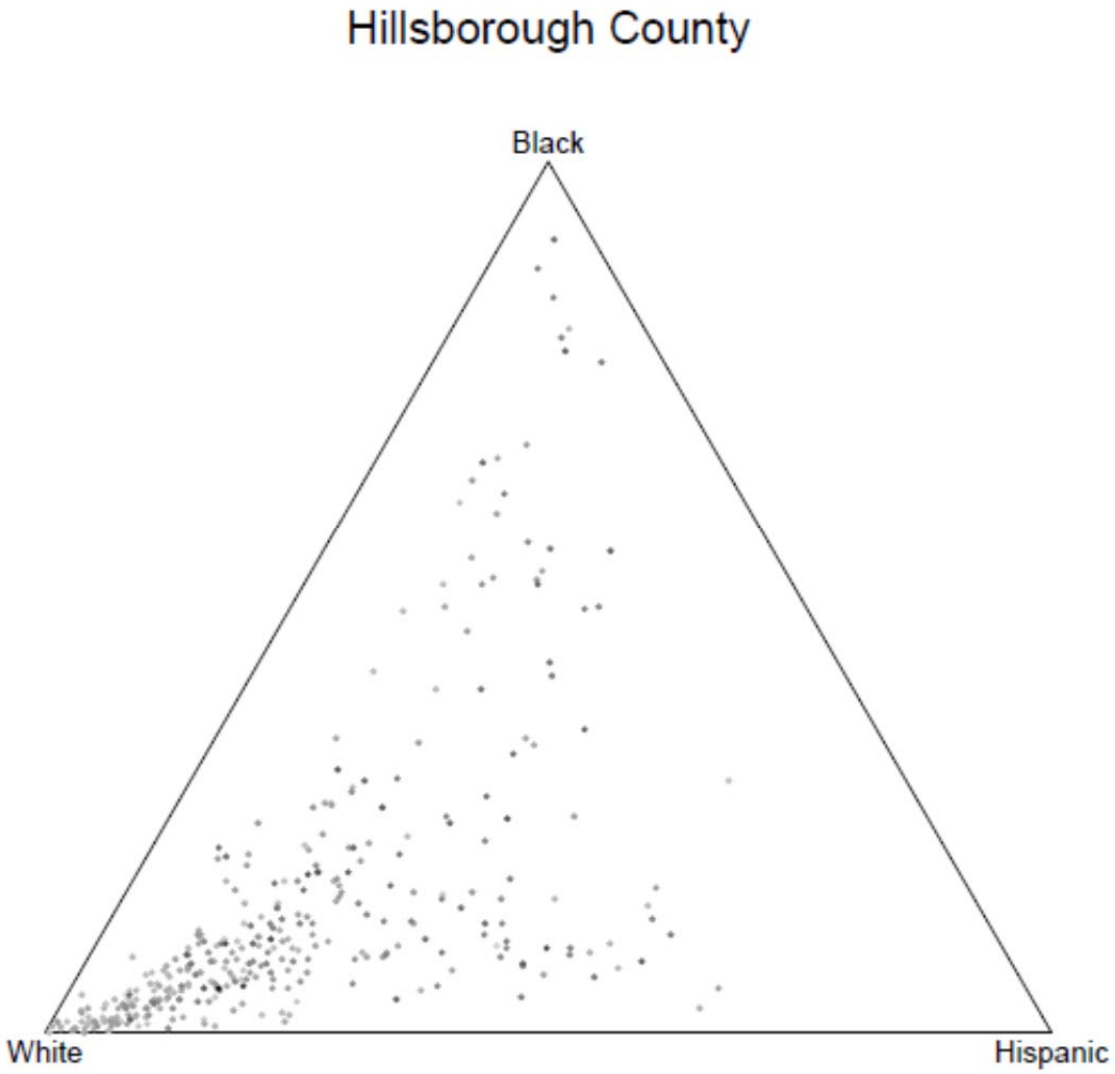

Hillsborough County
Minutes open beyond 7:00pm
Percent Election Day Black


Hillsborough County
Minutes open beyond 7:00pm
Percent Election Day Hispanic


Hillsborough County
Minutes open beyond 7:00pm
Individuals Voted at Polls


Hillsborough County
Minutes open beyond 7:00pm
Percent Election Day Under 30 Years


Hillsborough County
Minutes open beyond 7:00pm
Percent Election Day Over 65 Years

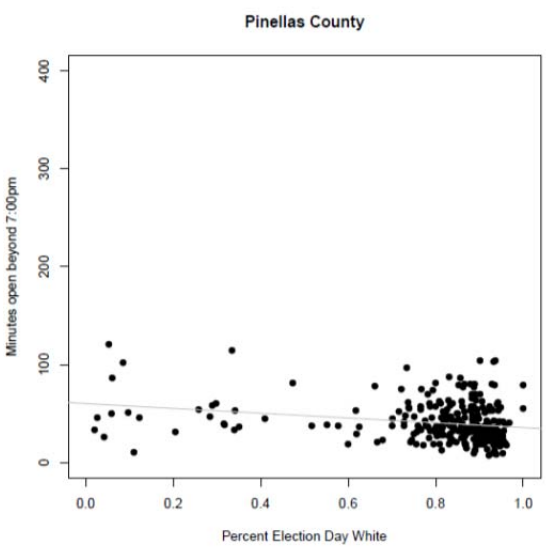

Hillsborough County
Black
White
Hispanic

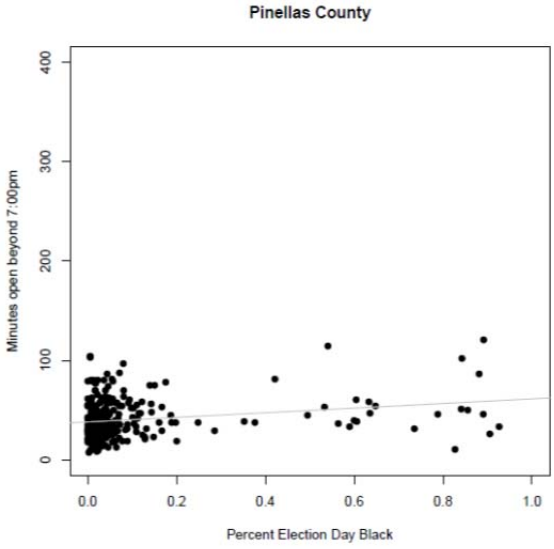
Pinellas County

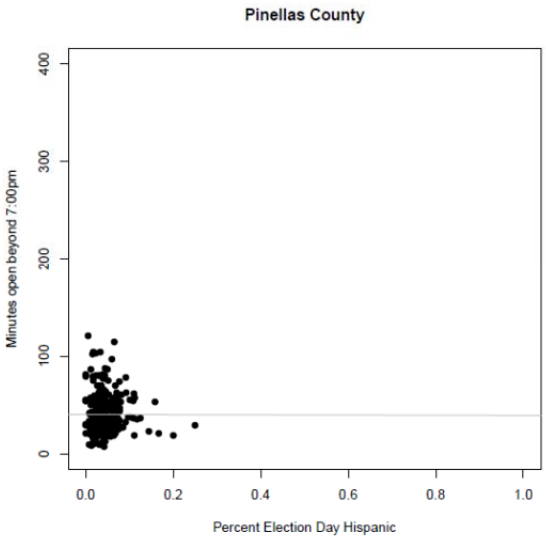
To the west of Hillsborough County lies Pinellas County, a county less heterogeneous than the other large counties in Florida. In terms of 2012 Election Day voters, on average by precinct 81.4% were White, and on average slightly more than 9% were Black and only 4.2% were Hispanic. On average, 16% of the nearly 169,000 Election Day voters in our merged dataset who cast ballots in the nearly 300 precincts in our dataset were under the age of 30, and on average by precinct nearly 19% were over the age of 65.

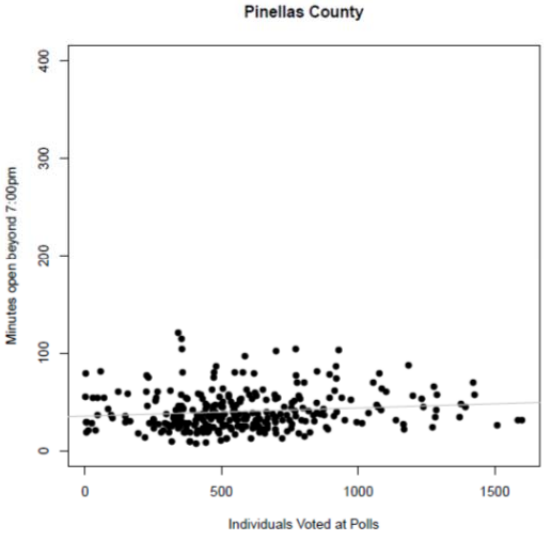
The Pinellas plots reveal very little correlation between the socio-demographic composition of Election Day voters across the county's precincts and the close of polls. The few Pinellas precincts with large concentrations of people of color did not have appreciably higher closing times than those primarily made up of White voters. However, we do find that precincts with heavy concentration of young voters had later closing times, and those with greater proportions of elderly voters had earlier closing times. The ternary plot for Pinellas confirms that the distribution of Election Day precincts that closed relatively late are not disproportionately comprised of people of color.

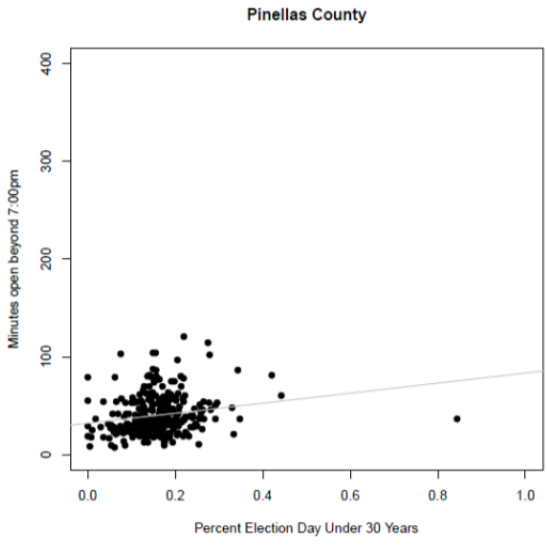
We do, however, find a slight positive relationship between the raw number of voters a precinct actually processed on Election Day and how long it stayed open after 7:00pm. But like Palm Beach County, very few of Pinellas County's precincts reported excessively late closing times.


Pinellas County
Minutes open beyond 7:00pm
0
100
200
300
400
0.0
0.2
0.4
0.6
0.8
1.0
Percent Election Day White


Pinellas County
Minutes open beyond 7:00pm
0
100
200
300
400
0.0
0.2
0.4
0.6
0.8
1.0
Percent Election Day Black


Pinellas County
Minutes open beyond 7:00pm
0
100
200
300
400
0.0
0.2
0.4
0.6
0.8
1.0
Percent Election Day Hispanic


Pinellas County
Minutes open beyond 7:00pm
0
100
200
300
400
0
500
1000
1500
Individuals Voted at Polls


Pinellas County
Minutes open beyond 7:00pm
0
100
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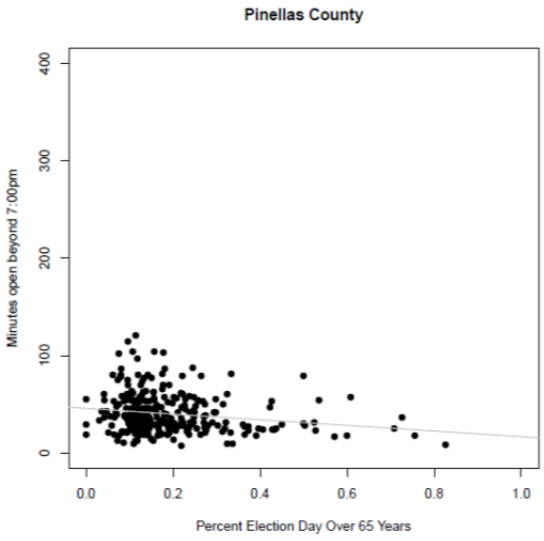
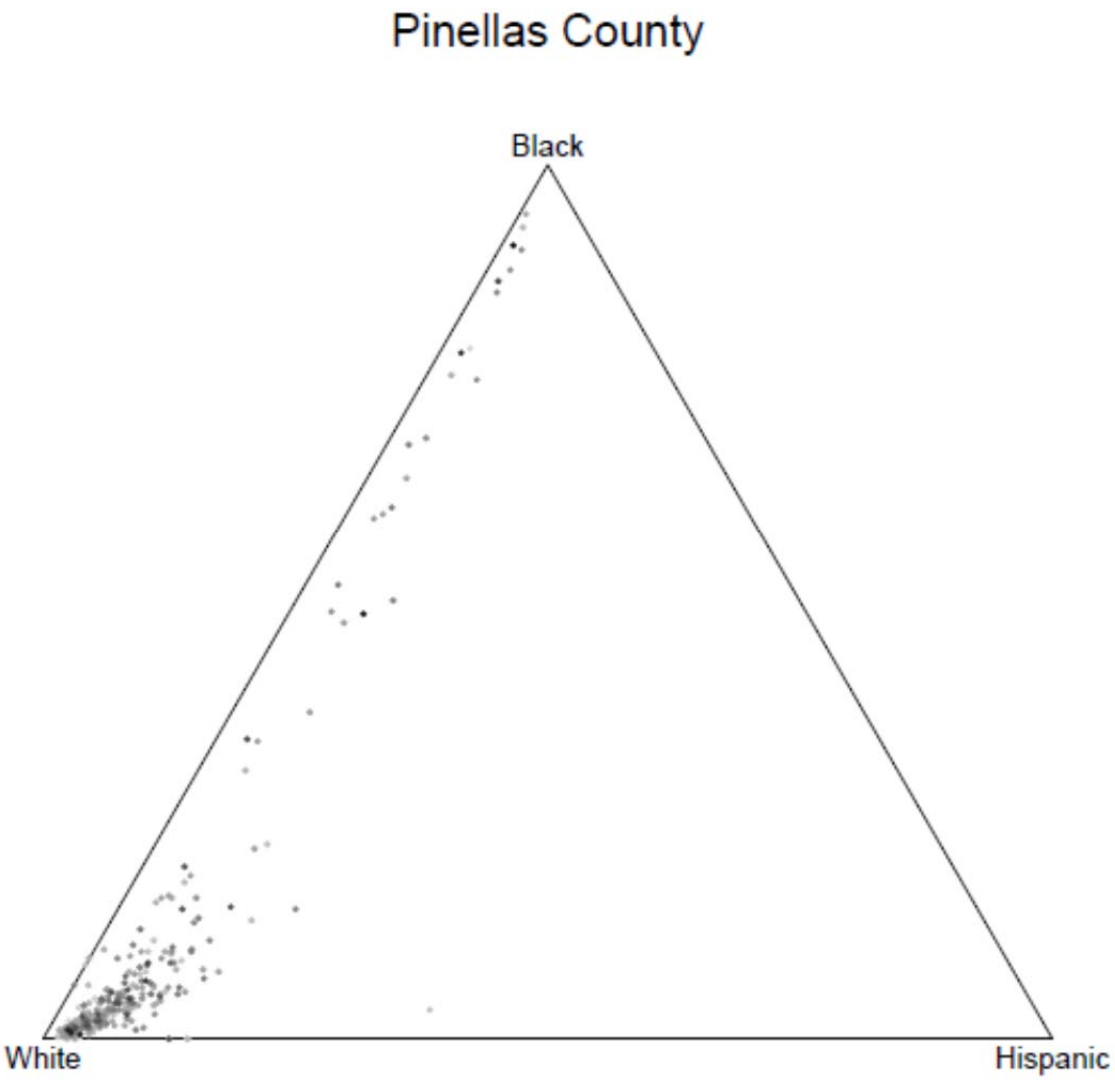
0.0
0.2
0.4
0.6
0.8
1.0
Percent Election Day Under 30 Years


Pinellas County
Minutes open beyond 7:00pm
0
100
200
300
400
0.0
0.2
0.4
0.6
0.8
1.0
Percent Election Day Over 65 Years

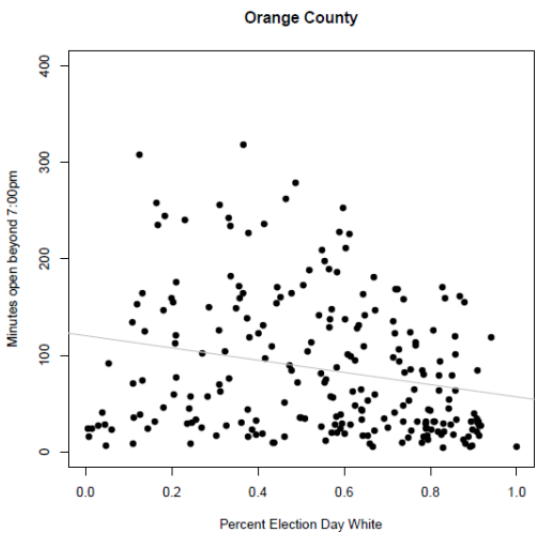

Pinellas County
Black
White
Hispanic

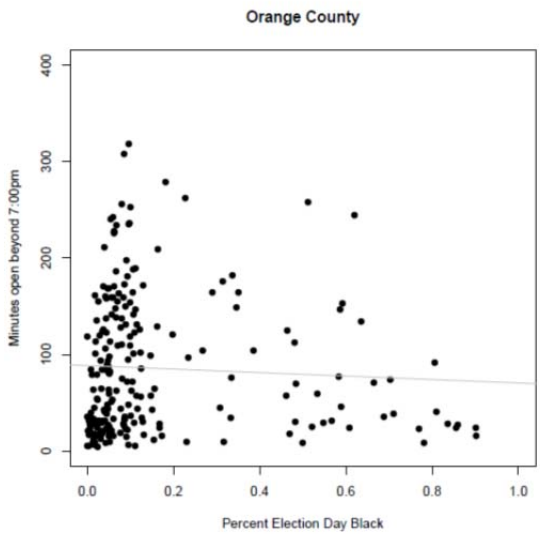
Orange County

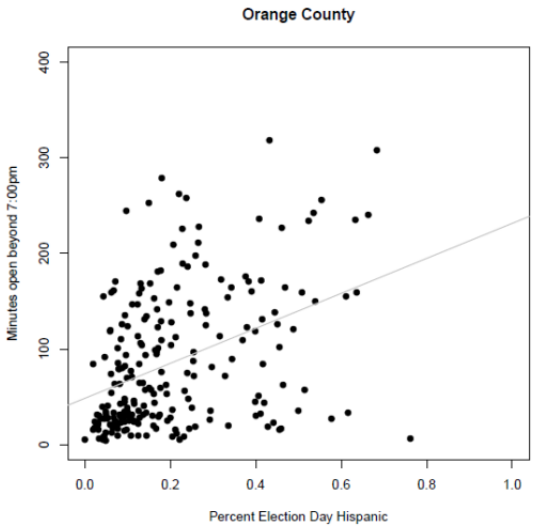
On average by precinct, roughly 28% of the more than 727,000 registered voters in our Orange County dataset turned out to vote on Election Day. Located in the central part of the state and dominated by Orlando, the county is one of the most diverse: according to our dataset, which captured the voters in 227 (or 97.4%) of Election Day precincts, on average by precinct 16.1% of those who voted on November 6, 2012 were Black and 20.3% were Hispanic; slightly less than 55% were White. Compared to some other counties, of those who turned out to vote on Election Day few of Orange's precincts were completely comprised of Blacks or Hispanics. As Table 2 makes clear, on average over its precincts the county also had a very high proportion (22.0%) of younger Election Day voters.

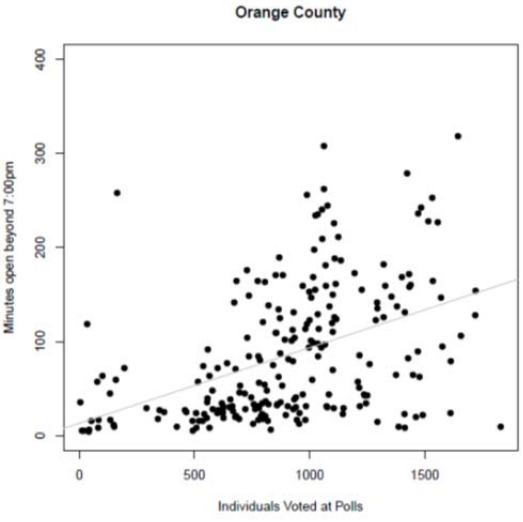
With respect to Orange County's close of polls, several precincts in the county reported very late closing times—precincts averaged 86 minutes after the 7:00pm closing time and in at least one precinct reported shutting down five hours after the close of polls. Our plots reveal that these excessive wait times were not evenly distributed across Orange County precincts. In fact, precincts with high proportions of Hispanics who turned out on Election Day had much later closing times, on average, than did those with predominantly White voters. Precincts with higher proportions of Black voters had only slightly later closing times. The ternary plot confirms this finding, as the darkest dots in the plot cluster near the Hispanic vertex (relatively so, given the low fraction of Hispanic voters across Orange County precincts in general).

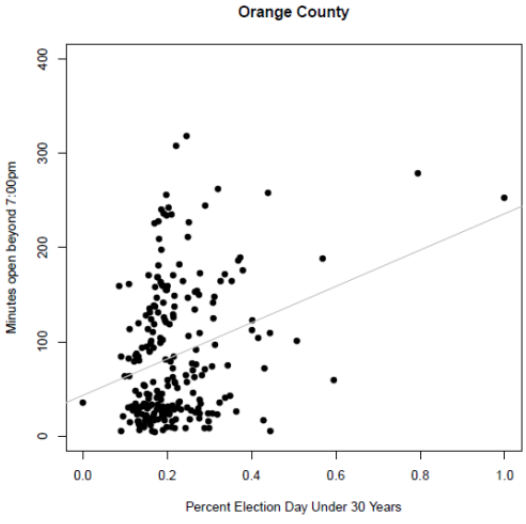
Also quite notably, Orange County precincts that processed higher raw numbers of Election Day voters and high proportions of voters under the age of 30 had later closing times, whereas closing times declined as the proportions of voters over the age of 65 increased.

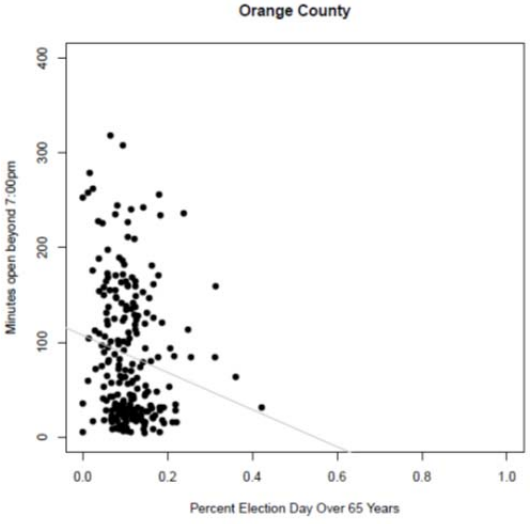

Orange County
Minutes open beyond 7:00pm
0
100
200
300
400
0.0
0.2
0.4
0.6
0.8
1.0
Percent Election Day White

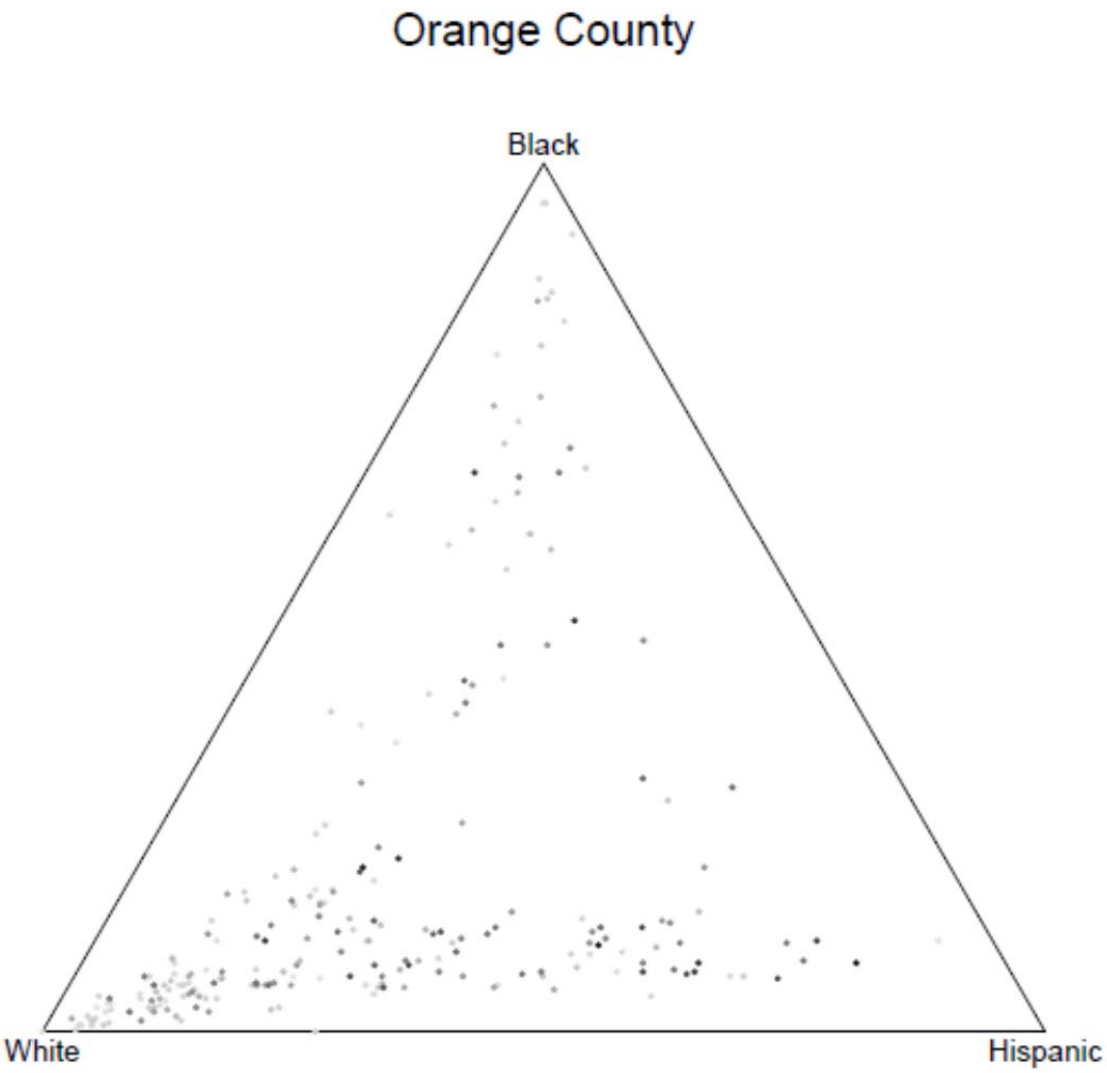

Orange County
Minutes open beyond 7:00pm
0
100
200
300
400
0.0
0.2
0.4
0.6
0.8
1.0
Percent Election Day Black


Orange County
Minutes open beyond 7:00pm
0
100
200
300
400
0.0
0.2
0.4
0.6
0.8
1.0
Percent Election Day Hispanic


Orange County
Minutes open beyond 7:00pm
0
100
200
300
400
0
500
1000
1500
Individuals Voted at Polls


Orange County
Minutes open beyond 7:00pm
0
100
200
300
400
0.0
0.2
0.4
0.6
0.8
1.0
Percent Election Day Under 30 Years


Orange County
Minutes open beyond 7:00pm
0
100
200
300
400
0.0
0.2
0.4
0.6
0.8
1.0
Percent Election Day Over 65 Years

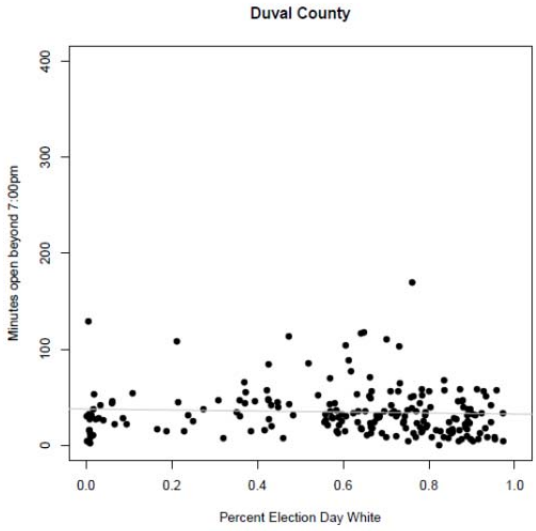

Orange County
Black
White
Hispanic

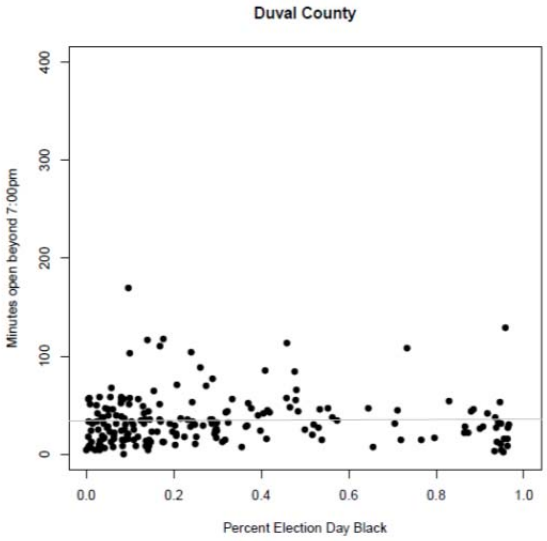
Duval County

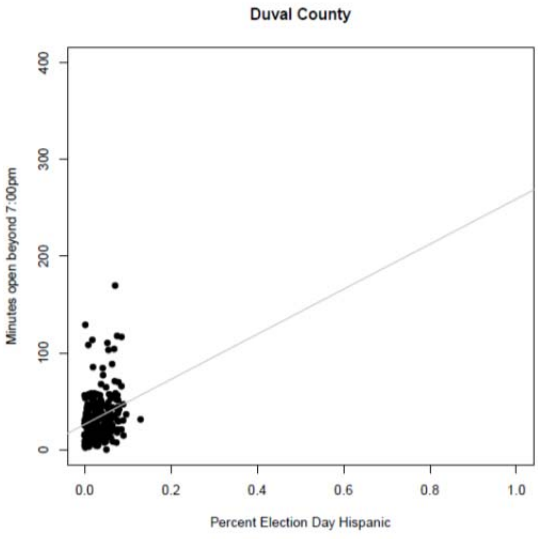
Finally, located in the northeast corner of the state, Duval County is home to Jacksonville and one of the larger concentrations of Black voters in Florida. On average and across Duval precincts, 30% of Election Day voters were Black, but only 3.6% were Hispanic; the balance (60.1%) of Election Day voters were White. The mean closing time for Duval's precincts was 7:35pm, and only a few precincts reported closing greater than two hours after the official close of polls.

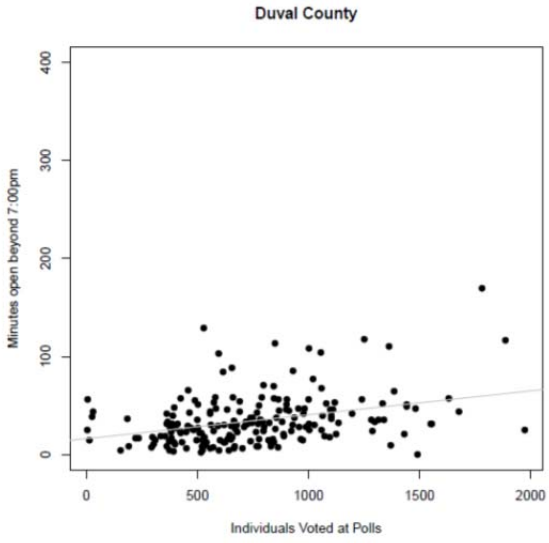
The Duval plots show that there is little correlation between a precinct's composition of either White or Black Electon Day voters and its closing time, although there is a positive relationship between the proportion of Hispanics voting in a precinct and closing time (as indicated by the superimposed tobit regression line). This is reinforced by the Duval ternary plot, which shows slightly darker dots as the dots move away from the line connecting the White and Black vertices.

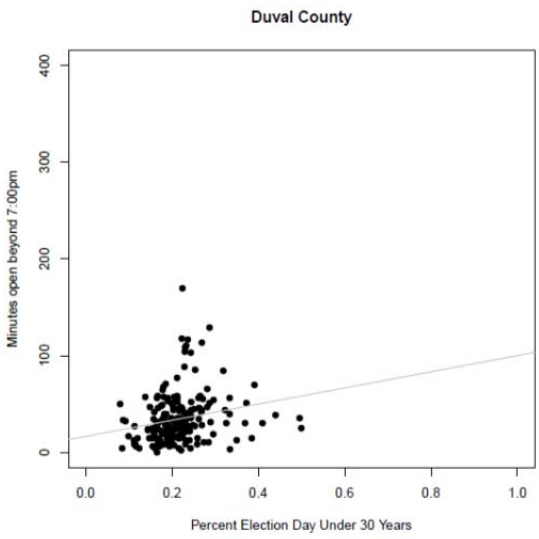
Precincts with greater raw numbers of voters and higher proportions of younger voters had closing times that were slightly later than others, especially those with a greater density of older Election Day voters.

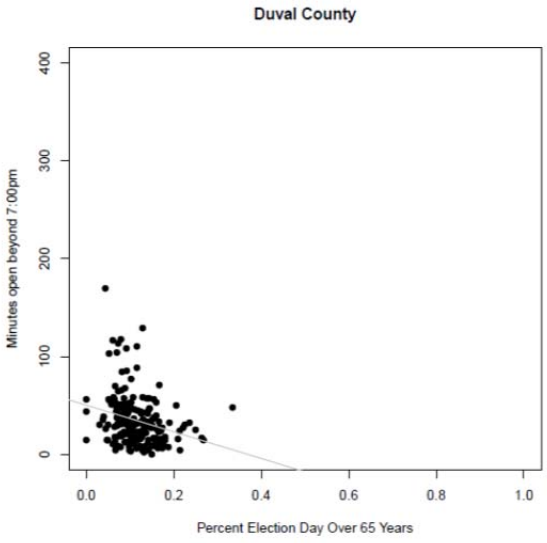

Duval County
Minutes open beyond 7:00pm
Percent Election Day White

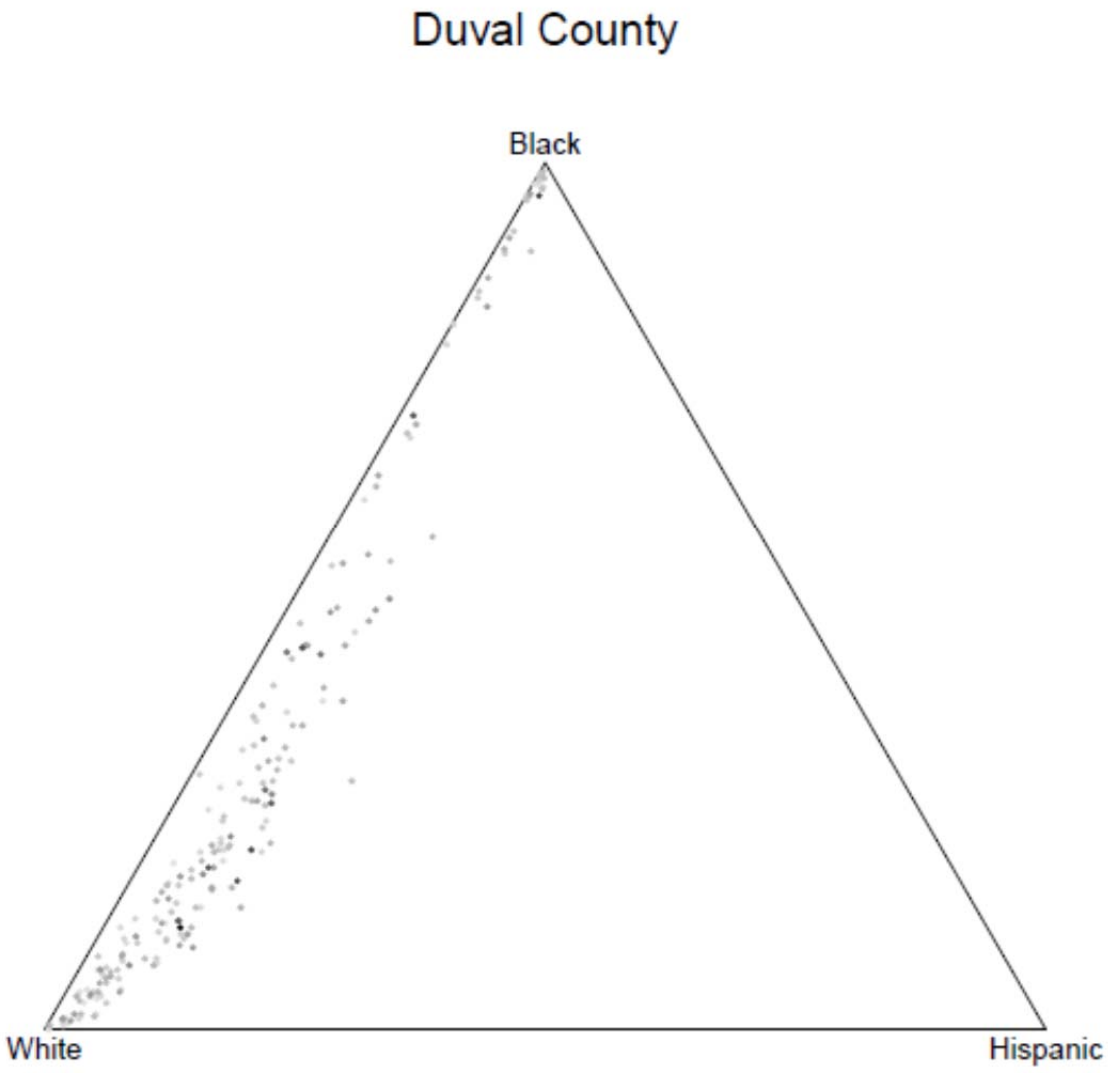

Duval County
Minutes open beyond 7:00pm
Percent Election Day Black


Duval County
Minutes open beyond 7:00pm
Percent Election Day Hispanic


Duval County
Minutes open beyond 7:00pm
Individuals Voted at Polls


Duval County
Minutes open beyond 7:00pm
Percent Election Day Under 30 Years


Duval County
Minutes open beyond 7:00pm
Percent Election Day Over 65 Years

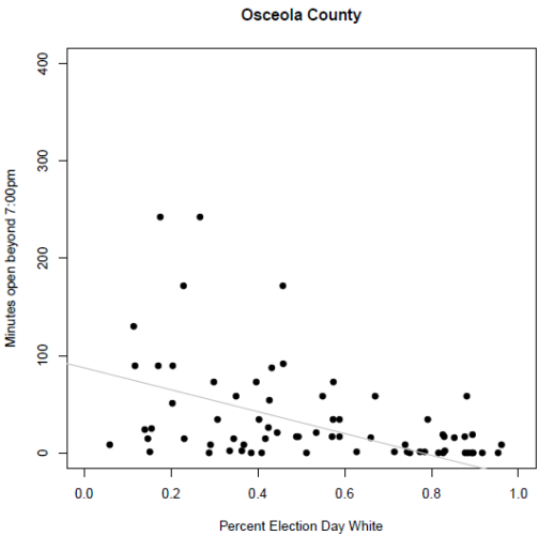

Duval County
Black
White
Hispanic

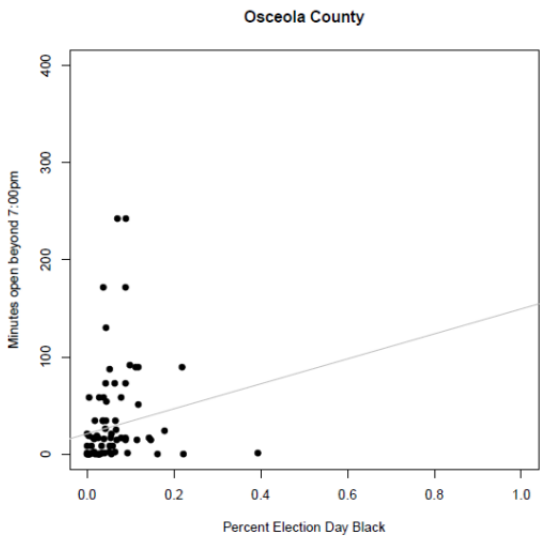
We conclude our Election Day closing time analysis by examining patterns in two medium sized counties—Osceola and Alachua—that have higher than average proportions of Hispanic and younger Election Day voters, respectively.

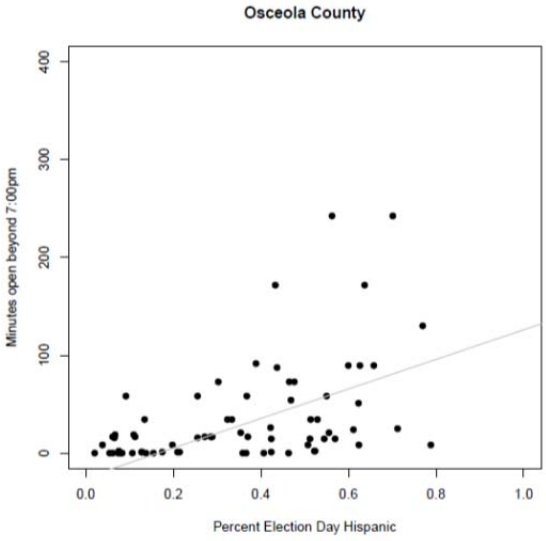
Osceola County

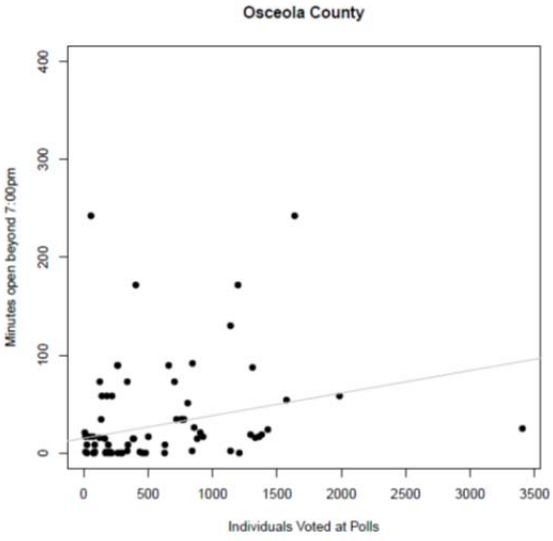
Located immediately to the south of Orange County, Osceola County is one of the faster growing and Hispanic counties in Florida. Our dataset captures closing times for all 71 of the county's Election Day precincts as well as the socio-demographic profiles of more than 41,000 voters who cast ballots that day. The average closing time in Osceola was 37 minutes past the 7:00pm close of polls, but there was considerable variance in the county; at least one precinct took more than four hours to report its results. On average and by precinct, 52.4% of Election Day voters in Osceola were Hispanic and another 6.2% were Black, with Whites comprising 35.4% of those who cast ballots on November 6, 2012.

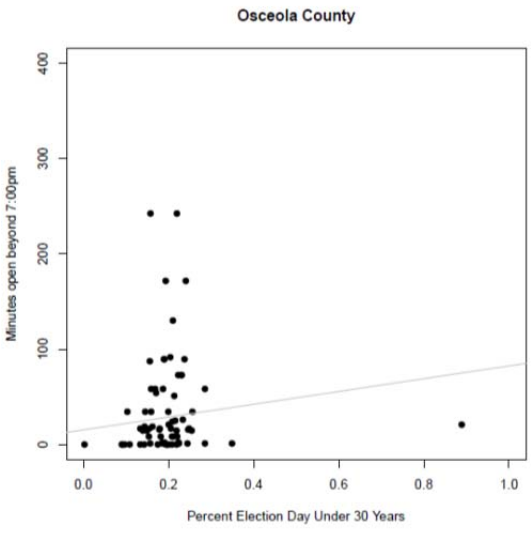
The socio-demographic plots for Osceola clearly show that precincts with higher proportions of Election Day voters of color (both Black and Hispanic) had later poll closing times, whereas those with greater proportions of Whites had earlier closing times. The ternary plot clearly shows that the precincts with the latest closing times were clustered nearest to the Hispanic vertex. This clustering, it appears, was not because these late closing precincts were processing high volumes of Election Day voters; note that the correlation between closing time and voter counts in Osceola County is fairly mild. In addition, precincts with greater shares of younger voters tended to have later closing times relative to those with Election Day voters over the age of 65.

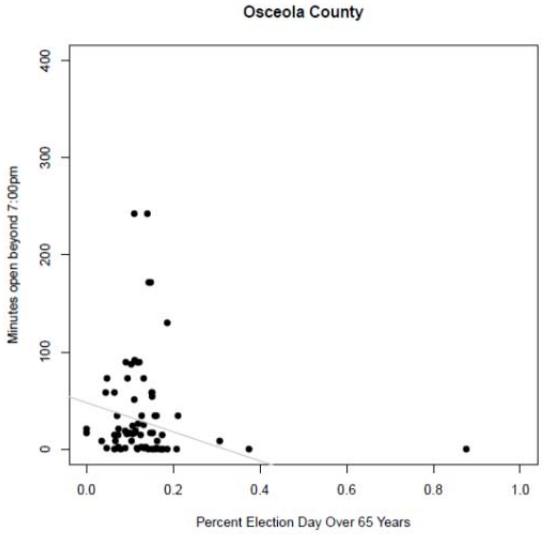

Osceola County
Minutes open beyond 7:00pm
Percent Election Day White


Osceola County
Minutes open beyond 7:00pm
Percent Election Day Black

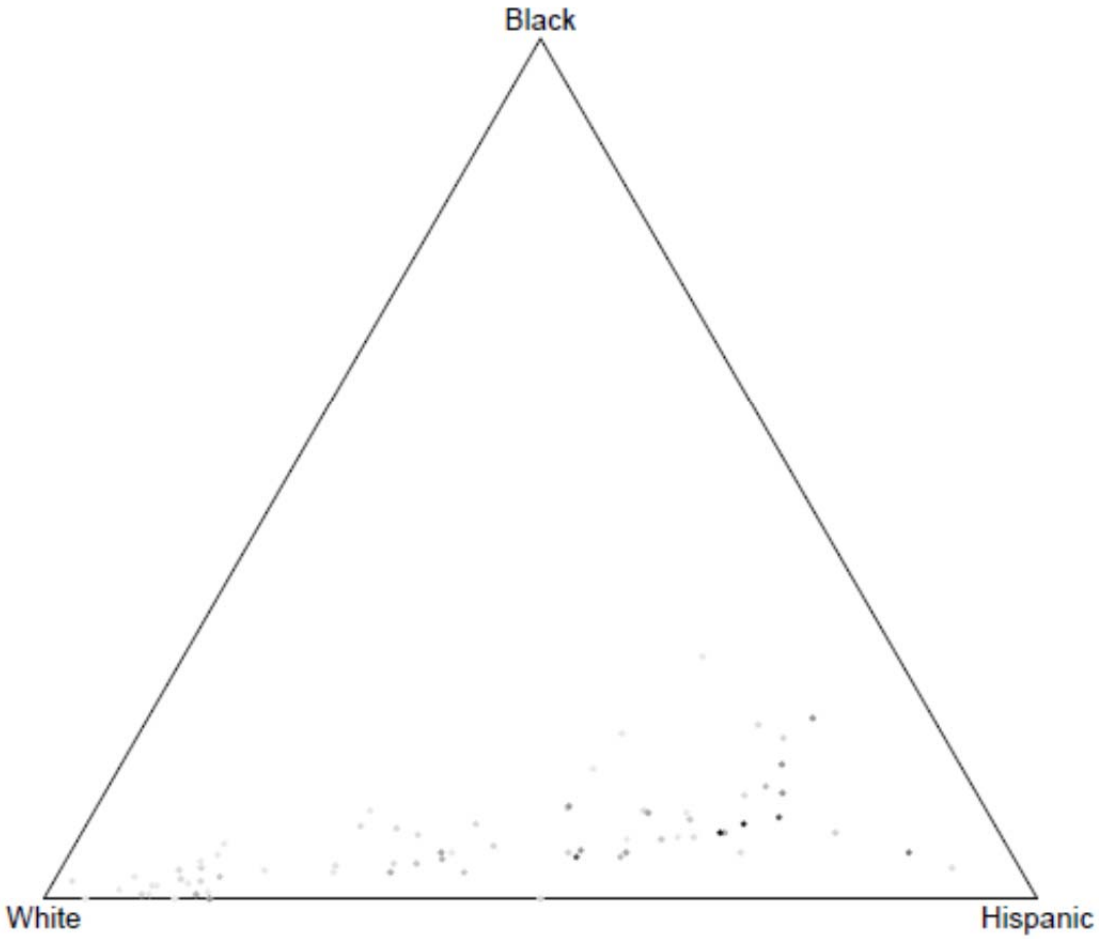

Osceola County
Minutes open beyond 7:00pm
Percent Election Day Hispanic


Osceola County
Minutes open beyond 7:00pm
Individuals Voted at Polls


Osceola County
Minutes open beyond 7:00pm
Percent Election Day Under 30 Years


Osceola County
Minutes open beyond 7:00pm
Percent Election Day Over 65 Years

Osceola County

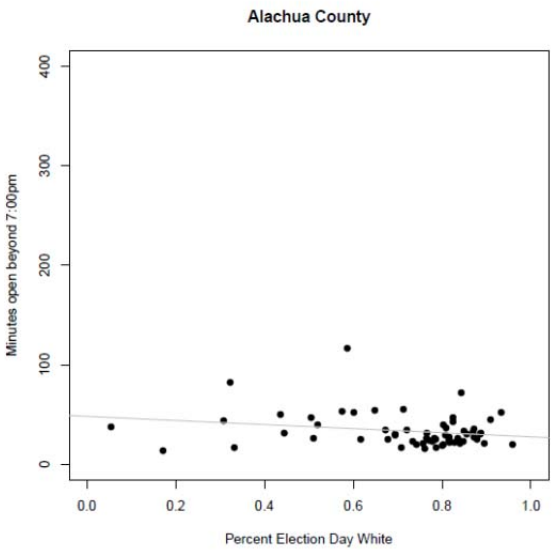


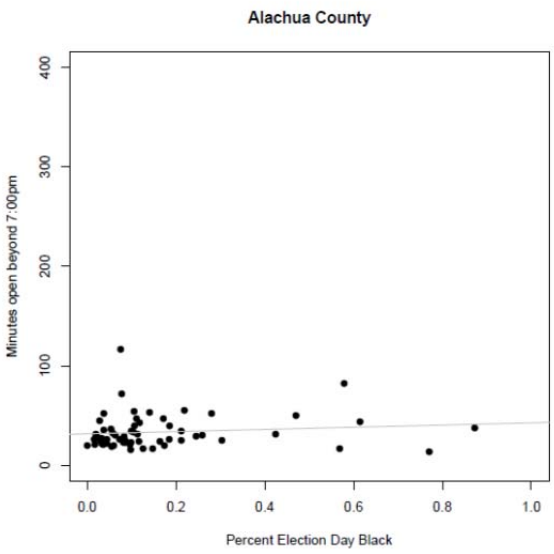
Alachua County

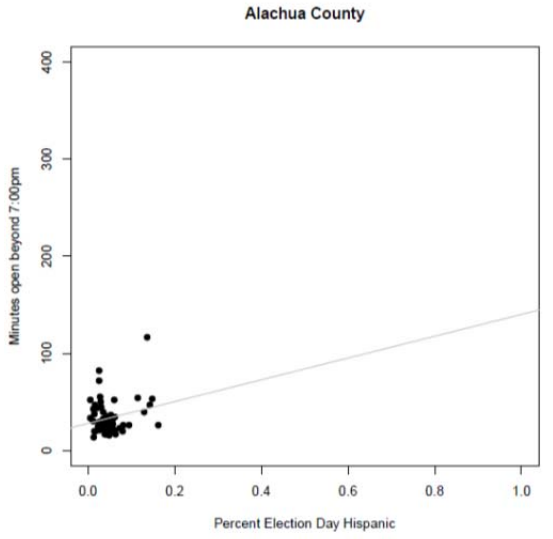
Lastly we consider precinct closing times from Alachua County, home of the University of Florida with a sizeable Black population.[48] Our dataset captures slightly less than 90 percent of the Alachua precincts used in the 2012 General Election, and across precincts it accounts for more than 52,000 Election Day voters, or slightly less than 32% of all ballots cast in Alachua County. Of Election Day voters there, on average and across precincts, nearly 72% were White, 16% were Black, and a tad less than 5% were Hispanic. As the bivariate plots show and the superimposed tobit regression lines indicate, as the proportion of a precinct's Election Day voters became more Hispanic, closing times were later. In contrast, the relationship between the density of Black and White Election Day voters and closing times were essentially flat and negative, respectively.

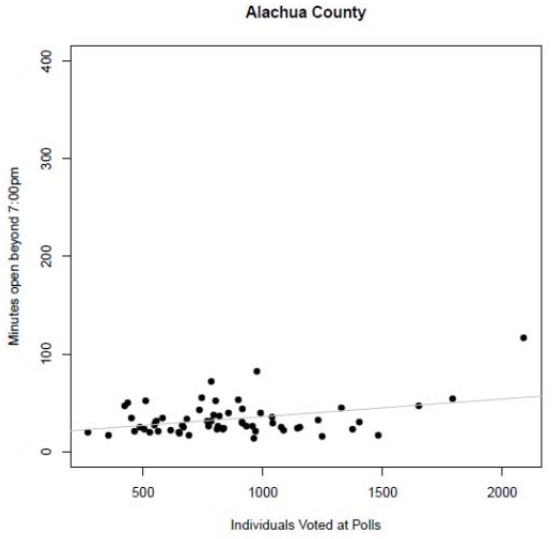
Importantly, as it is a college town, Alachua precincts with more Election Day voters turning out as well as those with greater proportions of voters under the age of 30 closed relatively late in the night, while those with greater density of voters over the age of 65 had shorter closing delays.

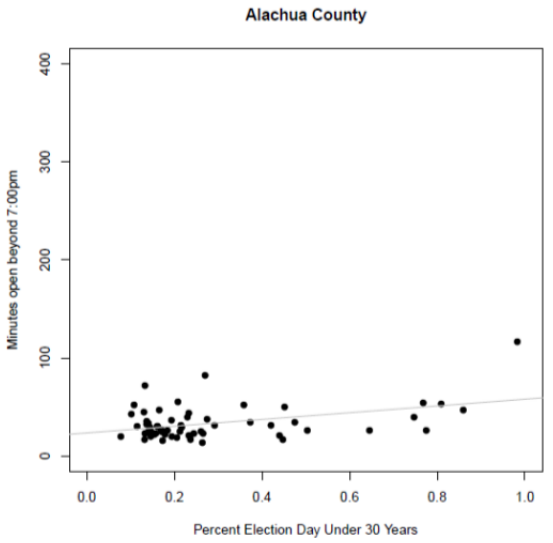
[48] We could just as easily analyzed here Leon County, home of Florida State University and the state capitol, Tallahassee; the socio-demographic / closing time plots of these two college towns are remarkably similar.

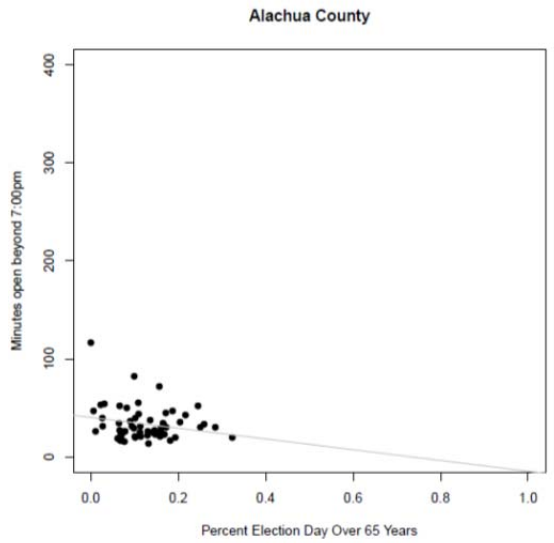

Alachua County
Minutes open beyond 7:00pm
0
100
200
300
400
0.0
0.2
0.4
0.6
0.8
1.0
Percent Election Day White

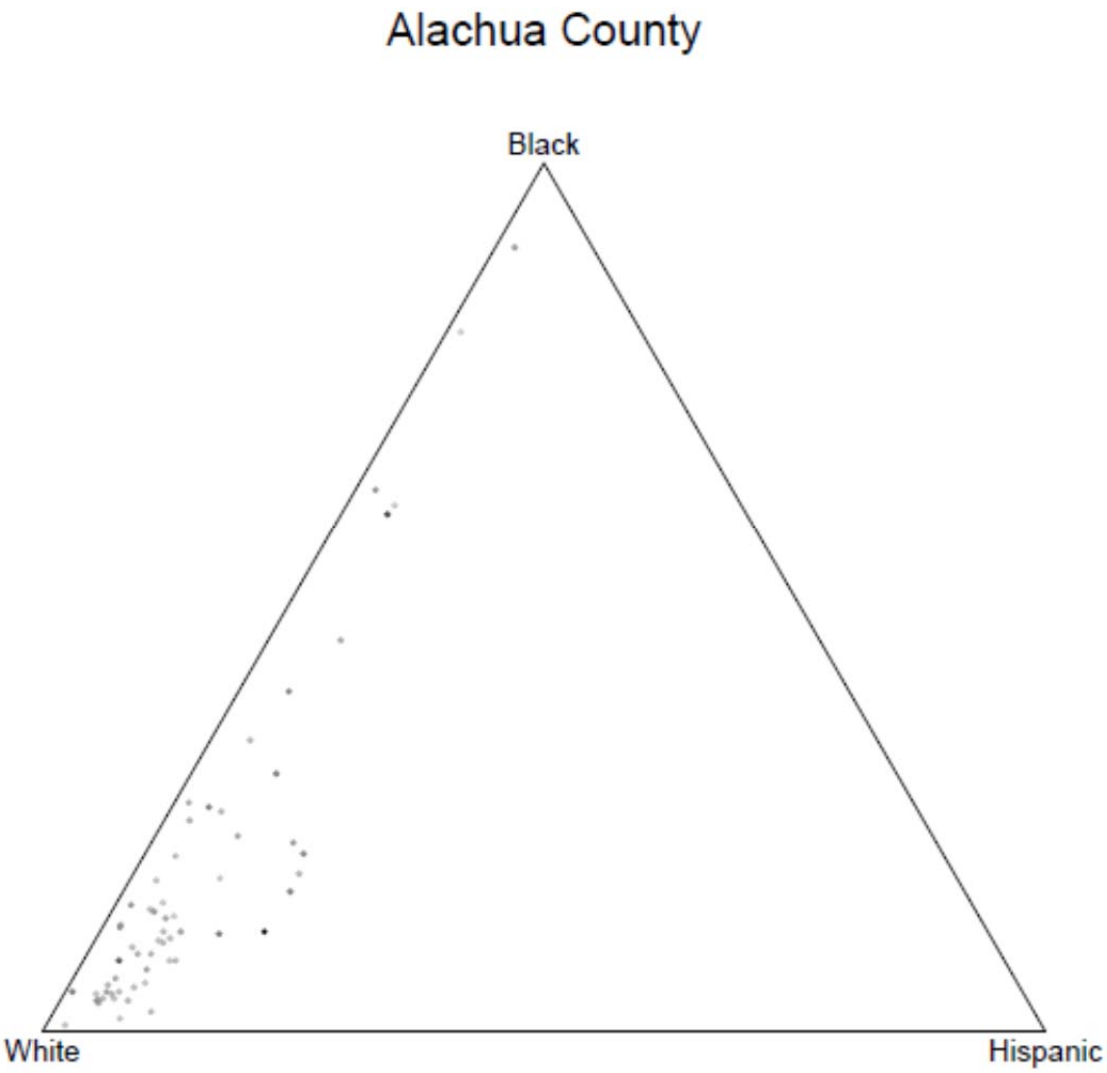

Alachua County
Minutes open beyond 7:00pm
0
100
200
300
400
0.0
0.2
0.4
0.6
0.8
1.0
Percent Election Day Black


Alachua County
Minutes open beyond 7:00pm
0
100
200
300
400
0.0
0.2
0.4
0.6
0.8
1.0
Percent Election Day Hispanic


Alachua County
Minutes open beyond 7:00pm
0
100
200
300
400
500
1000
1500
2000
Individuals Voted at Polls


Alachua County
Minutes open beyond 7:00pm
0
100
200
300
400
0.0
0.2
0.4
0.6
0.8
1.0
Percent Election Day Under 30 Years


Alachua County
Minutes open beyond 7:00pm
0
100
200
300
400
0.0
0.2
0.4
0.6
0.8
1.0
Percent Election Day Over 65 Years


Alachua County
Black
White
Hispanic

Finally, Table 3 (below) shows the total number of precincts in counties with at least 90% Black or 90% Hispanic Election Day voters, along with the average precinct closing times after 7:00pm for these heavily concentrated precincts. We find that precincts in Miami-Dade and Palm Beach with heavy concentrations of Hispanic voters had disproportionately later closing times. Of the handful of precincts with at least 90% Black Election Day voters, those in Broward, Leon, and St. Lucie Counties had average closing times that were almost twice as late as those with similar concentrations of White voters. We do find, though, that nearly homogenous White precincts in Miami-Dade, Palm Beach, and St. Lucie, had relatively late closing times, on average, too.

In sum, our detailed within-county analyses of precinct demographics and closing times across Florida's seven largest counties reveal intriguing patterns that belie some of the conventional wisdom and scholarship concerning precinct performance. Across these large counties, as well as other counties, our bivariate plots with tobit regression lines as well as associated ternary plots reveal that precincts with greater proportions of Hispanics—and in several counties, Blacks—generally had later closing times on Election Day relative to precincts with heavier concentrations of Whites.

In addition, our precinct-level analyses find considerable evidence across several large Florida counties that precincts with greater densities of younger Election Day voters had disproportionately later closing times, especially compared to those with greater proportion of older voters. Overall, then, of the counties we have analyzed here (as well as others), we find a positive correlation between the proportion of people of color, especially Hispanics, voting in precincts on Election Day and later close of polls.

Table 3: Average Election Day Precinct Closing Times for Precincts with at Least 90% Black or Hispanic Concentration, by County

County	Number of Precincts with at least 90% Black Voters	Average Number of Minutes After Polls Closed for Precincts with at least 90% Black Voters	Number of Precincts with at least 90% Hispanic Voters	Average Number of Minutes After Polls Closed for Precincts with at least 90% Hispanic Voters	Number of Precincts with at least 90% White Voters	Average Number of Minutes After Polls Closed for Precincts with at least 90% White Voters
Broward	11	21			19	11
Miami-Dade	6	24	40	88	3	60
Duval	19	28			18	27
Escambia	1	10			13	8
Leon	3	65			18	30
Martin	1	26			23	0
Orange	2	20			11	40
Palm Beach	7	57	9	88	379	81
Pinellas	2	30			111	35
St. Lucie	2	138			16	90

Early Voting and Polling Station Wait Times in Miami-Dade County

We turn now to an analysis of early voting in Miami-Dade County.[49] The early voting period during the 2012 General Election spanned eight days, and Miami-Dade had 20 early voting stations that operated during this period. Fortuitously, the county maintained a wait times website during the early voting period (Saturday, October 27 through Saturday, November 3), and this site contained data on estimated line lengths across the 20 stations at various times during each day of early voting.[50] Miami-Dade had some of the longest early voting lines in the country, and it was on

[49] In addition to the eight days of early voting, Miami-Dade Supervisor of Elections Penelope Townsley office (and then closed, and then opened) her office on Sunday, November 4, to allow voters to drop off in-person absentee ballots. See Jane Campbell, "Miami-Dade Elections Temporarily Closes Doors on Early Voters Sunday," *The Huffington Post*, November 4, 2012, at http://www.huffingtonpost.com/2012/11/04/miami-dade-elections-chaos_n_2073433.html.

[50] The Miami-Dade Supervisor of Election posted real-time wait times at the county's 20 early voting polling centers used in the 2012 General Election here: http://www.miamidade.gov/elections/wait-times.asp.

the first day of early voting, at the North Miami Public Library early voting station, that Ms. Desiline Victor experienced her extended wait.[51] Polling station line lengths—or what are best thought of as wait times—are snapshots of the early voting period, and for a given early voting day, Miami-Dade County sampled each of its early voting station at a set of times. The particular times varied across early voting days, but on each day each early voting station was sampled by the Supervisor of Elections simultaneously.

The 20 early voting stations in Miami-Dade County were supposed to open at 7:00am and close at 7:00pm on each day; each station was thus intended to be open for a total of 96 hours, the maximum permitted by state law. In light of this, we calculated the last (in general taken close to 6:30pm) sampled line length at each station on each day. Because there were 20 stations and eight days of early voting, this gives us 160 total last wait times. Each time refers to one early voting station on one day. We then do the same thing for the first sampled wait time taken by the Supervisor of Elections at each early voting station on each early voting day; these samples were taken around 7:00am, around the time the polls opened, but in some cases a bit before this time. There are 160 first sampled wait times in our dataset (one per day for each of 20 early voting stations) just as there are 160 last sampled wait times.

Having calculated 320 wait times (160 first sampled times and 160 last sampled times) we then turn to the set of early voting files that the Florida Department of State made available on its website during the course of the 2012 General Election. These files contain lists of early voting individuals across Florida, and in particular the lists specify the place and date on which each early voter cast a ballot. We restrict attention here to Miami-Dade early voters because we do not have comprehensive early voting wait time data beyond this county. We merged the early voting files

[51] Erika Bolstad and Nadege Green, "First Lady invites 102-year-old North Miami woman to State of Union speech," The Miami Herald, February 12, 2013, at http://www.miamiherald.com/2013/02/11/3229065/first-lady-michelle-obama-invites.html.

with our hybrid voter file, and this allowed us to calculate the Black, Hispanic, and White composition of each of Miami-Dade's 20 early voting stations by day.[52]

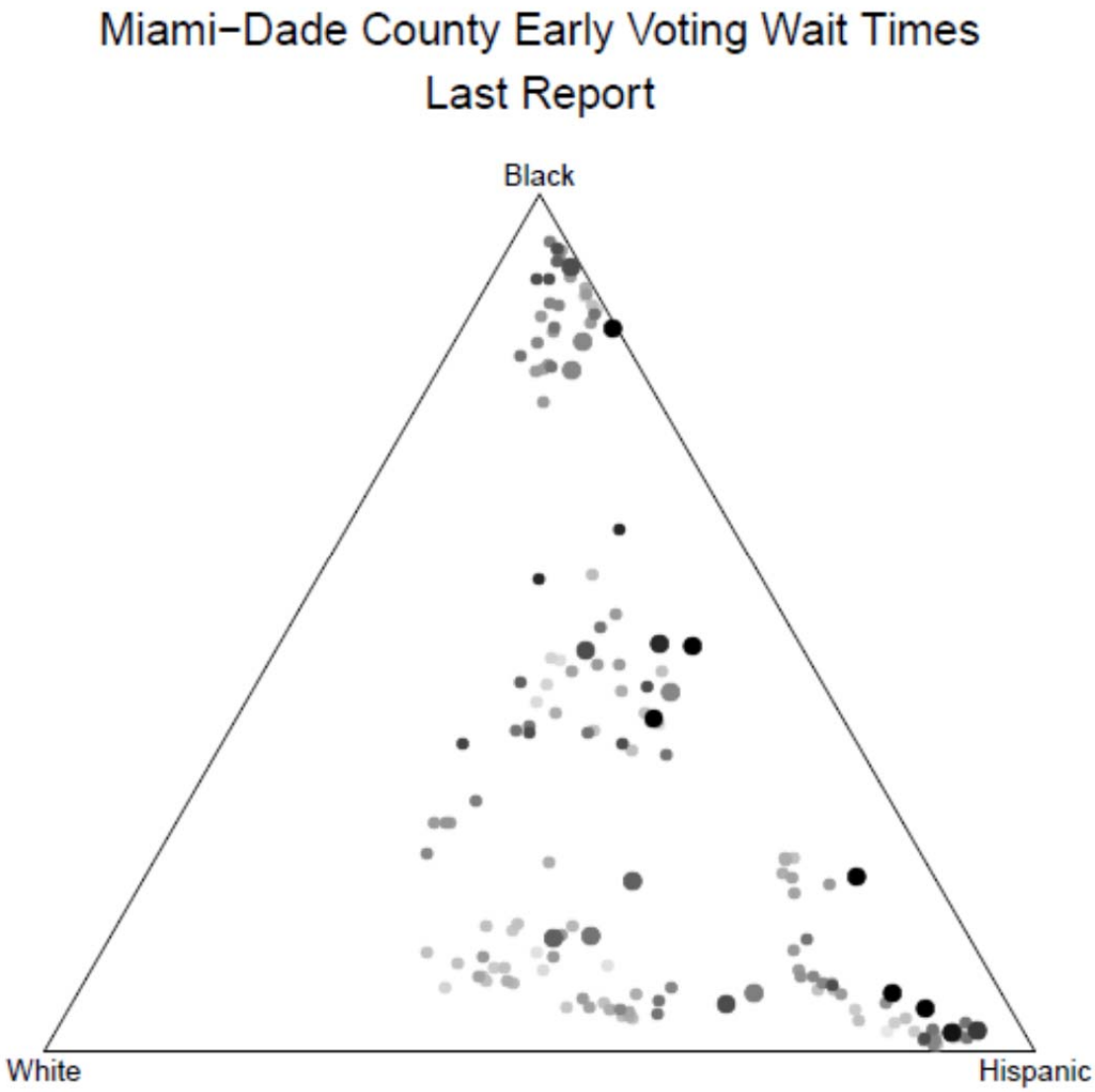
Consider for example the Miami-Dade early voting station at the North Miami Public Library, where Ms. Victor voted in the evening after she returned after waiting for three hours earlier in the day. For this location and for the first day of early voting, we calculated the fraction of the early voting pool that was African-American. In all, we calculated this fraction 160 times, once for each early voting station per day. We similarly calculated fraction Hispanic and fraction White for each day of early voting at each early voting station, and this exercise gives us 160 ordered triplets that describe the racial/ethnic composition of each day's early voting electorate at each of Miami-Dade's 20 early voting stations.

The 160 racial/ethnic triplets are summarized in the ternary plot below. Each grayscale dot in the plot refers to an early voting station-early voting day pair, and the location of each dot in the triangle indicates an associated racial/ethnic composition. The larger grayscale dots in the figure are those from the last day of early voting (there are 20 such dots, one for each of the early voting stations), and the coloring of each dot is proportional to the last recorded wait time at a given station. As before, darker dots indicate longer last-recorded wait times.

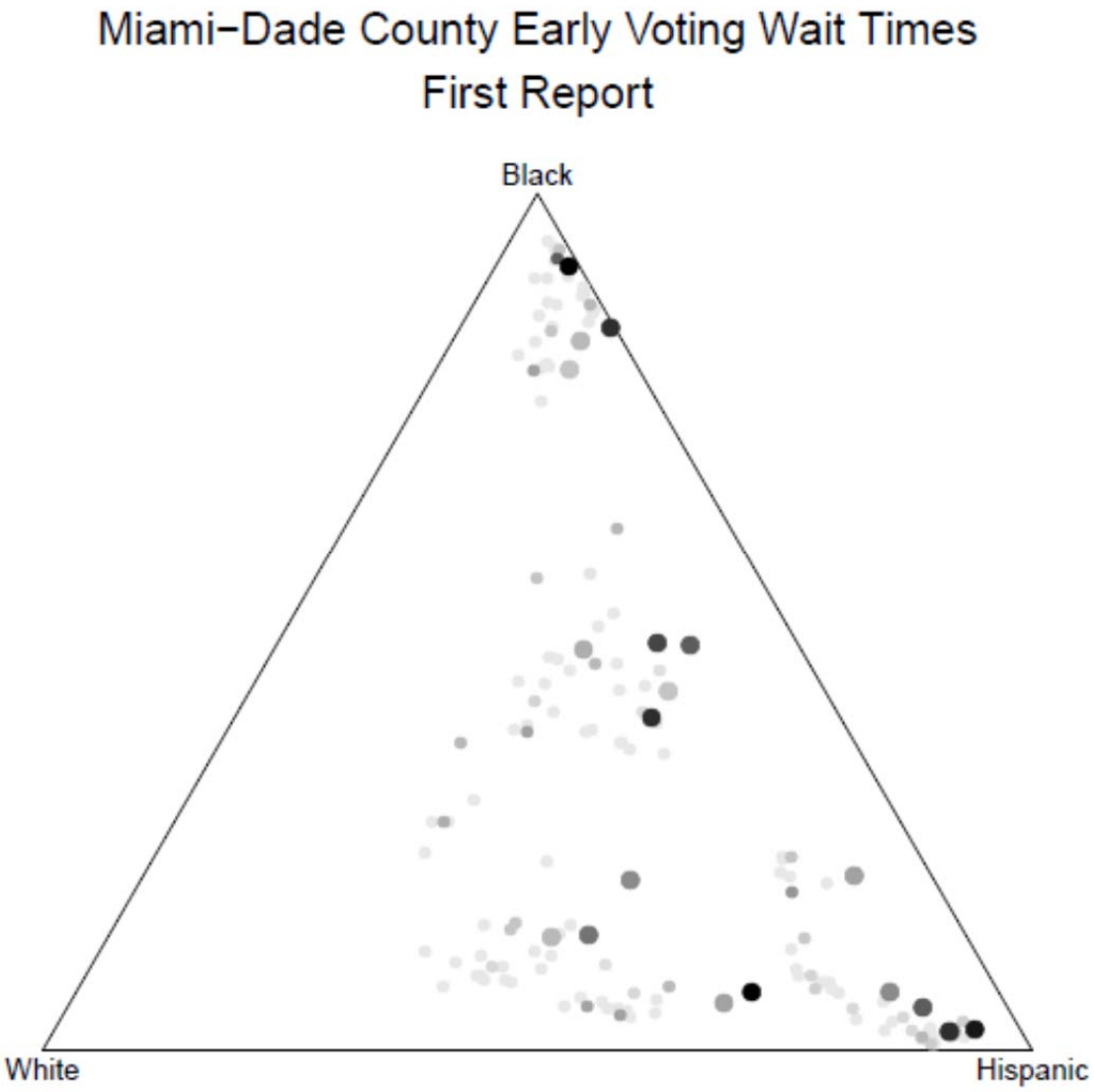
As one can see, there were some heavily African-American station-days pairs (close to the "Black" vertex in the triangle) and some heavily Hispanic pairs. There were no early voting station-day pairs that were heavily White. Moreover, the dots relatively close to the White vertex are for the most part relatively lightly colored. This implies that early voting station-days pairs that were the most heavily White had relatively short last-recorded wait times. In contrast, there are some very dark dots closed to both the Black vertex and the Hispanic vertex; there is also a cluster of a few

[52] These compositions are based on all voters from the early voting file whose records we could locate in our hybrid voting file.

dark dots between these two vertices. We cannot determine when during a given day a particular early voter voted, but the dark dots indicate that early voting station-day pairs that had relatively long last-recorded wait times tended to be heavily Hispanic, heavily African-American, or approximately split between these two groups. The darkest colored dots are for the most part large, showing that longest last-recorded wait times for early voting occurred on the last day of voting.



We repeat our ternary plot analysis with the supervisor's first-recorded wait times, depicted below. Dot colors cannot be compared across figures as they are all relative. Nonetheless, we see similar patterns to the last-recorded wait times. That is, early voting station-day pairs with the highest proportion of White voters on that given day had relatively short first-recorded wait times, and the darkest dots in the figure—connoting the station-day pairs with the longest wait times—are either close to non-White vertices or distributed between Black and Hispanic vertices.



Insofar as Black Floridians disproportionately use early voting in the state,[53] we suspect the patterns we see for Miami-Dade are not unique to this county. We cannot confirm this here, however, because we do not have early voting wait time data beyond that from Miami-Dade. We note that the proportion of early voters in Miami-Dade, Palm Beach, Broward, Hillsborough, Pinellas, Orange, and Duval who were Black all exceeded 25 percent in the 2012 General Election, even though Blacks only made up slightly less than 14% of registered voters statewide. It is certainly plausible that the reduction in early voting days in Florida in 2012 exacerbated the wait times for people of color in Miami Dade County and elsewhere.

Conclusion

In this study we have considered the correlates of precinct closing and wait times in Florida during the course of the 2012 General Election. We have merged precinct-level data from 41 county Supervisors of Elections with individual-level voter records from two official Florida statewide voter files, and this exercise has allowed us to consider the extent to which precinct socio-demographic profile is correlated with closing or wait time. In part, our study lends support to those who argue that the problem of long lines at the polls has to do with where people live, but we find considerable evidence that closing times on Election Day and early voting wait times in Miami-Dade County were disproportionately long found in precincts with greater proportions of Hispanic and Black voters, as well as younger voters. Across more densely urban counties—both large and medium-sized—we find late precinct closing times on Election Day to be concentrated in heavily Hispanic precincts, and we find early precinct closing times associated with predominantly White voters. We do not, of course, know why this disparity exists, and we emphasize that we do not have data on the time of day when individuals voted. Nonetheless, it is clear from our analysis that Election Day precincts with greater densities of people of color had disproportionately later closing

[53] See Herron and Smith (2012).

times, and that during the early voting period in Miami-Dade County, people of color generally faced the longest wait times each day in both the morning and the evening.

Our precinct-level study, which covers more than 90% of Florida's 12.6 million registered voters and more than 92% of the 3.7 million who voted on Election Day and practically all of the voters who cast ballots during the eight days of early voting in Miami-Dade County, shows the importance of disaggregating Election Day and early voting when studying wait times, or more broadly, congestion at the polls. Indeed, conflating wait times for Election Day and early voters may produce misleading results because these two types of voting involve different procedures, in Florida at least, and they engage different types of voters.[54] Our analysis of early voting in Miami-Dade should raise suspicions that the shortening of early voting days that the state of Florida implemented in 2011 may have had an impact on wait times in polling stations that had greater densities of people of color trying to exercise their right to vote.

Because our study examines actual precinct-level closing times (and in the case of Miami-Dade County, wait times) *within* counties, it should help to clarify the question of whether congestion at the polls is more a function of geography or of race. Our Election Day voting analysis finds considerable variation in the time polls closed across socio-demographically diverse precincts *within* counties, suggesting that longer lines are not primarily caused by being located in large, dense, mostly urban areas or electoral jurisdictions. Our study thus suggests we should not minimize

[54] See Herron and Smith (2012). Stewart (2013), for example, stresses the different early voting and Election Day administrative procedures (page 8), and reports longer average wait times for those who voted early using national survey data (page 4)—although he finds that in "ZIP codes comprising the least dense neighborhoods…wait times between Election Day and early voters are equivalent" and that in "more densely populated areas…early voting wait times are roughly 50% longer than those encountered on Election Day in equivalent communities (page 18). But because his smallest unit of analysis is the ZIP code, his study is unable to assess the possibility of differential wait times across precincts *within* a ZIP code or an election administration jurisdiction. In addition, his critical finding that "Florida's voters waited the longest to vote in 2012, nearly 40 minutes on average" (page 4), does not differentiate between early voters and those who voted on Election Day.

considerations of racial, ethnic, or age *within* electoral administration jurisdictions when trying to understand differential wait times.[55]

Finally, our precinct-level, within-county comparisons of the durations precincts remained open after 7:00pm, or of the wait times during early voting in Miami-Dade County, should put to rest the claim that the long lines in Florida in November, 2012, were caused by the length of the General Election ballot.[56] Though ballot designs and ballot length varied across Florida's 67 counties, our precinct-level analysis reveals differential closing times across precincts *within* counties and across early voting centers in Miami-Dade County.

To conclude, it is certainly a strong possibility that even minor changes to a state's election code might marginally affect the participation calculus ("Should I leave the queue?" "Should I vote or stay home?") of some voters more than others, especially if those changes lead to increases in poll congestion. Since at least the 1960s, scholars have found low rates of voter turnout associated with younger voters as well as Blacks and Hispanics;[57] this raises serious representation issues about these citizens.[58] More recently, however, scholars have identified various types of institutional reforms, such as on-line and Election Day voter registration, no-excuse absentee voting, greater polling place access, and expanded hours of early voting that may mitigate nonvoting of these traditionally low

[55] See Stewart (2013), page 4.

[56] See Theodore T. Allen, "Delving into the reasons for long lines can bring solutions," *The Orlando Sentinel*, January 8, 2013, at http://articles.orlandosentinel.com/2013-01-08/news/os-ed-long-lines-voting-florida-010813-20130107_1_long-lines-ballot-length-turnout.

[57] E.E. Schattschneider. *The Semisovereign People* (New York: Holt, Rinehart, and Winston, 1960); Raymond E. Wolfinger and Steven J. Rosenstone, *Who Votes?* (New Haven: Yale University Press, 1980); Steven J. Rosenstone, *Mobilization, Participation, and Democracy in America* (New York: Longman,1993); Sidney Verba, Kay Lehman Schlozman and Henry Brady, *Voice and Equality: Civic Voluntarism in American Politics* (Cambridge, MA: Harvard University Press, 1960).

[58] Martin Gilens, "Inequality and Democratic Responsiveness," 69 *Public Opinion Quarterly* 5:778-96; Peter K. Enns and Chistopher Wlezien, eds., *Who Gets Represented?* (New York: Russell Sage Foundation Press, 2011).

propensity voters.[59] We encourage state and local election administrators to pursue these reforms that will alleviate congestion at the polls, especially for people of color and youth in Florida and elsewhere.

[59] For a summary, see Advancement Project, "Advancement Project Public Comment Submitted to the Presidential Commission on Election Administration for its public meeting in Miami, Florida," June 28, 2013.

About the Authors

Michael C. Herron is Professor of Government at Dartmouth College. He taught previously at Northwestern University and has visited at the Hertie School of Governance, Harvard University, and the University of Rochester. Herron's research focuses on election problems and representation, and much of his recent work revolves around Florida. At Dartmouth College Herron teaches classes on statistics, game theory, and American politics.

Daniel A. Smith is Professor of Political Science at the University of Florida. A former Fulbright Scholar and Director of the Political Campaigning Program at UF, his research examines the effect of political institutions on political behavior in the American states. Smith, who teaches graduate courses on state politics, political parties, and electoral politics, is the author of dozens of academic articles and several books, including, *State and Local Politics: Institutions and Reform*.

Appendix A: "Congestion" Proxy Data, Source of Data, and Date Data Received, by County

County	"Congestion" Proxy	Source	Date Received
Alachua	Upload to SOE of Minutes past 7:00PM	Orlando Sentinel	9-May-13
Baker	"We did not have long lines at our Precinct on Election Day"	SOE email	21-May-13
Bradford	"tabulator shut-down times recorded on the results tapes"	SOE email	22-May-13
Brevard	Upload to SOE of Minutes past 7:00PM	Orlando Sentinel	9-May-13
Broward	Upload to SOE of Minutes past 7:00PM	Orlando Sentinel	9-May-13
Charlotte	"no reports of any location staying open beyond 7:00pm"	SOE email	24-May-13
Citrus	"we did not have any precincts open beyond 7:00pm election night"	SOE email	21-May-13
Clay	"last voter check in time on EViD"	SOE email	31-May-13
Collier	Upload to SOE of Minutes past 7:00PM	Orlando Sentinel	9-May-13
Duval	Upload to SOE of Minutes past 7:00PM	Orlando Sentinel	9-May-13
Escambia	Upload to SOE of Minutes past 7:00PM	Orlando Sentinel	9-May-13
Franklin	"all of our polls closed exactly at 7pm"	SOE email	22-May-13
Hamilton	last vote tabulated by each M100 optical scan machine	SOE email	6-Jun-13
Hillsborough	Upload to SOE of Minutes past 7:00PM	Orlando Sentinel	9-May-13
Holmes	"last voter check in time on EViD"	SOE email	31-May-13
Indian River	"time indicated on the optical scan voting machines tapes when the polls were closed"	SOE email	21-May-13
Jackson	"Tabulator closed at…"	SOE email	21-May-13
Lafayette	"All precincts concluded election day at 7pm - there were no votes cast after that time"	SOE email	28-May-13
Lake	Upload to SOE of Minutes past 7:00PM	Orlando Sentinel	9-May-13
Lee	Upload to SOE of Minutes past 7:00PM	Orlando Sentinel	9-May-13
Leon	Upload to SOE of Minutes past 7:00PM	Orlando Sentinel	9-May-13
Manatee	Upload to SOE of Minutes past 7:00PM	Orlando Sentinel	9-May-13
Marion	Upload to SOE of Minutes past 7:00PM	Orlando Sentinel	9-May-13
Martin	"All precincts closed within minutes after 7 p.m."	SOE email	21-May-13
Miami-Dade	Upload to SOE of Minutes past 7:00PM	Orlando Sentinel	9-May-13
Nassau	"Last EViD Checkin By Polling Placel"	SOE email	7-Jun-13
Okeechobee	"all precincts were closed within minutes after 7 p.m."	SOE email	22-May-13
Orange	Upload to SOE of Minutes past 7:00PM	Orlando Sentinel	9-May-13
Osceola	"Last EVid Checkin By Polling Place"	SOE email	4-Jun-13
Palm Beach	"Time cartridge dropped off at collection center"	SOE email	10-May-13
Pasco	Upload to SOE of Minutes past 7:00PM	Orlando Sentinel	9-May-13
Pinellas	Upload to SOE of Minutes past 7:00PM	Orlando Sentinel	9-May-13
Polk	"time that final results were tallied at each precinct"	SOE email	11-Jun-13
Sarasota	Upload to SOE of Minutes past 7:00PM	Orlando Sentinel	9-May-13
Seminole	Upload to SOE of Minutes past 7:00PM	Orlando Sentinel	9-May-13
St. Johns	Upload to SOE of Minutes past 7:00PM	Orlando Sentinel	9-May-13
St. Lucie	Upload to SOE of Minutes past 7:00PM	Orlando Sentinel	9-May-13
Sumter	"Time DS200 Results Tape Printed"	SOE email	22-May-13
Taylor	"All precincts opened at 7:00am and all precincts closed at 7:00pm."	SOE email	21-May-13
Union	"All voters had voted by 7:00 pm"	SOE email	21-May-13
Volusia	Upload to SOE of Minutes past 7:00PM	Orlando Sentinel	9-May-13
Wakulla	"All precincts reported no voters after 7pm."	SOE email	22-May-03

Appendix B: Analysis of Alternative Optical Scan Shut Down Data, Hillsborough County

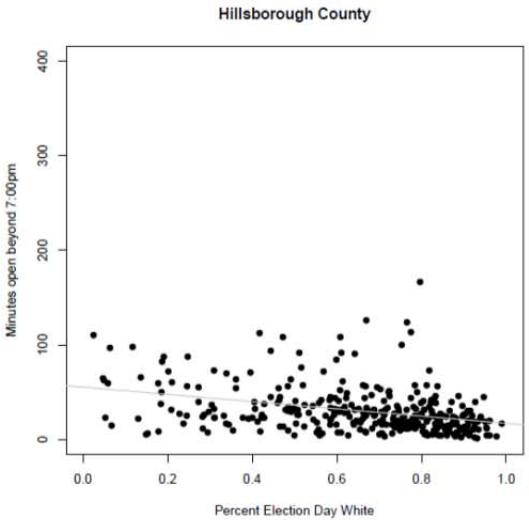
In July 2013, following the initial launch of this report, Hillsborough County provided us with alternative closing time data—specifically the minutes after 7:00pm when the optical scan machine(s) shut down in each precinct. Table 1 reports the summary statistics of the alternative optical scan shut down times, with an average of 30.2 minutes, a minimum of 1 minute, and a maximum of 167 minutes.

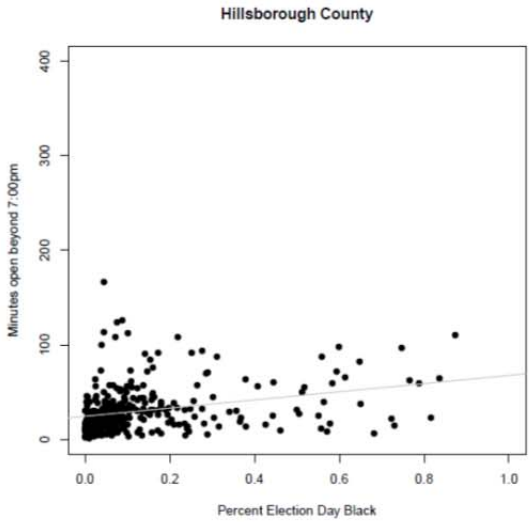
Although the average number of minutes after the polls closed was reduced by more than half using this alternative measure of closing times, the resulting plots of Election Day voters across the county's 350 precincts show the same of correlations between heavily Black, Hispanic, and White precincts and the times when their optical scan machines were shut down. As a precinct's composition of Black or Hispanic voters increased, the elapsed time after the 7:00pm close of polls until that precinct's optical scan machine(s) shut down also increased. Note that the superimposed tobit regression lines in both the Black and Hispanic plots below have positive slopes. In sharp contrast, precincts comprised disproportionately of White voters had optical scan machines shut down times closer to 7:00pm. The Hillsborough ternary plot reinforces these findings insofar as dark dots are not clustered around the White vertex in the plot. In addition, Hillsborough precincts with more registered voters who cast ballots on Election Day had slightly later optical scan shut down times than those with fewer voters. However, we find that those with greater proportions of younger voters had later shut down times, and those with greater proportions of older voters had shorter shut down times.

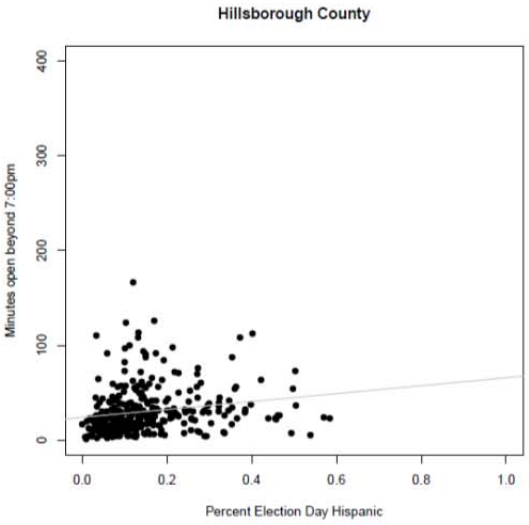
Table 1: Hillsborough County, Election Day Precincts and Optical Scan Shut Down Times

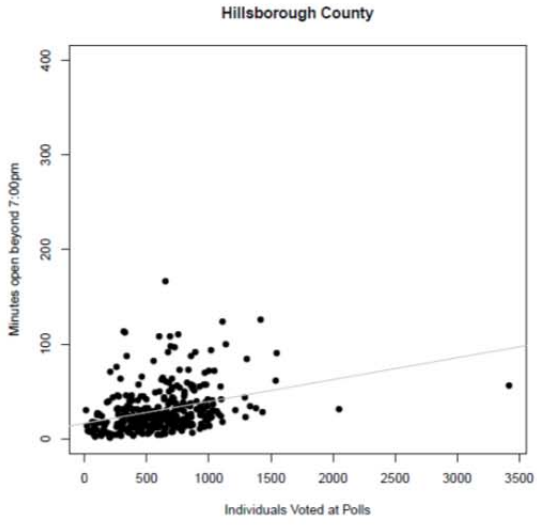
County	Number of Merged Precincts	Percent of Precincts Covered	Minimum Number of Minutes After Polls Closed	Maximum Number of Minutes After Polls Closed	Number of Precincts with No Wait Time After Polls Closed	Average Number of Minutes After Polls Closed
Hillsborough	347	100	1	167	0	30.2

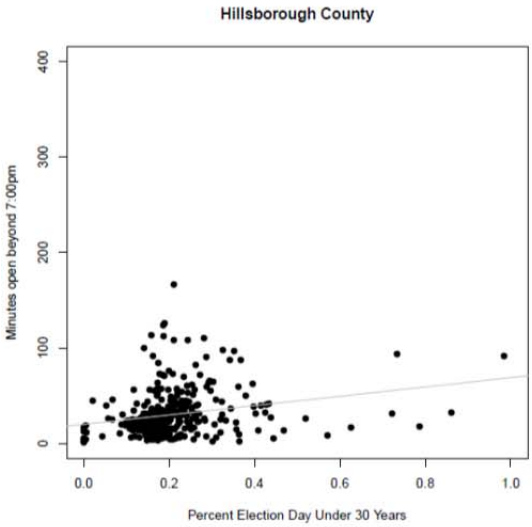
Plots using Hillsborough County's Optical Scan Shut Down Data

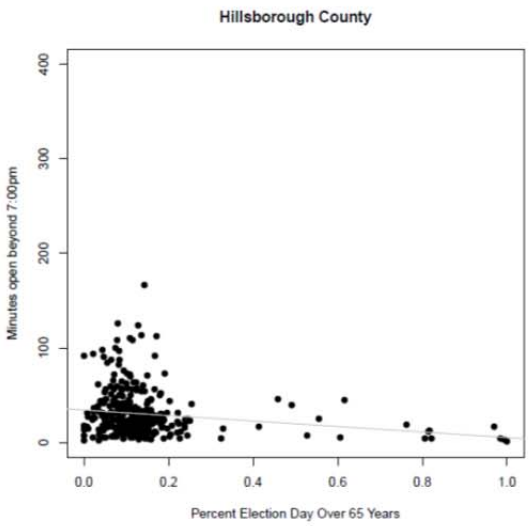


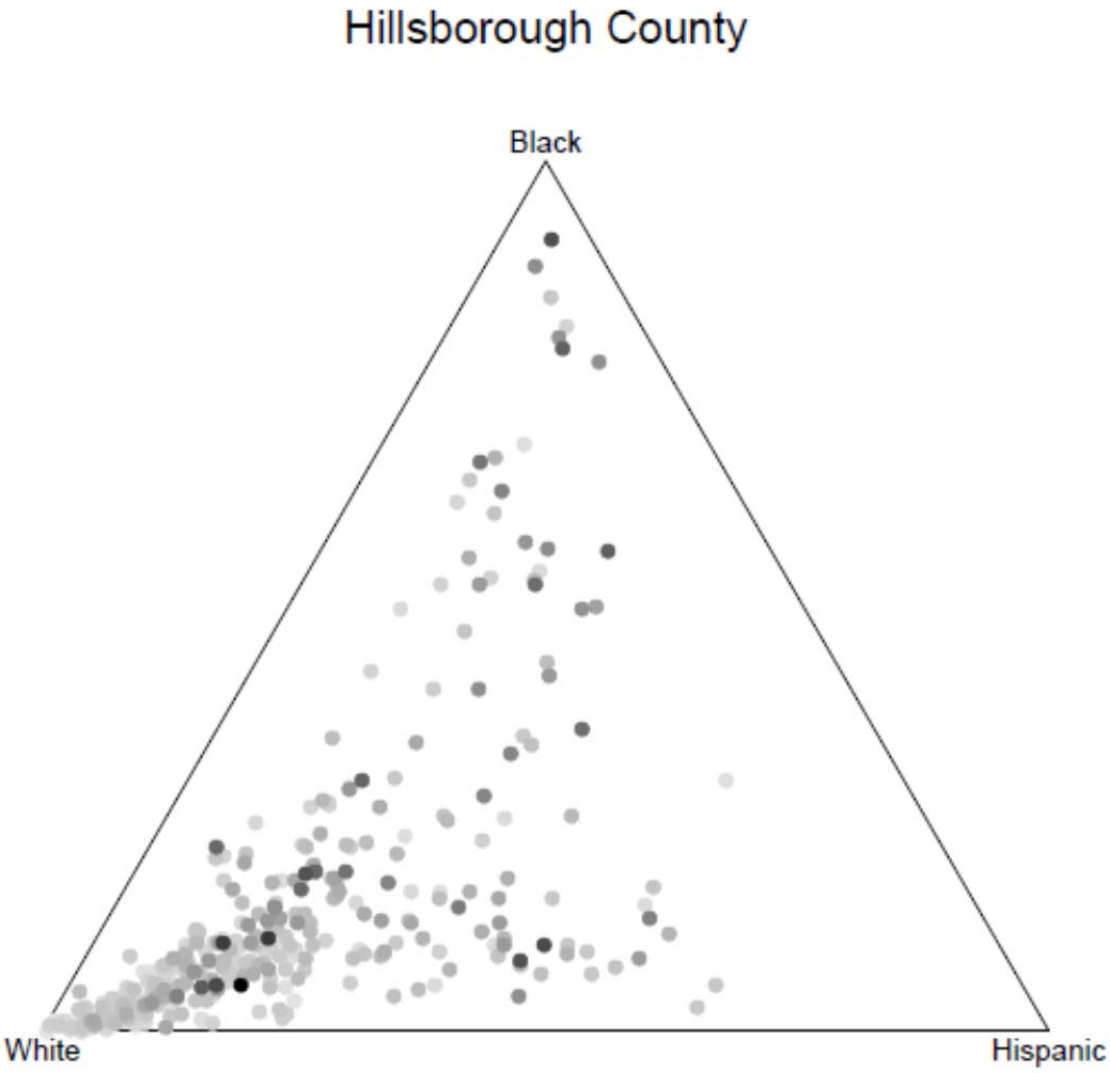











Hillsborough County
Black
White
Hispanic